DCS880

DCS880 Firmware manual

Table of contents

Parameters

What this chapter contains

The chapter describes the parameters and signals of the firmware.

Terms and abbreviations

Term	Definition
Signal	Type of parameter that is the result of a measurement or calculation by the drive, or contains status information. Most signals are read-only, but some (especially counter-type signals) can be reset.
Default (def.)	The default value of a parameter.
Scale/Fbeq16	16-bit fieldbus equivalent: The scaling between the value shown on the panel and the integer used in communication when a 16-bit value is selected for transmission to an external system. A dash (-) indicates that the parameter is not accessible in 16-bit format.
Other	The value is taken from another parameter. Choosing “Other” displays a parameter list in which the user can specify the source parameter.
Other [bit]	The value is taken from a specific bit in another parameter. Choosing “Other” displays a parameter list in which the user can specify the source parameter and bit.
Parameter	A user-adjustable operating instruction for the drive.
p.u.	Per unit

Summary of parameter groups

Group	Contents
01 Actual values	Basic signals for monitoring the drive.
03 Input references	Values of references received from various sources.
04 Warnings and faults	Information on warnings and faults that occurred last. For explanations of individual warning and fault codes.
05 Diagnostics	Various run-time-type counters and measurements related to drive maintenance.
06 Control and status words	Drive control, status and event words.
07 System info	The drive’s hardware and firmware information.
10 Standard DI, RO	Configuration of digital inputs and relay outputs.
11 Standard DIO, FI, FO	Configuration of digital input/outputs and frequency inputs/outputs.
12 Standard AI	Configuration of standard analog inputs.
13 Standard AO	Configuration of standard analog outputs.
14 I/O extension module 1	Configuration of I/O extension module 1.
15 I/O extension module 2	Configuration of I/O extension module 2.
16 I/O extension module 3	Configuration of I/O extension module 3.
19 I/O Operation mode	Selection of local and external control locations and operating modes.
20 Start/Stop/Direction	Start/Stop/Direction and run/start/jog enable signal source selection. Positive/Negative reference enable source selection. Breaker and acknowledge source selection.
21 Start/Stop mode	Start and stop modes, emergency stop mode and zero speed.
22 Speed reference selection	Speed reference selection and motor potentiometer settings.
23 Speed reference ramp	Speed reference ramp settings (programming of the acceleration and deceleration rates for the drive).
24 Speed reference conditioning	Speed error calculation, speed error window control configuration and speed error (Δn) step.
25 Speed control	Speed controller settings.
26 Torque reference chain	Settings for the torque reference chain.
27 Armature current control	Settings for the armature current control chain.
28 EMF and field current control	Settings for the EMF and field current control chain.
29 12-pulse/Hardparallel	Settings for 12-pulse and hardparallel.
30 Control limits	Drive operation limits.

31 Fault functions and fault levels	Configuration of external events. Selection of the drive behavior in fault situations.
32 Supervision	Configuration of signal supervision functions 1 … 3. Three values can be monitored. A warning or fault is generated whenever predefined limits are exceeded.
33 Generic timer & counter	Configuration of maintenance timers/counters.
35 Motor thermal protection	Motor thermal protection settings such as temperature measurement configuration and load curve definition.
36 Load analyzer	Peak value and amplitude logger settings.
37 User load curve	Settings for user load curve.
40 Process PID	Parameter values for process PID controller.
42 Shared motion (2nd motor)	Configuration of 2nd motor.
44 Mechanical brake control	Configuration of mechanical brake.
45 Energy efficiency	Settings for the energy saving calculators.
46 Monitoring/Scaling settings	Speed supervision settings, signal filtering and general scaling settings.
47 Data storage	Data storage parameters that can be written to and read from using other parameters' source and target settings.
49 Panel port communication	Communication settings for the control panel port on the drive.
50 Fieldbus adapter (FBA)l	Fieldbus communication configuration.
51 FBA A settings	Fieldbus adapter A configuration.
52 FBA A data in	Selection of data sent by fieldbus adapter A to the master (e.g. PLC).
53 FBA A data out	Selection of data sent by the master (e.g. PLC) to fieldbus adapter A.
54 FBA B settings	Description see group 51 FBA A settings.
55 FBA B data in	Description see group 52 FBA A data in.
56 FBA B data out	Description see group 53 FBA A data out.
58 Embedded fieldbus	Embedded fieldbus (EFB) configuration.
60 DDCS Communication	DDCS communication configuration.
61 D2D and DDCS transmit data	Defines the data sent from the drive to the DDCS/D2D link.
62 D2D and DDCS receive data	Defines the data sent from the DDCS/D2D link to the drive.
70 DCSLink Communication	Defines the DCSLink communication.
74 … 89 Application specific groups	Groups used for application programming.
90 Feedback selection	Motor and load feedback configuration.
91 Encoder module settings	Configuration of the encoder interface modules.
92 Encoder 1 configuration	Settings for encoder 1.
93 Encoder 2 configuration	Settings for encoder 2.
94 OnBoard speed feedback configuration	Settings for analog tacho and OnBoard encoder.
95 HW configuration	Various hardware-related settings.
96 System	Language selection; access levels; macro selection; parameter save and restore; control board reboot; user parameter sets; unit selection; data logger triggering; parameter checksum calculation; user lock.
99 Motor data	Motor configuration settings.

Parameter listing

01 Actual Values

Basic signals for monitoring the drive.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
01.01	**Used motor speed filtered**						
	Measured or EMF motor speed. Displays the measured or EMF motor speed depending on which feedback is used. See 90.41 M1 feedback selection. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	Rpm	See 46.02	y	n	Signal
01.02	**EMF speed filtered**						
	Motor speed calculated from EMF. Displays the motor speed calculated from EMF in rpm. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
01.03	**Tacho speed filtered**						
	OnBoard tacho speed. Displays the motor speed measured with OnBoard tacho in rpm. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
01.04	**OnBoard encoder speed filtered**						
	OnBoard encoder speed. Displays the motor speed measured with OnBoard encoder in rpm. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
01.05	**Encoder 1 speed filtered**						
	Encoder 1 speed. Displays the motor speed measured with encoder 1 in rpm. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
01.06	**Encoder 2 speed filtered**						
	Encoder 2 speed. Displays the motor speed measured with encoder 2 in rpm. A filter time constant is defined by 46.11 Filter time motor speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
01.07	**Speed change rate**						
	Rate of speed change. Displays the rate of motor speed change. Positive values indicate acceleration. Negative values indicate deceleration. See 31.31 Emergency ramp supervision, 31.32 Emergency ramp supervision delay, 31.33 Ramp stop supervision and 31.34 Ramp stop supervision delay.						
	-15000 … 15000	-	rpm/s	1 = 1 rpm/s	y	n	Signal
01.10	**Motor current in A**						
	Motor current. Measured motor current in amperes.						
	-32500 … 32500	-	A	1 = 1 A	y	n	Signal
01.17	**Motor torque filtered**						
	Filtered motor torque. Displays the filtered motor torque in percent of 99.02 M1 nominal torque. A filter time constant is defined by 46.13 Filter time motor torque. Is used for the EMF controller and the EMF feed forward.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
01.20	**Mains voltage in V**						
	Mains voltage. Measured mains voltage in volt. Filtered with 10 ms.						
	0.0 … 3250.0	-	V	10 = 1 V	y	n	Signal
01.21	**Armature voltage in V**						
	Armature voltage. Measured armature voltage in volt. Filtered with 10 ms. This value is also influenced by 95.34 DC voltage measurement adjust and 95.35 DC voltage measurement offset.						
	-3250.0 … 3250.0	-	V	10 = 1 V	y	n	Signal
01.24	**Output power in kW**						
	Output power. Measured output power in kW. The unit is selected by 96.02 Unit selection. A filter time constant is defined by 46.14 Filter time power output.						
	-32500 … 32500	-	kW or hp	1 = 1 kW or hp	y	n	Signal
01.25	**Output power**						
	Output power. Measured output power in percent of 99.03 M1nominal power.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
01.26	**Reactive power**						
	Reactive power. Measured reactive power in percent of 99.03 M1nominal power.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
01.29	**M1 field current in A**						
	Motor 1 field current Motor 1 measured field current in amps. Filtered with 500 ms.						
	-3250.0 … 3250.0	-	A	10 = 1 A	y	n	Signal
01.30	**M2 field current in A**						
	Motor 2 field current Motor 2 measured field current in amps. Filtered with 500 ms.						
	-3250.0 … 3250.0	-	A	10 = 1 A	y	n	Signal
01.40	**Drive current**						
	Drive current. Measured drive current in percent of 07.35 Drive DC current scaling set.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
01.41	**Reactive current**						
	Reactive motor current. Measured reactive motor current in percent of 99.11 M1 nominal current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
01.50	**Current ripple**						
	Armature current ripple output. Displays the armature current ripple monitor output in percent of 99.11 M1 nominal current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
01.51	**Current ripple filtered**						
	Filtered armature current ripple output. Displays the filtered armature current ripple monitor output in percent of 99.11 M1 nominal current. The filter time constant is 200 ms.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal

03 Input references

Values of references received from various sources.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
03.01	**Panel reference 1**						
	Panel reference 1. Displays the local reference given from the control panel or PC tool.						
	-100000.00 … 100000.00	-	-	1 = 10	y	n	Signal
03.05	**FBA A reference 1**						
	Fieldbus adapter A reference 1. Displays reference 1 received via fieldbus adapter A.						
	-100000.00 … 100000.00	-	-	See 50.04	y	n	Signal
03.06	**FBA A reference 2**						
	Fieldbus adapter A reference 2. Displays reference 2 received via fieldbus adapter A.						
	-100000.00 … 100000.00	-	-	See 50.05	y	n	Signal
03.07	**FBA B reference 1**						
	Fieldbus adapter B reference 1. Displays reference 1 received via fieldbus adapter B.						
	-100000.00 … 100000.00	-	-	See 50.34	y	n	Signal
03.08	**FBA B reference 2**						
	Fieldbus adapter B reference 2. Displays reference 2 received via fieldbus adapter B.						
	-100000.00 … 100000.00	-	-	See 50.35	y	n	Signal
03.09	**EFB reference 1**						
	Embedded fieldbus reference 1. Displays scaled reference 1 received via the embedded fieldbus interface. The scaling is defined by 58.26 EFB ref1 type.						
	-30000.00 … 30000.00	-	rpm	See 58.26	y	n	Signal
03.10	**EFB reference 2**						
	Embedded fieldbus reference 2. Displays scaled reference 2 received via the embedded fieldbus interface. The scaling is defined by 58.27 EFB ref2 type.						
	-30000.00 … 30000.00	-	rpm	See 58.27	y	n	Signal

04 Warnings and faults

Information on warnings and faults that occurred last. For explanations of individual warning and fault codes. See chapter Fault tracing.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.01	**Tripping fault**						
	1st active fault. Code of the 1st active fault (the fault that caused the current trip).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.02	**Active fault 2**						
	2nd active fault. Code of the 2nd active fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.03	**Active fault 3**						
	3rd active fault. Code of the 3rd active fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.04	**Active fault 4**						
	4th active fault. Code of the 4th active fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.05	**Active fault 5**						
	5th active fault. Code of the 5th active fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.06	**Active warning 1**						
	1st active warning. Code of the 1st active warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.07	**Active warning 2**						
	2nd active warning. Code of the 2nd active warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.08	**Active warning 3**						
	3rd active warning. Code of the 3rd active warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.09	**Active warning 4**						
	4th active warning. Code of the 4th active warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.10	**Active warning 5**						
	1st active warning. Code of the 1st active warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.11	**Latest fault**						
	1st stored fault. Code of the 1st stored (non-active) fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.12	**2nd latest fault**						
	2nd stored fault. Code of the 2nd stored (non-active) fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.13	**3rd latest fault**						
	3rd stored fault. Code of the 3rd stored (non-active) fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.14	**4th latest fault**						
	4th stored fault. Code of the 4th stored (non-active) fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.15	**5th latest fault**						
	5th stored fault. Code of the 5th stored (non-active) fault.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.16	**Latest warning**						
	1st stored warning. Code of the 1st stored (non-active) warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.17	**2nd latest warning**						
	2nd stored warning. Code of the 2nd stored (non-active) warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.18	**3rd latest warning**						
	3rd stored warning. Code of the 3rd stored (non-active) warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.19	**4th latest warning**						
	4th stored warning. Code of the 4th stored (non-active) warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.20	**5th latest warning**						
	5th stored warning. Code of the 5th stored (non-active) warning.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.21	**Fault word 1**						
	DCS800 compatible fault word 1. The bit assignments of this word correspond to *FaultWord1 (9.01)* in the DCS800. Each bit can indicate several DCS880 events as listed below. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F501 AuxUnderVolt	F501 Auxiliary undervoltage
1	F502 ArmOverCur	2310 Armature overcurrent
2	F503 ArmOverVolt	F503 Armature overvoltage
3	F504 ConvOverTemp	4310 Bridge temperature measured
4	F505 ResCurDetect	2330 Residual current detected
5	F506 M1OverTemp	4981 Motor temperature 1 measured/estimated
6	F507 M1OverLoad	4981 Motor temperature 1 measured/estimated
7	F508 I/OBoardLoss	7082 I/O extension communication
8	F509 M2OverTemp	4982 Motor temperature 2 measured/estimated
9	F510 M2OverLoad	4982 Motor temperature 2 measured/estimated
10	F511 ConvFanCur	-
11	F512 MainsLowVolt	3280 Mains low voltage
12	F513 MainsOvrVolt	F513 Mains overvoltage
13	F514 MainsNotSync	F514 Mains synchronization lost
14	F515 M1FexOverCur	F515 M1 field exciter overcurrent
15	F516 M1FexCom	F516 M1 field exciter communication

Index	Name / Text	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.22	**Fault word 2**	0000h … FFFFh	-	-	1 = 1	y	n	Signal

DCS800 compatible fault word 2.
The bit assignments of this word correspond to *FaultWord2 (9.02)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F517 ArmCurRipple	F517 Armature current ripple
1	F518 M2FexOverCur	F518 M2 field exciter overcurrent
2	F519 M2FexCom	F519 M2 field exciter communication
3	reserved	-
4	F521 FieldAck	F521 Field acknowledge missing
5	F522 SpeedFb	7301 Motor speed feedback, 73A1 Load speed feedback
6	F523 ExtFanAck	71B1 Motor fan acknowledge
7	F524 MainContAck	F524 Main contactor acknowledge
8	F525 TypeCode	50FE Type code
9	F526 ExternalDI	9081 External fault 1 … 9085 External fault 5
10	F527 ConvFanAck	5080 Drive fan acknowledge
11	F528 FieldBusCom	6681 EFB communication, 7510 FBA A communication, 7520 FBA B communication
12	F529 M1FexNotOK	F529 M1 field exciter not OK
13	F530 M2FexNotOK	F530 M2 field exciter not OK
14	F531 MotorStalled	7121 Motor stall
15	F532 MotOverSpeed	7310 Overspeed

Index	Name / Text	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.23	**Fault word 3**							

DCS800 compatible fault word 3.
The bit assignments of this word correspond to *FaultWord3 (9.03)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F533 12PRevTime	F533 12-pulse reversal timeout
1	F534 12PCurDiff	F534 12-pulse current difference
2	F535 12PulseCom	F535 12-pulse communication
3	F536 12PSlaveFail	F536 12-pulse slave
4	F537 M1FexRdyLost	F537 M1 field exciter ready lost
5	F538 M2FexRdyLost	F538 M2 field exciter ready lost
6	F539 FastCurRise	F539 Fast current rise
7	F540 COM8Faulty	-
8	F541 M1FexLowCur	F541 M1 field exciter low current
9	F542 M2FexLowCur	F542 M2 field exciter low current
10	F543 COM8Com	7581 DDCS controller communication, 7582 Master-follower communication
11	F544 P2PandMFCom	F544 P2P and M/F communication
12	F545 ApplLoadFail	64A3 Application loading
13	F546 LocalCmdLoss	7081 Control panel/PC tool link communication
14	F547 HwFailure	F547 Drive hardware
15	F548 FwFailure	6000 Internal firmware

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.24 Fault word 4

DCS800 compatible fault word 4.
The bit assignments of this word correspond to *FaultWord4 (9.04)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F549 ParComp	
1	F550 ParMemRead	64B2 User set fault
2	F551 AIRange	80A0 AI supervision
3	F552 MechBrake	71A2 Mechanical brake not closed, 71A3 Mechanical brake not opened, 71A5 Mechanical brake opening not allowed
4	F553 TachPolarity	7381 Speed feedback device
5	F554 TachoRange	7381 Speed feedback device
6	reserved	-
7	F556 TorqProving	F556 Torque proving
8	F557 ReversalTime	F557 Reversal time
9	reserved	-
10	reserved	-
11	F601 APFault1	-
12	F602 APFault2	-
13	F603 APFault3	-
14	F604 APFault4	-
15	F605 APFault5	-

0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.25 User fault word

DCS800 compatible user fault word.
The bit assignments of this word correspond to *UserFaultWord (9.05)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F610 UserFault1	-
1	F611 UserFault2	-
2	F612 UserFault3	-
3	F613 UserFault4	-
4	F614 UserFault5	-
5	F615 UserFault6	-
6	F616 UserFault7	-
7	F617 UserFault8	-
8	F618 UserFault9	-
9	F619 UserFault10	-
10	F620 UserFault11	-
11	F621 UserFault12	-
12	F622 UserFault13	-
13	F623 UserFault14	-
14	F624 UserFault15	-
15	F625 UserFault16	-

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.26 M1 field exciter fault word

DCS800 compatible motor 1 field exciter fault word.
The bit assignments of this DCS880 word and the DCS800 word *M1FexFaultWord (9.18)* are the same.
Bit assignment:

Bit	DCS880/DCS800 fault name
0	DCSLink communication
1	Supply voltage synchronization
2	Overcurrent
3	Fast supply voltage rise
4	AC supply voltage < 30 V_{AC}
5	AC supply voltage > 650 V_{AC}
6	reserved
7	reserved
8	Temperature heatsink
9	Parameter flash read fault
10	Compatibility
11	Auxiliary voltage
12	reserved
13	General hardware
14	General firmware
15	reserved

Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.27 M2 field exciter fault word

DCS800 compatible motor 2 field exciter fault word.
The bit assignments of this DCS880 word and the DCS800 word *M2FexFaultWord (9.20)* are the same.
Bit assignment:

Bit	DCS880/DCS800 fault name
0	DCSLink communication
1	Supply voltage synchronization
2	Overcurrent
3	Fast supply voltage rise
4	AC supply voltage < 30 V_{AC}
5	AC supply voltage > 650 V_{AC}
6	reserved
7	reserved
8	Temperature heatsink
9	Parameter flash read fault
10	Compatibility
11	Auxiliary voltage
12	reserved
13	General hardware
14	General firmware
15	reserved

Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.31	**Warning word 1**						

DCS800 compatible warning word 1.
The bit assignments of this word correspond to *AlarmWord1 (9.06)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 warning name	DCS880 events indicated by this bit
0	A101 Off2ViaDI	AFE1 Off 2 (emergency off)
1	A102 Off3ViaDI	AFE2 Off 3 (emergency stop)
2	A103 DC BreakAck	A103 DC-breaker acknowledge
3	A104 ConvOverTemp	A4B0 Bridge temperature measured, A581 Drive fan acknowledge
4	A105 DynBrakeAck	A105 Dynamic braking acknowledge
5	A106 M1OverTemp	A491 Motor temperature 1 measured/estimated
6	A107 M1OverLoad	A491 Motor temperature 1 measured/estimated
7	reserved	-
8	A109 M2OverTemp	A492 Motor temperature 2 measured/estimated
9	A110 M2OverLoad	A492 Motor temperature 2 measured/estimated
10	A111 MainsLowVolt	A111 Mains low voltage
11	A112 P2PandMFCom	A112 P2P and M/F communication
12	A113 COM8Com	A7CA DDCS controller communication, A7CB Master-follower communication
13	A114 ArmCurDev	A114 Armature current deviation
14	A115 TachoRange	A7E1 Speed feedback device
15	A116 BrakeLongFalling	A116 Brake long falling

Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
04.32	**Warning word 2**						

DCS800 compatible warning word 2.
The bit assignments of this word correspond to *AlarmWord2 (9.07)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 warning name	DCS880 events indicated by this bit
0	A117 ArmCurRipple	A117 Armature current ripple
1	A118 FoundNewAppl	A118 Application
2	A119 ApplDiff	A118 Application
3	A120 OverVoltProt	A120 Overvoltage protection active
4	A121 AutotuneFail	AF90 Autotuning
5	A122 MechBrake	A7A1 Mechanical brake not closed, A7A2 Mechanical brake not opened, A7A5 Mechanical brake opening not allowed
6	A123 FaultSuppres	-
7	A124 SpeedScale	A7E1 Speed feedback device
8	A125 SpeedFb	A7B0 Motor speed feedback, A7B1 Load speed feedback
9	A126 ExternalDI	A981 External warning 1 … External Warning 5 A985
10	A127 AIRange	A8A0 AI supervision
11	A128 FieldBusCom	A7C1 FBA A communication, A7C2 FBA B communication, A7CE EFB communication
12	A129 ParRestored	-

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	13 A130 LocalCmdLoss — A7EE Control panel/PC tool link communication 14 A131 ParAdded — - 15 A132 ParConflict — A132 Parameter setting conflict						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.33	**Warning word 3**						

DCS800 compatible warning word 3.
The bit assignments of this word correspond to *AlarmWord3 (9.08)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 warning name	DCS880 events indicated by this bit
0	A133 RetainInv	-
1	A134 ParComp	-
2	A135 ParUpDwnLoad	-
3	A136 NoAPTaskTime	-
4	A137 SpeedNotZero	A137 Speed not zero
5	A138 Off2FieldBus	AFE1 Off 2 (emergency off)
6	A139 Off3FieldBus	AFE2 Off 3 (emergency stop)
7	A140 IllgFieldBus	A6D1 FBA A parameter conflict, A6D2 FBA B parameter conflict
8	A141 COM8FwVer	-
9	A142 MemCardMiss	FB11 Memory unit missing
10	A143 MemCardFail	FB12 Memory unit incompatible, FB13 Memory unit, firmware incompatible, FB14 Memory unit, firmware load failed
11	A301 APWarning1	-
12	A302 APWarning2	-
13	A303 APWarning3	-
14	A304 APWarning4	-
15	A305 APWarning5	-

	0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.34 Warning word 4

Warning word 4.
DCS880 warning word. Each bit indicates a certain warning as listed below.
Bit assignment:

Bit	DCS800 warning name	DCS880 events indicated by this bit
0	reserved	
1	reserved	
2	reserved	
3	reserved	
4	reserved	
5	reserved	
6	reserved	
7	reserved	
8	reserved	
9	reserved	
10	reserved	
11	reserved	
12	reserved	

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	13 reserved						
	14 reserved						
	15 reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.35 User warning word

DCS800 compatible user warning word.
The bit assignments of this word correspond to *UserAlarmWord (9.09)* in the DCS800. Each bit can indicate several DCS880 events as listed below.
Bit assignment:

Bit	DCS800 fault name	DCS880 events indicated by this bit
0	F310 UserWarning1	-
1	F311 UserWarning1	-
2	F312 UserWarning2	-
3	F313 UserWarning3	-
4	F314 UserWarning4	-
5	F315 UserWarning5	-
6	F316 UserWarning6	-
7	F317 UserWarning7	-
8	F318 UserWarning8	-
9	F319 UserWarning9	-
10	F320 UserWarning10	-
11	F321 UserWarning11	-
12	F322 UserWarning12	-
13	F323 UserWarning13	-
14	F324 UserWarning14	-
15	F325 UserWarning16	-

0000h … FFFFh	-	-	1 = 1	y	n	Signal

04.36 M1 field exciter warning word

DCS800 compatible motor 1 field exciter warning word.
The bit assignments of this DCS880 word and the DCS800 word *M1FexAlarmWord (9.17)* are the same.
Bit assignment:

Bit	DCS880/DCS800 warning name
0	Phase missing
1	Temperature heatsink
2	reserved
3	reserved
4	reserved
5	Parameters added
6	Parameter up- or download failed
7	Compatibility
8	Parameters restored
9	reserved
10	reserved
11	reserved
12	reserved
13	reserved
14	reserved

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	15 Reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
04.37	**M2 field exciter warning word**						
	DCS800 compatible motor 2 field exciter warning word. The bit assignments of this DCS880 word and the DCS800 word *M2FexAlarmWord (9.19)* are the same. Bit assignment:						

Bit	DCS880/DCS800 warning name
0	Phase missing
1	Temperature heatsink
2	reserved
3	reserved
4	reserved
5	Parameters added
6	Parameter up- or download failed
7	Compatibility
8	Parameters restored
9	reserved
10	reserved
11	reserved
12	reserved
13	reserved
14	reserved
15	Reserved

	0000h … FFFFh	-	-	1 = 1	y	n	Signal

05 Diagnostics

Various run-time-type counters and measurements related to drive maintenance.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
05.01	**On-time counter**						
	On-time counter. The counter runs when the drive is powered.						
	0 … 65535	-	d	1 = 1 d	y	n	Signal
05.02	**Run-time counter**						
	Motor run-time counter. The counter runs when the drive is in state ready for reference. See 06.15.b02 Main Status Word.						
	0 … 65535	-	d	1 = 1 d	y	n	Signal
05.04	**Fan on-time counter**						
	Drive fan cooling run-time counter. Displays the running time of the drives cooling fan. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 65535	-	d	1 = 1 d	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
05.10	**Control board temperature**						
	Control board temperature. Measured temperature of the control board. The unit is selected by 96.02 Unit selection.						
	-80 … 1000	-	°C or °F	1 = 1°C or °F	y	n	Signal
05.11	**Bridge temperature**						
	Bridge temperature. Measured bridge temperature. The unit is selected by 96.02 Unit selection.						
	-80 … 1000	-	°C or °F	1 = 1°C or °F	y	n	Signal

05.22 Diagnostic

Attention: 05.22 Diagnostic is set to zero by means of Reset.
Displays the diagnostics messages:

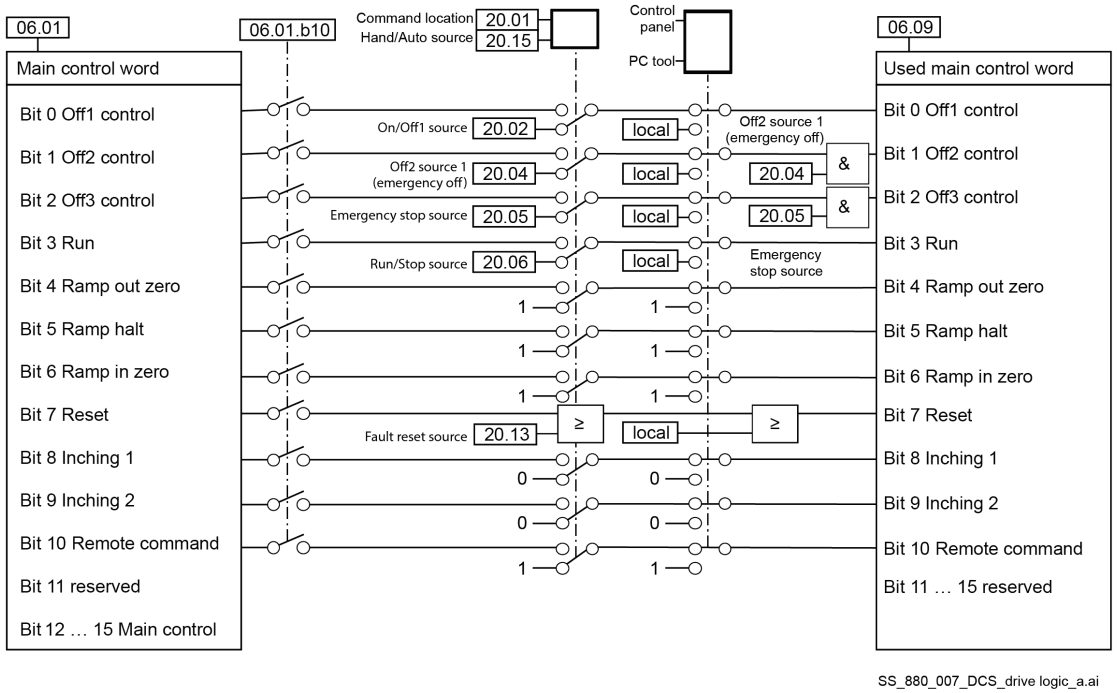
0	No message
Thyristor diagnostic	
90	Short circuit caused by V1 (V11).
91	Short circuit caused by V2 (V12).
92	Short circuit caused by V3 (V13).
93	Short circuit caused by V4 (V14).
94	Short circuit caused by V5 (V15).
95	Short circuit caused by V6 (V16).
96	Thyristor block test failed.
97	Short circuit caused by V15 or V22.
98	Short circuit caused by V16 or V23.
99	Short circuit caused by V11 or V24.
100	Short circuit caused by V12 or V25.
101	Short circuit caused by V13 or V26.
102	Short circuit caused by V14 or V21.
103	Motor connected to ground.
104	Armature winding is not connected.
1000	Possibly trigger pulse channels are mixed up.
1xdd	V1 or V11 not conducting.
2xdd	V2 or V12 not conducting.
3xdd	V3 or V13 not conducting.
4xdd	V4 or V14 not conducting.
5xdd	V5 or V15 not conducting.
6xdd	V6 or V16 not conducting.
Example	– x = 0: Only a single thyristor in bridge 1 is not conducting (e.g. 320dd means V2 respectively V12 is not conducting). – x = 1 … 6: Additionally a second thyristor in bridge 1 is no conducting (e.g. 325dd means V2 and V5 respectively V12 and V15 are not conducting). – dd = don't care: The numbers of this digits do not carry any information about the thyristors of the first bridge. Thus, 36030 means V16 in bridge 1 and V23 in bridge 2 are not conducting.
dd1y	V21 not conducting.
dd2y	V22 not conducting.
dd3y	V23 not conducting.
dd4y	V24 not conducting.
dd5y	V25 not conducting.
dd6y	V26 not conducting.
Example	– y = 0: Only a single thyristor in bridge 2 is not conducting (e.g. 3dd20 means V22 is not conducting).

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	– y = 1 … 6: Additionally a second thyristor in bridge 2 is no conducting (e.g. 3dd25 means V22 and V25 are not conducting). – dd = don't care: The numbers of this digits do not carry any information about the thyristors of the second bridge. Thus, 36030 means V16 in bridge 1 and V23 in bridge 2 are not conducting.						
	0 … 65535	-	-	1 = 1	y	n	Signal
05.41	**Main fan service counter**						
	Main cooling fan age. Displays the age of the main cooling fan as a percentage of its estimated lifetime. The estimate is based on the duty, operating conditions and other operating parameters of the fan. When the counter reaches 100 %, warning A8C0 Fan service counter is generated. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 150	-	%	1 = 1 %	y	n	Signal
05.42	**Auxiliary fan service counter**						
	Auxiliary cooling fan age. Displays the age of the auxiliary cooling fan as a percentage of its estimated lifetime. The estimate is based on the duty, operating conditions and other operating parameters of the fan. When the counter reaches 100 %, warning A8C0 Fan service counter is generated. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 150	-	%	1 = 1 %	y	n	Signal

06 Control and status words

Drive control, status and event words.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Drive logic:						



Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
06.01	**Main control word**						

Main control word.
Displays the main control word of the drive. This signal shows the control signals as received from the selected sources, such as digital inputs, the fieldbus interfaces and the application program. See 06.08 Main control word source.
Attention:
Do not write on this signal.
Bit assignment:

Bit	Name	Value	Remarks
0	Off1 control	1	On command to Ready run state. With 20.33 Mains contactor control mode = On: Contactors are closed, field exciter and fans are started. With 20.33 Mains contactor control mode = On and run: Ready run flag in 06.15 Main Status Word is forced to 1.
		0	Off1 command to Ready on state, unless other interlocks (Off2, Off3) are active. Stopping via 21.02 Off1 mode.
1	Off2 control	1	Normal operation (Off2 inactive).
		0	Off2 (emergency off/electrical disconnect/fast current off) command to Switch-on inhibited state. Stop by coasting. The firing pulses are immediately set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked, the contactors are opened, field exciter and fans are stopped. Off2 control has priority over Off3 control and Off1 control.
2	Off3 control	1	Normal operation (Off3 inactive).
		0	Off3 (emergency stop) command to Switch-on inhibited state. Stopping via 21.03 Emergency stop mode. Off3 control has priority over Off1 control.
3	Run	1	Run command to Ready for reference state. The firing pulses are released and the drive is running with the selected speed reference.
		0	Stop command to Ready run state. Stop via 21.04 Stop mode from 21.03.
4	Ramp out zero	1	Normal operation. Speed ramp output is enabled.
		0	Force speed ramp output to zero. The drive will immediately decelerate to zero speed.
5	Ramp halt	1	Normal operation. Speed ramp output is enabled.
		0	Halt (freeze) speed ramp output.
6	Ramp in zero	1	Normal operation. Speed ramp input is enabled.
		0	Force speed ramp input to zero
7	Reset	0 → 1	Acknowledge fault indications with the positive edge.
8	Inching 1	1	Constant speed defined by 22.42 Jogging 1 reference, active only with 20.01 Command location = Main control word. Set Ramp out zero = Ramp hold = Ramp in zero = 0, then give On command and Run command. If both Inching 1 and 2 are activated, the one that was activated first has priority.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	9 Inching 2 — 1: Constant speed defined by 22.43 Jogging 2 reference, active only with 20.01 Command location = Main control word. Set Ramp out zero = Ramp hold = Ramp in zero = 0, then give On command and Run command. If both Inching 1 and 2 are activated, the one that was activated first has priority.						
	10 Remote command — 1: Enable command: Overriding control enabled (overriding control has to set this bit to 1).						
	10 Remote command — 0: Disable command: Main control word and references are not getting through to the drive. Bits 0 … 2 and the main control bits 12 … 15 are not affected.						
	11 reserved						
	12 Main control 12 — 1 / 0: Used by Adaptive Program, application program or overriding control as signal source for binary-source selector parameters.						
	13 Main control 13 — 1 / 0						
	14 Main control 14 — 1 / 0						
	15 Main control 15 — 1 / 0						
	Bits 12 … 15 can be used to carry additional control data. E.g. as signal source for binary-source selector parameters (see: Other [bit], source selection).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
06.02	**Application control word**						
	Application program control word. The drive control word received from the application program.						
	0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter
06.03	**FBA A transparent control word**						
	Displays the unaltered control word received from the PLC via fieldbus adapter A when a transparent communication profile is selected. See group 51 FBA A settings.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.04	**FBA B transparent control word**						
	Displays the unaltered control word received from the PLC via fieldbus adapter A when a transparent communication profile is selected. See group 54 FBA B settings.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.05	**EFB transparent control word**						
	Displays the unaltered control word received from the PLC via the embedded fieldbus interface when a transparent communication profile is selected in 58.25 Control profile.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.06	**Follower control word**						
	Follower control word to followers (master only). Displays 06.06 Follower control word send by the master, using D2D link, to 06.07 Follower control word received in all followers. Bit assignment:						

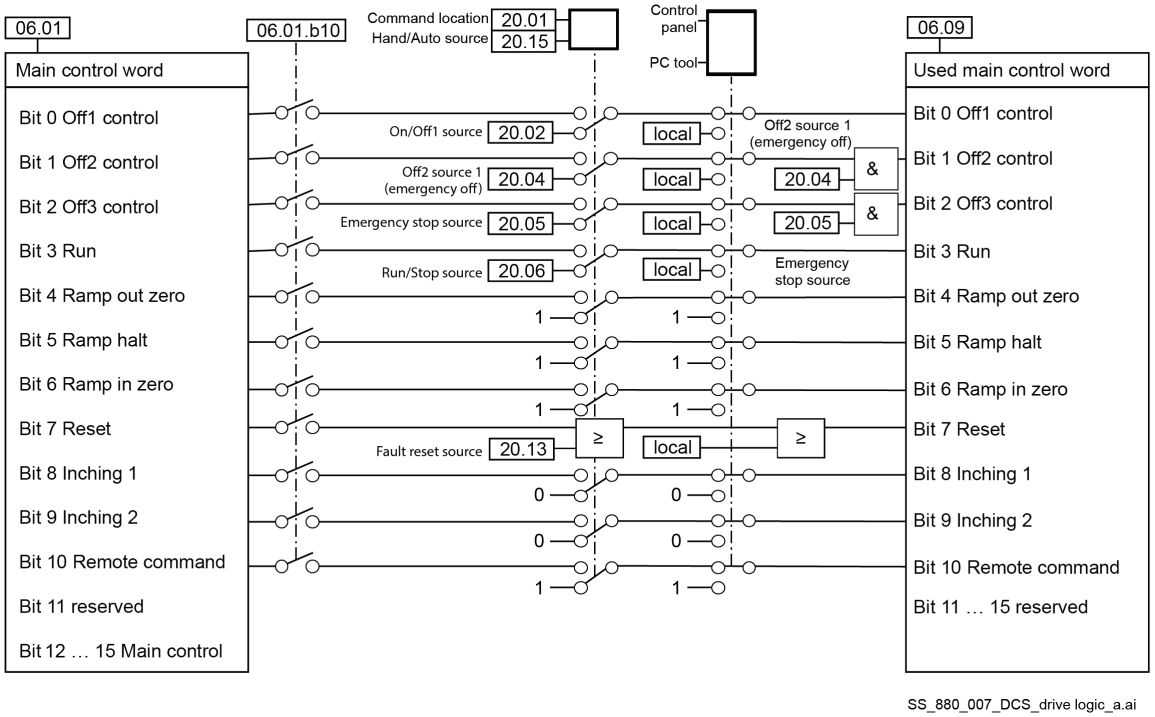
Bit	Name	Value	Remarks
0	Off1 control	1	On command and no active fault in the master to Ready run state. With 20.33 Mains contactor control mode = On:

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

			Contactors are closed, field exciter and fans are started. With 20.33 Mains contactor control mode= On and run: Ready run flag in 06.15 Main Status Word is forced to 1.
		0	Off1 command or active fault in the master to Ready on state, unless other interlocks (Off2, Off3) are active. Stopping via 21.02 Off1 mode.
1	Off2 control	1	Normal operation (Off2 inactive).
		0	Off2 (emergency off/fast current off) command to Switch-on inhibited state. Stop by coasting. The firing pulses are immediately set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked, the contactors are opened, field exciter and fans are stopped. Off2 control has priority over Off3 control and Off1 control.
2	Off3 control	1	Normal operation (Off3 inactive).
		0	Off3 (emergency stop) command to Switch-on inhibited state. Stopping via 21.03 Emergency stop mode. Off3 control has priority over Off1 control.
3	Run and no fault in master	1	Run command and no active fault in the master to Ready for reference state. The firing pulses are released and the drive is running with the selected speed reference.
		0	Stop command or active fault in the master to Ready run state. Stop via 21.04 Stop mode from 21.03.
4	Ramp out zero	1	Normal operation. Speed ramp output is enabled.
		0	Force speed ramp output to zero. The drive will immediately decelerate to zero speed.
5	Ramp halt	1	Normal operation. Speed ramp output is enabled.
		0	Halt (freeze) speed ramp output.
6	Ramp in zero	1	Normal operation. Speed ramp input is enabled.
		0	Force speed ramp input to zero
7	Reset	0 → 1	Acknowledge fault indications with the positive edge.
8	Inching 1	1	Constant speed defined by 22.42 Jogging 1 reference, active only with 20.01 Command location = Main control word. Set Ramp out zero = Ramp hold = Ramp in zero = 0, then give On command and Run command. If both Inching 1 and 2 are activated, the one that was activated first has priority.
9	Inching 2	1	Constant speed defined by 22.43 Jogging 2 reference, active only with 20.01 Command location = Main control word. Set Ramp out zero = Ramp hold = Ramp in zero = 0, then give On command and Run command. If both Inching 1 and 2 are activated, the one that was activated first has priority.
10	Remote command	1	Enable command: Overriding control enabled (overriding control has to set this bit to 1).
		0	Disable command: Main control word and references are not getting through to the drive. Bits 0 … 2 and the follower control bits 12 … 15 are not affected.
11	reserved		

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	12 Master warning/fault: 1 = See 06.45 Follower CW user bit 0 sel. Warning/Fault active in the master.; 0 = Warning/Fault inactive in the master.						
	13 Follower control 13: 1 / 0 = See 06.46 Follower CW user bit 1 sel.						
	14 Follower control 14: 1 / 0 = See 06.47 Follower CW user bit 0 sel.						
	15 Follower control 15: 1 / 0 = See 06.48 Follower CW user bit 0 sel.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
06.07	**Follower control word received**						
	Follower control word received from master (followers only). Displays 06.06 Follower control word send by the master, using D2D link, to 06.07 Follower control word received in all followers. Bit assignment see 06.06 Follower control word.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
06.08	**Main control word source**						
	Selects the source for 06.01 Main control word. Other; source selection. 0: **None**; inactive. All bits are forced to zero. 1: **FBA A**; 06.03 FBA A transparent control word. 2: **FBA B**; 06.04 FBA B transparent control word. 3: **EFB**; 06.05 EFB transparent control word. 4: **Application**; 06.02 Application control word. 5: **Follower**; 06.07 Follower control word received (follower only). 6: **User 1**; 06.100 User control word 1. 7: **User 2**; 06.101 User control word 2.						
	0 … 7	None	-	1 = 1	n	y	Parameter
06.09	**Used main control word**						
	Used main control word. Displays the main control word used by the internal drive logic. The selection is depending on the drives local/remote control setting, 20.01 Command location and 20.15 Hand/Auto source.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type



Bit assignment see 06.01 Main control word. Bits 11 … 15 are reserved.

0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.10 Auxiliary control word 1

Auxiliary control word 1.
The auxiliary control word 1 can be written to by Adaptive Program, application program or overriding control.
Bit assignment:

Bit	Name	Value	Remarks
0	Direct speed reference	1	The speed ramp output is overwritten and forced to 23.32 Direct speed reference.
		0	Speed ramp is active.
1	Drive direction	1	Drive direction reverse (see note 1), changes the signs of 24.02 Used speed feedback and 27.01 Current reference.
		0	Drive direction forward (see note 1).
2	Limit used speed reference	1	24.01 Used speed reference is not limited.
		0	24.01 Used speed reference is limited by 30.11 M1 minimum speed, 30.12 M1 maximum speed or by 42.21 M2 minimum speed, 42.22 M2 maximum speed.
3	reserved		
4	Bypass speed ramp	1	Bypass speed ramp (speed ramp output is forced to value of speed ramp input).
5	reserved		
6	Halt speed controller	1	Halt (freeze) the speed controller integration time.
7	Reset speed controller	1	Reset the speed controller integration time.
8	Limit speed controller	1	No back calculation of the speed controller torque limitation. The speed controller output can run to the

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

			settings of 30.13 Speed control min torque or 30.14 Speed control max torque. This is typically used for winders.
		0	Back calculation of the speed controller torque limitation. The speed controller integration time is limited by torque or current limits. See 30.02 Torque limit status.
9	reserved		
10	Force max firing angle	1	Force single firing pulses to suppress the DC current and set the firing angle to 30.45 Maximum firing angle.
		0	Normal firing pulses released.
11	reserved		
12	Aux. control 12	1	Used by Adaptive Program, application program or overriding control as signal source for binary-source selector parameters.
		0	
13	Aux. control 13	1	
		0	
14	Aux. control 14	1	
		0	
15	Aux. control 15	1	
		0	

Note 1: Changes of Drive direction become active only in drive state Ready run. Changing the speed direction of a running drive (Ready for reference state) by means of Drive direction is not possible.
Note 2: Bits 12 … 15 can be used to carry additional control data. E.g. as signal source for binary-source selector parameters (see: Other [bit], source selection).

0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter

06.11 Auxiliary control word 2

Auxiliary control word 2.
The auxiliary control word 2 can be written to by Adaptive Program, application program or overriding control.
Bit assignment:

Bit	Name	Value	Remarks
0	Dynamic braking on	1	Force dynamic braking regardless from settings of 19.20 Follower force ramp stop, 21.02 Off1 mode, 21.03 Emergency stop mode or 21.04 Stop mode.
1	reserved		
2	Synchronizing command	1	Positioning: Synchronizing command from overriding control for OnBoard encoder, encoder 1 or encoder 2. See 90.86 Pos counter init cmd source (trigger) and 90.51 Load feedback selection.
3	reserved		
4	Torque proving OK	1	Selected motor torque proving is OK. This bit to be set by Adaptive Program, application program or overriding control. See 44.19 M1 brake torque proving time.
		0	Selected motor torque proving is inactive. This bit is to be set by Adaptive Program, application program or overriding control.
5	Reset torque memory	1	Reset torque memory. Valid only if 44.09 M1 brake open torque source = Brake torque memory.
6	reserved		

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	7 Suppress armature current deviation: 1 = A114 Armature current deviation is blocked. See 04.31.12 Warning word 1. Usually used for non-motoric applications.						
	7 Suppress armature current deviation: 0 = A114 Armature current deviation is released. See 04.31.12 Warning word 1						
	8 … 15 reserved						
	0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter

06.15 Main status word

Main status word.
Displays the main status word of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	Ready on	1	Ready to be switched on.
		0	Not ready to be switched on.
1	Ready run	1	Ready to operate.
		0	Not ready to operate e.g. Off1 active.
2	Ready reference	1	Operation enabled (drive is running).
		0	Operation inhibited.
3	Tripped	1	Fault.
		0	No fault.
4	Off2 status	1	Off2 inactive.
		0	Off2 active (emergency off/fast current off), Switch-on inhibited state.
5	Off3 status	1	Off3 inactive.
		0	Off3 active (emergency stop), Switch-on inhibited state.
6	Switch-on inhibited	1	Switch-on inhibited state is active after: – Fault. – Off2 (emergency off/fast current off) active. – Off3 (emergency stop) active. – Switch-on inhibited via digital input 20.04 Off2 source 1 (emergency off), 20.08 Off2 source 2 (emergency off) or 20.05 Emergency stop source.
		0	Switch-on inhibited state inactive.
7	Warning	1	Warning.
		0	No warning.
8	At setpoint	1	Setpoint: The feedback value equals the reference. Means it is within the tolerance limits. See 46.21 At speed hysteresis and 46.23 At torque hysteresis feedback.
		0	Setpoint: The feedback value differs from the reference. Means it is outside the tolerance limits. See 46.21 At speed hysteresis and 46.23 At torque hysteresis feedback.
9	Remote	1	Drive control location: Remote.
		0	Drive control location: Local.
10	Above level	1	See 06.29 MSW bit 10 sel. Speed or torque feedback equals or exceeds levels defined by 46.31 Above speed level or 46.33 Above torque level. Valid in both rotation directions.
		0	Within speed or torque levels.
11	Status control 11	1	See 06.30 MSW bit 11 sel.
		0	
12		1	See 06.31 MSW bit 12 sel.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

	Status control 12	0	
13	Status control 13	1 0	See 06.32 MSW bit 13 sel.
14	Status control 14	1 0	See 06.33 MSW bit 14 sel.
15	reserved		

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.16 Drive status word 1

Drive status word 1.
Displays the drive status word 1.
Bit assignment:

Bit	Name	Value	Remarks
0	Tripped	1	Drive is tripped.
1	Inhibited	1	Start inhibited. See 06.19 Drive inhibit status word 2 and 06.20 Run inhibit status word for the source of the inhibiting signal.
2	Enabled	1	20.08 Off2 source 2 (emergency off) is set to 1 = Off2 inactive. This bit is not affected by the presence of a fault.
3	Ready on	1	Drive is ready to receive an On command.
4	Ready run	1	Drive is ready to receive a Run command.
5	Ready reference	1	Drive is ready to receive a reference (drive is running).
6	Stopping	1	Drive is stopping.
7	Off	1	Drive is off.
8	Off2	1	Off2 active (emergency off/fast current off), Switch-on inhibited state.
9	Off3	1	Off3 active (emergency stop), Switch-on inhibited state.
10	On requested	1	An On command was given.
11	Run requested	1	A Run command was given.
12	Limiting	1	One operating limit (speed, torque, etc.) is active. See 30.01 Limit word 1 and 30.02 Torque limit status.
13	Field current	1	Drive is generating field current.
14	Local control	1	Drive is in local control.
15	Network control	1	Drive is in network control. With fieldbus protocols based on the Common Industrial Protocol (CIPTM), such as DeviceNet and Ethernet/IP, denotes the control of the drive using the Net Ctrl and Net Ref objects of the ODVA AC/DC Drive Profile. For more information, see www.odva.org, and the following manuals: – FDNA-01 DeviceNet adapter module User's manual (3AFE68573360 [English]). – FENA-01/-11 Ethernet adapter module User's manual (3AUA0000093568 [English])

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.17 Drive status word 2

Drive status word 2.
Displays the drive status word 2.
Bit assignment:

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

Bit	Name	Value	Remarks
0	Autotuning	1	The requested autotuning has been finished.
1	reserved		
2	Torque control	1	Torque control mode active.
3	Speed control	1	Speed control mode active.
4	reserved		
5	Safe reference	1	A safe speed reference is active. See functions such as 49.05 Communication loss action and 50.02 FBA A comm loss func.
6	Last speed	1	A last speed reference is active. See functions such as 49.05 Communication loss action and 50.02 FBA A comm loss func.
7	Loss of reference	1	Reference signal lost.
8	Emergency stop failed	1	Emergency stop failed. See 31.31 Emergency ramp supervision and 31.32 Emergency ramp supervision delay.
9	Jogging	1	Jogging is enabled. See 20.25 Jogging enable.
10	Above level	1	Speed or torque feedback equals or exceeds levels defined by 46.31 Above speed level or 46.33 Above torque level. Valid in both rotation directions.
11	Emergency stop	1	An emergency stop command signal is active or the drive is stopping after receiving an emergency stop command.
12	Reduced run	1	Reduced run active. See section Reduced run function.
13	reserved		
14	Ramp stop failed	1	Ramp stop failed. See 31.33 Ramp stop supervision and 31.34 Ramp stop supervision delay.
15	reserved		

0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.18 Drive status word 3

Drive status word 3.
Displays the drive status word 3.
Bit assignment:

Bit	Name	Value	Remarks
0	M1 field exciter	1	Motor 1 field exciter acknowledged.
1	M2 field exciter	1	Motor 2 field exciter acknowledged.
2	M1 field heating	1	Motor 1 field heating is active. See 28.34 Field heating source.
3	M2 field heating	1	Motor 2 field heating is active. See 28.34 Field heating source.
4	M1 (motor 1)	1	Motor 1 and field exciter 1 are active.
5	M2 (motor 2)	1	Motor 2 and field exciter 2 are active.
6	User set 1	1	User parameter set 1 active. See 96.22 User set save/load.
7	User set 2	1	User parameter set 2 active. See 96.22 User set save/load.
8	User set 3	1	User parameter set 3 active. See 96.22 User set save/load.
9	User set 4	1	User parameter set 4 active. See 96.22 User set save/load.
10	Auto-reclosing	1	Auto-reclosing logic is active. See 31.51 Mains loss mode.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	11 Drive direction negative	1	Negative drive direction active. Controlled by 06.10.b01 Auxiliary control word 1.				
	12 Fault or warning	1	Fault or warning active.				
	13 reserved						
	14 reserved						
	15 reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.19 Drive inhibit status word 2

Drive inhibit status word 2.
The drive inhibit status word 2 specifies the source of the inhibiting signal that is preventing the drive from starting. See 06.16.b01 Drive status word 1 and 06.20 Run inhibit status word.
Bit assignment:

Bit	Name	Value	Remarks
0	Follower	1	A follower is preventing the master from starting (master only).
1	Application	1	The application program is preventing the drive from starting.
2	Auxiliary power failure	1	Auxiliary power failure is preventing the drive from starting.
3	Encoder feedback	1	The encoder feedback configuration is preventing the drive from starting.
4	Reference source parametrization	1	A reference source parametrization conflict is preventing the drive from starting. See warning A6DA Reference source parametrization.
5 … 15	reserved		

0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.20 Run inhibit status word

Run inhibit status word.
The Run inhibit status word specifies the source of the inhibiting signal that is preventing the drive from starting. The conditions marked with an asterisk (*) require that the On command is cycled. In all other instances, the inhibiting condition must be removed first.
See 06.16.b01 Drive status word 1 and 06.19 Drive inhibit status word 2.
Bit assignment:

Bit	Name	Value	Remarks
0	Not ready run	1	Drive has not been parametrized correctly. Check the parameters in groups 95 HW configuration and 99 Motor data.
1	Control location changed	*1	Control location has changed.
2	Firmware inhibit	1	Control program is keeping itself in inhibited state. See 64B1 Internal firmware.
3	Fault reset	*1	A fault has been reset.
4	Off2 from source 2	1	20.08 Off2 source 2 (emergency off) is set to 0 = Off2 command (emergency off/fast current off).
5	reserved		
6	FSO inhibit	1	Operation prevented by FSO-xx safety functions module.
7	STO	1	Safe torque off active
8	reserved		
9	Autotuning finished	1	The requested autotuning has been finished.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

10	Off3 stop mode 0	1	Off3 active (emergency stop) using coast stop. See 21.03 Emergency stop mode.
11	Off3 stop mode 1	1	Off3 active (emergency stop) using ramp stop. See 21.03 Emergency stop mode.
12	Off3 stop mode 2	1	Off3 active (emergency stop) using emergency ramp stop. See 21.03 Emergency stop mode.
13	Off3 stop mode 3	1	Off3 active (emergency stop) using torque limit. See 21.03 Emergency stop mode.
14	Off3 stop mode 4	1	Off3 active (emergency stop) using dynamic braking. See 21.03 Emergency stop mode.
15	Jogging active	1	The jogging enable signal is inhibiting the operation. See 20.25 Jogging enable.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.21 Speed control status word

Speed control status word.
Displays the speed control status word of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	Zero speed	1	Drive is running in the zero speed level area. The absolute value of 90.01 Motor speed for control has remained below 21.08 M1 zero speed level, 42.23 M2 zero speed level for longer than 21.07 M1 zero speed delay, 42.24 M2 zero speed delay. **Notes:** – This bit is not updated when mechanical brake control is enabled by 44.06 M1 brake control enable, 42.75 M2 brake control enable and the drive is running. See 06.15.b02 Main Status Word. – During a ramp stop when the drive is running forward, the delay count runs whenever 90.01 < 21.06 or 42.23. – During a ramp stop when the drive is running reverse, the delay count runs whenever 90.01 > (-1) • 21.06 or (-1) • 42.23.
1	Forward	1	90.01 > 21.06 or 42.23, thus the drive is running forward above zero speed level.
2	Reverse	1	90.01 < (-1) • 21.06 or (-1) • 42.23, thus the drive is running reverse below zero speed level.
3	Out of window	1	Speed error window control is active and the speed error is out of the window. See 24.41 Speed error window control enable.
4	EMF speed feedback	1	EMF speed feedback active. See 90.41 M1 feedback selection, 42.20 M2 feedback selection, 90.46 Force open loop or 31.35 Motor feedback fault in case the selected OnBoard tacho/encoder has faulted.
		0	OnBoard tacho/Encoder is used for speed feedback.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	5	OnBoard tacho speed feedback	1	OnBoard tacho speed feedback active. See 90.41 M1 feedback selection, 42.20 M2 feedback selection.			
			0	OnBoard tacho faulted or not selected as source of speed feedback. See 90.41 M1 feedback selection, 42.20 M2 feedback selection or 90.46 Force open loop.			
	6	OnBoard encoder speed feedback	1	OnBoard encoder speed feedback active. See 90.41 M1 feedback selection, 42.20 M2 feedback selection.			
			0	OnBoard encoder faulted or not selected as source of speed feedback. See 90.41 M1 feedback selection, 42.20 M2 feedback selection or 90.46 Force open loop.			
	7	Encoder 1 speed feedback	1	Encoder 1 speed feedback active. See 90.41 M1 feedback selection, 42.20 M2 feedback selection.			
			0	Encoder 1 faulted or not selected as source of speed feedback. See 90.41 M1 feedback selection, 42.20 M2 feedback selection or 90.46 Force open loop.			
	8	Encoder 2 speed feedback	1	Encoder 2 speed feedback active. See 90.41 M1 feedback selection, 42.20 M2 feedback selection.			
			0	Encoder 2 faulted or not selected as source of speed feedback. See 90.41 M1 feedback selection, 42.20 M2 feedback selection or 90.46 Force open loop.			
	9	Any constant speed request	1	A constant speed has been selected. See 06.22 Constant speed status word.			
	10	Follower speed correction min level	1	Minimum limit of speed correction in a speed-controlled follower has been reached. See parameters 23.39 … 23.42.			
	11	Follower speed correction max level	1	Maximum limit of speed correction in a speed-controlled follower has been reached. See parameters 23.39 … 23.42.			
	12 … 15	reserved					
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

06.22 Constant speed status word

Constant speed status word.
Indicates which constant speed is active, if any. See 06.21.b09 Speed control status word.
Bit assignment:

Bit	Name	Value	Remarks
0	Constant speed 1	1	Constant speed 1 active.
1	Constant speed 2	1	Constant speed 2 active.
2	Constant speed 3	1	Constant speed 3 active.
3	Constant speed 4	1	Constant speed 4 active.
4	Constant speed 5	1	Constant speed 5 active.
5	Constant speed 6	1	Constant speed 6 active.
6	Constant speed 7	1	Constant speed 7 active.
7 … 15	reserved		

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

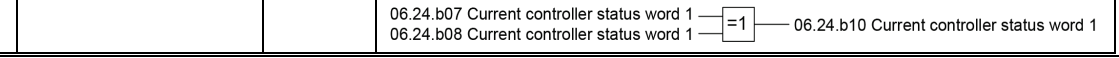
06.23 Follower Status Word

Bit	Name	Value	Remarks
			–

06.24 Current controller status word 1

Current controller status word 1.
Displays the current controller status word 1 of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	Fans	1	Fans On command for drive and motor fans.
		0	Fans Off command for drive and motor fans.
1	reserved		
2	reserved		
3	Field heating	1	Active.
		0	Inactive.
4	Field current direction	1	Reverse (negative field current).
		0	Forward (positive field current).
5	Field exciter	1	Field exciter On command.
		0	Field exciter Off command.
6	Dynamic braking	1	Dynamic braking active/started.
		0	Dynamic braking inactive.
7	Mains contactor	1	Mains contactor Close command (see note 1).
		0	Mains contactor Open command (see note 1).
8	Dynamic braking contactor	1	Dynamic braking contactor close command. Close the contactor for the dynamic braking resistor. Armature current must be zero.
		0	Dynamic braking contactor open command. Open the contactor for the dynamic braking resistor.
9	Energy flow	1	Drive is generating.
		0	Drive is motoring.
10	US style DC contactor	1	US style changeover DC contactor close command. Close the DC contactor and open the resistor contactor.
		0	US style changeover DC contactor open command. Open the DC contactor and close the resistor contactor.



Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

11	Firing pulses	1	Firing pulses active (on).
		0	Firing pulses inactive (blocked).
12	Discontinuous current	1	Continuous armature current.
		0	Discontinuous armature current.
13	Zero current	1	Zero armature current detected.
		0	Armature current not zero.
14	DC-breaker (continuous)	1	DC-breaker trip command (continuous signal).
15	DC-breaker (pulse)	1	DC-breaker trip command (1 s pulse).

Note 1: Fix connected to XSMC: 1/2.

0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.25 Current controller status word 2

Current controller status word 2.
Displays the current controller status word 2 of the drive. Value of zero means, that the status is OK. 27.18 Firing angle is forced to the value of 30.45 Maximum firing angle if any of the bits is set.
Bit assignment:

Bit	Name	Value	Remarks
0	Armature overcurrent	1	2310 Armature overcurrent. See 04.21.b01 Fault word 1.
1	Mains overvoltage	1	F513 Mains overvoltage. See 04.21.b12 Fault word 1.
2	Mains undervoltage	1	3280 Mains low voltage. See 04.21.b11 Fault word 1.
3	EMF reduction	1	Waiting for the reduction of the EMF to match the mains voltage. See 27.42 Reversal volt margin.
4	Bridge reversal	1	F533 12-pulse reversal timeout. See 04.23.b00 Fault word 3. F534 12-pulse current difference. See 04.23.b01 Fault word 3. F557 Reversal time. See 04.24.b08 Fault word 4.
5	Operation mode	1	99.06 Operation mode = 12-pulse parallel master, 12-pulse parallel slave, 12-pulse serial master, 12-pulse serial slave, 6-pulse serial master, 6-pulse serial slave, Serial sequential master or Serial sequential slave: Partner blocked. 99.06 Operation mode = Large field exciter: Overvoltage protection active (freewheeling).
6	M1 field exciter self-test	1	F529 M1 field exciter not OK. See 04.22.b12 Fault word 2.
		0	Motor 1 field exciter self-test OK.
7	M1 field exciter ready	1	F537 M1 field exciter ready lost. See 04.23.b04 Fault word 3.
		0	Motor 1 field exciter ready.
8	M2 field exciter self-test	1	F530 M2 field exciter not OK. See 04.22.b13 Fault word 2.
		0	Motor 2 field exciter self-test OK.
9	M2 field exciter ready	1	F538 M2 field exciter ready lost. See 04.23.b05 Fault word 3.
		0	Motor 2 field exciter ready.
10	Zero current	1	Waiting for zero armature current, if 27.40 Zero current timeout elapses before bit 10 is set back to zero, F557 Reversal time is set. See 04.24.b08 Fault word 4.
11	Field reversal	1	Field reversal active.
		0	Field reversal inactive.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

12	reserved		
13	PLL deviation level	1	PLL deviation level is exceeded. See 95.44 PLL deviation level.
		0	Below PLL deviation level. See 95.44 PLL deviation level.
14	Mains synchronization	1	F514 Mains synchronization lost. See 04.21.b13 Fault word 1.
		0	Mains synchronized.
15	Current controller	1	Disabled, the current controller is disabled and 27.02 Used current reference is forced to zero.
		0	Enabled.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.26 M1 field exciter status word

Motor 1 field exciter status word.
Displays motor 1 field exciter status word of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	None	1	No field exciter connected.
1	OK	1	Field exciter and communication to armature drive OK.
2	Communication	1	F516 M1 field exciter communication. See 04.21.b15 Fault word 1.
		0	Communication to armature drive OK.
3	Field exciter self-test	1	F529 M1 field exciter not OK. See 04.22.b12 Fault word 2.
		0	Field exciter self-test OK.
4	Field exciter ready	1	F537 M1 field exciter ready lost. See 04.23.b04 Fault word 3.
		0	Motor 1 field exciter ready.
5	Field exciter undercurrent	1	F541 M1 field exciter low current. See 04.23.b08 Fault word 3.
6	Field exciter overcurrent	1	F515 M1 field exciter overcurrent. See 04.21.b14 Fault word 1.
7	Wrong setting	1	Check setting of 99.07 M1 used field exciter type and 42.49 M2 used field exciter type.
8 … 15	reserved		

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

06.27 M2 field exciter status word

Motor 2 field exciter status word.
Displays motor 1 field exciter status word of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	None	1	No field exciter connected.
1	OK	1	Field exciter and communication to armature drive OK.
2	Communication	1	F519 M2 field exciter communication. See 04.22.b02 Fault word 2.
		0	Communication to armature drive OK.
3	Field exciter self-test	1	F530 M2 field exciter not OK. See 04.22.b13 Fault word 2.
		0	Field exciter self-test OK.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	4 Field exciter ready: 1 = F538 M2 field exciter ready lost. See 04.23.b05 Fault word 3.						
	0 = Motor 2 field exciter ready.						
	5 Field exciter undercurrent: 1 = F542 M2 field exciter low current. See 04.23.b09 Fault word 3.						
	6 Field exciter overcurrent: 1 = F518 M2 field exciter overcurrent. See 04.22.b01 Fault word 2.						
	7 Wrong setting: 1 = Check setting of 99.07 M1 used field exciter type and 42.49 M2 used field exciter type.						
	8 … 15 reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
06.29	**MSW bit 10 sel**						
	Binary source for main status word bit 10 (Above level). Selects a binary source whose status is transmitted as 06.15.b10 Main status word. **Other [bit]**; source selection. 0: **False**; 1: **True**; 2: **Above level**; see 06.17.b10 Drive status word 2.						
	0 … 2	Above level	-	1 = 1	n	y	Parameter
06.30	**MSW bit 11 sel**						
	Binary source for main status word bit 11 (Status control 11). Selects a binary source whose status is transmitted as 06.15.b11 Main status word. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.31	**MSW bit 12 sel**						
	Binary source for main status word bit 12 (Status control 12). Selects a binary source whose status is transmitted as 06.15.b12 Main status word. **Other [bit]**; source selection. 0: **False**; 1: **True**; **Lost run enable**						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.32	**MSW bit 13 sel**						
	Binary source for main status word bit 13 (Status control 13). Selects a binary source whose status is transmitted as 06.15.b13 Main status word. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.33	**MSW bit 14 sel**						
	Binary source for main status word bit 14 (Status control 14). Selects a binary source whose status is transmitted as 06.15.b14 Main status word. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
06.45	**Follower CW user bit 0 sel**						
	Binary source for follower control word bit 12 (Master warning/fault) (master only). Selects a binary source whose status is transmitted as 06.06.b12 Follower control word to all followers. **Other [bit]**; source selection. 0: **False**; 1: **True**; 2: **Main control 12**; see 06.01.b12 Main control word. 3: **Main control 13**; see 06.01.b13 Main control word. 4: **Main control 14**; see 06.01.b14 Main control word. 5: **Main control 15**; see 06.01.b15 Main control word. 6: **Master warning/fault**; see 06.18.b12 Drive status word 3.						
	0 … 6	Master warning/ fault	-	1 = 1	n	y	Parameter
06.46	**Follower CW user bit 1 sel**						
	Binary source for follower control word bit 13 (Main control 13) (master only). Selects a binary source whose status is transmitted as 06.08.b13 Follower control word to all followers. **Other [bit]**; source selection. 0: **False**; 1: **True**; 2: **Main control 12**; see 06.01.b12 Main control word. 3: **Main control 13**; see 06.01.b13 Main control word. 4: **Main control 14**; see 06.01.b14 Main control word. 5: **Main control 15**; see 06.01.b15 Main control word.						
	0 … 5	Main control 13	-	1 = 1	n	y	Parameter
06.47	**Follower CW user bit 2 sel**						
	Binary source for follower control word bit 14 (Main control 14) (master only). Selects a binary source whose status is transmitted as 06.08.b14 Follower control word to all followers. **Other [bit]**; source selection. 0: **False**; 1: **True**; 2: **Main control 12**; see 06.01.b12 Main control word. 3: **Main control 13**; see 06.01.b13 Main control word. 4: **Main control 14**; see 06.01.b14 Main control word. 5: **Main control 15**; see 06.01.b15 Main control word.						
	0 … 5	Main control 14	-	1 = 1	n	y	Parameter
06.48	**Follower CW user bit 4 sel**						
	Binary source for follower control word bit 15 (Main control 15) (master only). Selects a binary source whose status is transmitted as 06.08.b15 Follower control word to all followers. **Other [bit]**; source selection. 0: **False**; 1: **True**; 2: **Main control 12**; see 06.01.b12 Main control word. 3: **Main control 13**; see 06.01.b13 Main control word. 4: **Main control 14**; see 06.01.b14 Main control word. 5: **Main control 15**; see 06.01.b15 Main control word.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0 … 5	Main control 15	-	1 = 1	n	y	Parameter
06.50	**User status word 1**						
	User defined status word 1. This word displays the status of the binary sources selected by parameters 06.60 … 06.36. Bit assignment:						

Bit	Name	Remarks
0	User status bit 0	Status of source selected by 06.60 User status word 1 bit 0 sel.
1	User status bit 1	Status of source selected by 06.61 User status word 1 bit 1 sel.
2	User status bit 2	Status of source selected by 06.62 User status word 1 bit 2 sel.
3	User status bit 3	Status of source selected by 06.63 User status word 1 bit 3 sel.
4	User status bit 4	Status of source selected by 06.64 User status word 1 bit 4 sel.
5	User status bit 5	Status of source selected by 06.65 User status word 1 bit 5 sel.
6	User status bit 6	Status of source selected by 06.66 User status word 1 bit 6 sel.
7	User status bit 7	Status of source selected by 06.67 User status word 1 bit 7 sel.
8	User status bit 8	Status of source selected by 06.68 User status word 1 bit 8 sel.
9	User status bit 9	Status of source selected by 06.69 User status word 1 bit 9 sel.
10	User status bit 10	Status of source selected by 06.70 User status word 1 bit 10 sel.
11	User status bit 11	Status of source selected by 06.71 User status word 1 bit 11 sel.
12	User status bit 12	Status of source selected by 06.72 User status word 1 bit 12 sel.
13	User status bit 13	Status of source selected by 06.73 User status word 1 bit 13 sel.
14	User status bit 14	Status of source selected by 06.74 User status word 1 bit 14 sel.
15	User status bit 15	Status of source selected by 06.75 User status word 1 bit 15 sel.

	0000h … FFFFh	-	-	1 = 1	y	n	Signal
06.60	**User status word 1 bit 0 sel**						
	Binary source for bit 0. Selects a binary source whose status is shown as 06.50.b00 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.61	**User status word 1 bit 1 sel**						
	Binary source for bit 1. Selects a binary source whose status is shown as 06.50.b01 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.62	**User status word 1 bit 2 sel**						
	Binary source for bit 2. Selects a binary source whose status is shown as 06.50.b02 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.63	**User status word 1 bit 3 sel**						
	Binary source for bit 3. Selects a binary source whose status is shown as 06.50.b03 User Status Word 1. **Other [bit]**; source selection. 0: **False**;						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.64	**User status word 1 bit 4 sel**						
	Binary source for bit 4. Selects a binary source whose status is shown as 06.50.b04 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.65	**User status word 1 bit 5 sel**						
	Binary source for bit 5. Selects a binary source whose status is shown as 06.50.b05 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.66	**User status word 1 bit 6 sel**						
	Binary source for bit 6. Selects a binary source whose status is shown as 06.50.b06 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.67	**User status word 1 bit 7 sel**						
	Binary source for bit 7. Selects a binary source whose status is shown as 06.50.b07 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.68	**User status word 1 bit 8 sel**						
	Binary source for bit 8. Selects a binary source whose status is shown as 06.50.b08 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.69	**User status word 1 bit 9 sel**						
	Binary source for bit 9. Selects a binary source whose status is shown as 06.50.b09 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.70	**User status word 1 bit 10 sel**						
	Binary source for bit 10. Selects a binary source whose status is shown as 06.50.b10 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
06.71	**User status word 1 bit 11 sel**						
	Binary source for bit 11. Selects a binary source whose status is shown as 06.50.b11 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.72	**User status word 1 bit 12 sel**						
	Binary source for bit 12. Selects a binary source whose status is shown as 06.50.b12 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.73	**User status word 1 bit 13 sel**						
	Binary source for bit 13. Selects a binary source whose status is shown as 06.50.b13 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.74	**User status word 1 bit 14 sel**						
	Binary source for bit 14. Selects a binary source whose status is shown as 06.50.b14 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.75	**User status word 1 bit 15 sel**						
	Binary source for bit 15. Selects a binary source whose status is shown as 06.50.b15 User Status Word 1. **Other [bit]**; source selection. 0: **False**; 1: **True**;						
	0 … 1	False	-	1 = 1	n	y	Parameter
06.86	**FBA A generic control word**						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.87	**FBA B generic control word**						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.88	**FBA A profile status word**						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
06.89	**FBA A profile status word**						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
06.100	**User control word 1**						
	User defined control word 1. Bit assignment:						
	0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter
06.101	**User control word 2**						
	User defined control word 2. Bit assignment:						
	0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter

Bit	Name	Remarks
0	User control word 1 bit 0	User defined bits.
1	User control word 1 bit 1	
2	User control word 1 bit 2	
3	User control word 1 bit 3	
4	User control word 1 bit 4	
5	User control word 1 bit 5	
6	User control word 1 bit 6	
7	User control word 1 bit 7	
8	User control word 1 bit 8	
9	User control word 1 bit 9	
10	User control word 1 bit 10	
11	User control word 1 bit 11	
12	User control word 1 bit 12	
13	User control word 1 bit 13	
14	User control word 1 bit 14	
15	User control word 1 bit 15	

Bit	Name	Remarks
0	User control word 2 bit 0	User defined bits.
1	User control word 2 bit 1	
2	User control word 2 bit 2	
3	User control word 2 bit 3	
4	User control word 2 bit 4	
5	User control word 2 bit 5	
6	User control word 2 bit 6	
7	User control word 2 bit 7	
8	User control word 2 bit 8	
9	User control word 2 bit 9	
10	User control word 2 bit 10	
11	User control word 2 bit 11	
12	User control word 2 bit 12	
13	User control word 2 bit 13	
14	User control word 2 bit 14	
15	User control word 2 bit 15	

07 System info

The drive's hardware and firmware information.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
07.03	**Drive rating ID set**						
	Type of the drive. The value is read from 95.25 Set: Type code. **Example**: DCS880-S02-1000-05						
		-	-	1 = 1	y	n	Signal
07.04	**Firmware name**						
	Firmware identification. **Example**: DCSF1 = DCS880 Firmware.						
		-	-	1 = 1	y	n	Signal
07.05	**Firmware version**						
	Version number of the firmware. **Example**: 1.05.0.0 = Firmware version 5.						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.06	**Loading package name**						
	Name of the firmware loading package. **Example**: ????						
		-	-	1 = 1	y	n	Signal
07.07	**Loading package version**						
	Version number of the firmware loading package. **Example**: ????						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.08	**Bootloader version**						
	Version number of the firmware bootloader. **Example**: ????						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.11	**Cpu usage**						
	Microprocessor load in percent.						
	0 … 100	-	%	1 = 1 %	y	n	Signal
07.12	**Application usage**						
	Application program load in percent.						
	0 … 100	-	%	1 = 1 %	y	n	Signal
07.21	**Application environment status 1**						

Application program task status.
Shows, which tasks of the application program are running. See Drive (IEC 61131-3) application programming manual 3AUA0000127808.
Bit assignment:

Bit	Name	Value	Remarks
0	Pre task	1	Pre-task running.
1	Application task 1	1	Task 1 running.
2	Application task 2	1	Task 2 running.
3	Application task 3	1	Task 3 running.
4	reserved		
5	reserved		
6	reserved		

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	7 reserved						
	8 reserved						
	9 reserved						
	10 reserved						
	11 reserved						
	12 reserved						
	13 reserved						
	14 reserved						
	15 Task monitoring	1	Task monitoring enabled.				
	0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter

07.22 Application environment status 2

Application program opening status.
Shows, which tasks of the openings in the application program. See Drive (IEC 61131-3) application programming manual 3AUA0000127808.
Bit assignment:

Bit	Name	Value	Remarks
0	Opening 1	1	Status of opening 1 in the application program.
1	Opening 2	1	Status of opening 2 in the application program.
2	Opening 3	1	Status of opening 3 in the application program.
3	Opening 4	1	Status of opening 4 in the application program.
4	Opening 5	1	Status of opening 5 in the application program.
5	Opening 6	1	Status of opening 6 in the application program.
6	Opening 7	1	Status of opening 7 in the application program.
7	Opening 8	1	Status of opening 8 in the application program.
8	Opening 9	1	Status of opening 9 in the application program.
9	Opening 10	1	Status of opening 10 in the application program.
10	Opening 11	1	Status of opening 11 in the application program.
11	Opening 12	1	Status of opening 12 in the application program.
12	Opening 13	1	Status of opening 13 in the application program.
13	Opening 14	1	Status of opening 14 in the application program.
14	Opening 15	1	Status of opening 15 in the application program.
15	Opening 16	1	Status of opening 16 in the application program.

Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter

07.23 Application name

Application program name.
Displays the first five ASCII signs of the name given to the application program. The full name is visible under System info on the control panel or in the PC tool.
_N/A_: **No name**;

	-	-	1 = 1	y	n	Signal

07.24 Application version

Control Builder application version number.
Displays the version number given to the application program. Also visible under System info on the control panel or in the PC tool.
Example: 1.04.0.0 = Application program version 4.

0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal

07.25 Customization package name

Customization package name.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	Displays the first five ASCII letters of the name given to the customization package. The full name is visible under System info on the control panel or the PC tool. _N/A_: **No name**;						
		-	-	1 = 1	y	n	Signal
07.26	**Customization package version**						
	Customization package version number. Displays the version number given to the customization package. Also visible under System info on the control panel or the PC tool. **Example**: 1.03.0.0 = Customization package version 4.						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.30	**Adaptive program status**						
	Adaptive program status. Displays the status of the adaptive program. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
07.33	**Drive size**						
	Recognized drive size. Read from 95.25 Set: Type code. 0: **None**; when 95.25 Set: Type code = None. 1: **H1**; drive size H1. 2: **H2**; drive size H2. 3: **H3**; drive size H3. 4: **H4**; drive size H4. 5: **H5**; drive size H5. 6: **H6**; drive size H6. 7: **H7**; drive size H7. 8: **H8**; drive size H8. 9: **Manual set**; set by user. 95.27 Set: Drive DC current scaling and/or 95.28 Set: Drive AC voltage scaling have been changed for e.g. rebuild kits.						
	0 … 9	-	-	1 = 1	y	n	Signal

Bit	Name	Value	Remarks
0	Initialized	1	Adaptive program initialized.
1	Editing	1	Adaptive program is being edited.
2	Edit done	1	Editing of adaptive program finished.
3	Running	1	Adaptive program running.
4	reserved		
5	reserved		
6	reserved		
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	reserved		
13	reserved		
14	State changing	1	State change in progress in adaptive programming engine.
15	Faulted	1	Error in adaptive program.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
07.34	**Drive block bridge 2 set**						
	Recognized drive quadrant type. Displays the quadrant type of the drive (1 or 2 bridges). Read from 95.25 Set: Type code or set with 95.26 Set: Drive block bridge 2: – Read from 95.25 Set: Type code, if 95.26 Set: Drive block bridge 2= 0. – Read from 95.26 Set: Drive block bridge 2, if 95.26 Set: Drive block bridge 2 ≠ 0. 0: **Block bridge 2**; (reverse) bridge 2 blocked ≡ 2-Q operation. 1: **Release bridge 2**; (reverse) bridge 2 released ≡ 4-Q operation.						
	0 … 1	-	-	1 = 1	y	n	Signal
07.35	**Drive DC current scaling set**						
	Recognized drive nominal DC current. Displays the drive nominal DC current measurement circuit. Adjustment of DC current measuring channels (SDCS-PIN-H01 or SDCS-PIN-H51). Read from 95.25 Set: Type code or set with 95.27 Set: Drive DC current scaling: – Read from 95.25 Set: Type code, if 95.27 Set: Drive DC current scaling = 0. – Read from 95.27 Set: Drive DC current scaling, if 95.27 Set: Drive DC current scaling ≠ 0.						
	0 … 32500	-	A	1 = 1 A	y	n	Signal
07.36	**Drive DC overcurrent level**						
	Drive DC overcurrent level. Displays the drive current tripping level. This signal is set during initialization of the drive. New values are shown after the next power-up. Drive DC overcurrent scaling: 2.3 • 95.25 Set: Type code, if 95.27 Set: Drive DC current scaling = 0. 2.3 • 95.27 Set: Drive DC current scaling, if 95.27 Set: Drive DC current scaling ≠ 0.						
	0 … 32500	-	A	1 = 1 A	y	n	Signal
07.37	**Drive AC voltage scaling set**						
	Recognized drive nominal AC voltage. Displays the drive nominal AC voltage measurement circuit. Adjustment of AC voltage measuring channels (SDCS-PIN-H01 or SDCS-PIN-H51). Read from 95.25 Set: Type code or set with 95.28 Set: Drive AC voltage scaling: – Read from 95.25 Set: Type code, if 95.28 Set: Drive AC voltage scaling = 0. – Read from 95.28 Set: Drive AC voltage scaling, if 95.28 Set: Drive AC voltage scaling ≠ 0.						
	0.0 … 3250.0	-	V	10 = 1 V	y	n	Signal
07.38	**Drive max bridge temperature set**						
	Recognized drive maximum bridge temperature. Displays the drive maximum bridge temperature. Read from 95.25 Set: Type code or set with 95.29 Set: Drive max bridge temperature: – Read from 95.25 Set: Type code, if 95.29 Set: Drive max bridge temperature = 0. – Read from 95.29 Set: Drive max bridge temperature, if 95.29 Set: Drive max bridge temperature ≠ 0. The event generates fault 4310 Bridge temperature measured when 07.38 Drive max bridge temperature set is reached. The event generates warning A4B0 Bridge temperature measured is set, when the measured bridge temperature is approximately 5° below 07.38 Drive max bridge temperature. The unit is selected by 96.02 Unit selection.						
	-80 … 1000	-	°C or °F	1 = 1°C or °F	y	n	Signal
07.41	**M1 field exciter type**						
	Motor 1 field exciter type. Read from 99.07 M1 used field exciter type. 0: **None**; no or third party field exciter connected. 1: **OnBoard**; integrated 1-Q field exciter (for sizes H1 … H4 only). 2: **DCF803-0016**; external 1-Q 16 A field exciter used for field currents from 0.3 A to 16 A.						

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	3: **DCF803-0025**; internal 1-Q 25 A field exciter (for size H5 and H6 only) used for field currents from 0.3 A to 25 A. 4: **DCF803-0035**; external 1-Q 35 A field exciter used for field currents from 0.3 A to 35 A. 5: **DCF803 terminal 5 A**; external 1-Q 16 A field exciter (DCF803-0016), internal 1-Q 25 A field exciter (DCF803-0025) or external 1-Q 35 A field exciter (DCF803-0035) used for field currents from 0.3 A to 5 A. **Note**: Use 5 A terminals. 6: **DCF803-0050**; external 1-Q 50 A field exciter. 7: **DCF804-0050**; external 4-Q 50 A field exciter. 8: **DCF803-0060**; external 1-Q 60 A field exciter. 9: **DCF804-0060**; external 4-Q 60 A field exciter. 10: **DCS880-S01**; external 2-Q standard DCS880 module. 11: **DCS880-S02**; external 4-Q standard DCS880 module. 16: **External field exciter via AI1**; third party field exciter, acknowledge via AI1. 17: **External field exciter via AI2**; third party field exciter, acknowledge via AI2. 18: **External field exciter via AI3**; third party field exciter, acknowledge via AI3. 19: **Multiple field exciters**; see DCS880 Multiple field exciters motor control (3ADW000xxx).						
	0 … 19	-	-	1 = 1	y	n	Signal
07.42	**M1 field exciter firmware version**						
	Version number of Motor 1 field exciter firmware. **Example**: 1.02.0.0 = Firmware version 2.						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.45	**M2 field exciter type**						
	Motor 2 field exciter type. Read from 42.49 M2 used field exciter type. 0: **None**; no or third party field exciter connected. 1: **OnBoard**; integrated 1-Q field exciter (for sizes H1 … H4 only). 2: **DCF803-0016**; external 1-Q 16 A field exciter used for field currents from 0.3 A to 16 A. 3: **DCF803-0025**; internal 1-Q 25 A field exciter (for size H5 and H6 only) used for field currents from 0.3 A to 25 A. 4: **DCF803-0035**; external 1-Q 35 A field exciter used for field currents from 0.3 A to 35 A. 5: **DCF803 terminal 5 A**; external 1-Q 16 A field exciter (DCF803-0016), internal 1-Q 25 A field exciter (DCF803-0025) or external 1-Q 35 A field exciter (DCF803-0035) used for field currents from 0.3 A to 5 A. **Note**: Use 5 A terminals. 6: **DCF803-0050**; external 1-Q 50 A field exciter. 7: **DCF804-0050**; external 4-Q 50 A field exciter. 8: **DCF803-0060**; external 1-Q 60 A field exciter. 9: **DCF804-0060**; external 4-Q 60 A field exciter. 10: **DCS880-S01**; external 2-Q standard DCS880 module. 11: **DCS880-S02**; external 4-Q standard DCS880 module. 16: **External field exciter via AI1**; third party field exciter, acknowledge via AI1. 17: **External field exciter via AI2**; third party field exciter, acknowledge via AI2. 18: **External field exciter via AI3**; third party field exciter, acknowledge via AI3. 19: **Multiple field exciters**; see DCS880 Multiple field exciters motor control (3ADW000xxx).						
	0 … 19	-	-	1 = 1	y	n	Signal
07.46	**M2 field exciter firmware version**						
	Version number of Motor 2 field exciter firmware. **Example**: 1.01.0.0 = Firmware version 1.						
	0.00.0.0 … 255.255.255.255	-	-	1 = 1	y	n	Signal
07.50	**Progress signal**						
	Progress signal used for the start-up assistants in the PC-tool.						
	0 … 100	-	%	1 = 1 %	y	n	Signal

10 Standard DI, RO

Configuration of digital inputs and relay outputs.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
10.01	**DI status**						
	Status of digital inputs. Displays the electrical status of DI1 … DI6 and DIL. The activation/deactivation delays of the inputs (if any are specified) are ignored. A filtering time is defined by 10.51 DI filter time. Bits 0 … 5 reflect the status of DI1 … DI6. Bit 15 reflects the status of the DIL input. **Example**: 1000000000010011b = DIL, DI5, DI2 and DI1 are on, DI3, DI4 and DI6 are off. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
10.02	**DI delayed status**						
	Delayed status of digital inputs. Displays the delayed status of DI1 … DI6 and DIL. This word is updated only after activation/deactivation delays (if any are specified). Bits 0 … 5 reflect the delayed status of DI1 … DI6. Bit 15 reflects the delayed status of the DIL input. **Example**: 1000000000010011b = DIL, DI5, DI2 and DI1 are on, DI3, DI4 and DI6 are off. Bit assignment:						

Bit	Name	Value	Remarks
0	DI1	1	On.
1	DI2	1	On.
2	DI3	1	On.
3	DI4	1	On.
4	DI5	1	On.
5	DI6	1	On.
6	reserved		
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	reserved		
13	reserved		
14	reserved		
15	DIL	1	On.

Bit	Name	Value	Remarks
0	DI1	1	On.
1	DI2	1	On.
2	DI3	1	On.
3	DI4	1	On.
4	DI5	1	On.
5	DI6	1	On.
6	reserved		
7	reserved		
8	reserved		
9	reserved		
10	reserved		

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	11 reserved						
	12 reserved						
	13 reserved						
	14 reserved						
	15 DIL	1	On.				
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

10.03 DI force selection

Override selection for digital inputs.
The electrical status of DI1 … DI6 and DIL can be overridden for e.g. testing purposes. A bit in 10.04 DI force data is provided for each digital input and its value is applied whenever the corresponding bit in 10.03 DI force selection is 1.
Bit assignment:

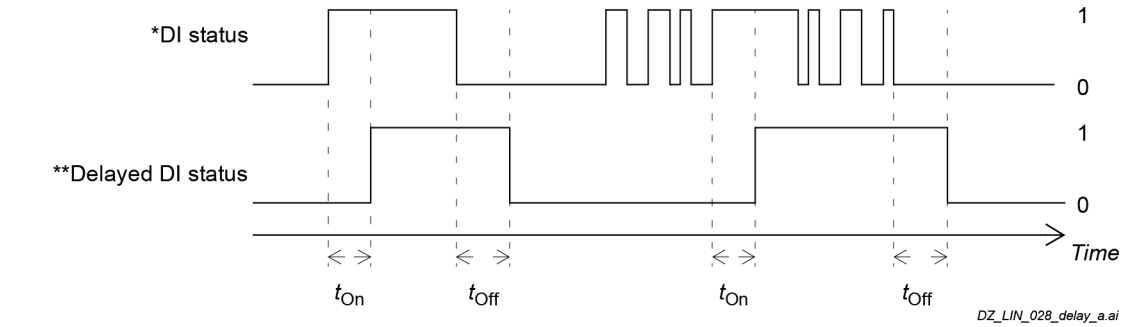
Bit	Name	Value	Remarks
0	DI1	1	Force DI1 to value of bit 0 of 10.04 DI force data.
1	DI2	1	Force DI2 to value of bit 1 of 10.04 DI force data.
2	DI3	1	Force DI3 to value of bit 2 of 10.04 DI force data.
3	DI4	1	Force DI4 to value of bit 3 of 10.04 DI force data.
4	DI5	1	Force DI5 to value of bit 4 of 10.04 DI force data.
5	DI6	1	Force DI6 to value of bit 5 of 10.04 DI force data.
6	reserved		
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	reserved		
13	reserved		
14	reserved		
15	DIL	1	Force DIL to value of bit 15 of 10.04 DI force data.

0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter

10.04 DI force data

Forced values of digital inputs.
Allows the data value of a forced DI1 … DI6 and DIL to be changed from 0 to 1. It is only possible to force an input that has been selected in 10.03 DI force selection.
Bits 0 … 5 are the forced values for DI1 … DI6. Bit 15 is the forced value for the DIL input.
Bit assignment:

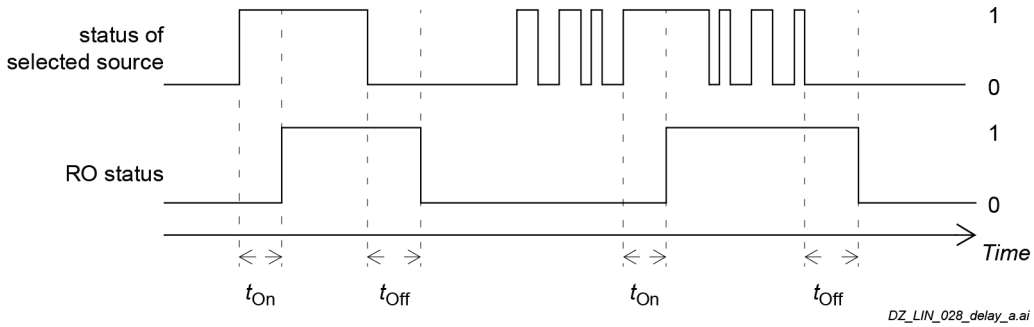
Bit	Name	Value	Remarks
0	DI1	1	Force DI1 to on.
1	DI2	1	Force DI2 to on.
2	DI3	1	Force DI3 to on.
3	DI4	1	Force DI4 to on.
4	DI5	1	Force DI5 to on.
5	DI6	1	Force DI6 to on.
6	reserved		

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	7 reserved						
	8 reserved						
	9 reserved						
	10 reserved						
	11 reserved						
	12 reserved						
	13 reserved						
	14 reserved						
	15 DIL	1	Force DIL to on.				
	0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter
10.05	**DI1 ON delay**						
	Activation delay for digital input DI1. Defines the activation delay for DI1.  t_{On} = 10.05 DI1 ON delay t_{Off} = 10.06 DI1 OFF delay *Electrical status of digital input. Indicated by 10.01 DI status. **Indicated by 10.02 DI delayed status.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.06	**DI1 OFF delay**						
	Deactivation delay for digital input DI1. Defines the deactivation delay for DI1. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.07	**DI2 ON delay**						
	Activation delay for digital input DI2. Defines the activation delay for DI2. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.08	**DI2 OFF delay**						
	Deactivation delay for digital input DI2. Defines the deactivation delay for DI2. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.09	**DI3 ON delay**						
	Activation delay for digital input DI3. Defines the activation delay for DI3. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
10.10	**DI3 OFF delay**						
	Deactivation delay for digital input DI3. Defines the deactivation delay for DI3. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.11	**DI4 ON delay**						
	Activation delay for digital input DI4. Defines the activation delay for DI4. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.12	**DI4 OFF delay**						
	Deactivation delay for digital input DI4. Defines the deactivation delay for DI4. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.13	**DI5 ON delay**						
	Activation delay for digital input DI5. Defines the activation delay for DI5. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.14	**DI5 OFF delay**						
	Deactivation delay for digital input DI5. Defines the deactivation delay for DI5. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.15	**DI6 ON delay**						
	Activation delay for digital input DI6. Defines the activation delay for DI6. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.16	**DI6 OFF delay**						
	Deactivation delay for digital input DI6. Defines the deactivation delay for DI6. See 10.05 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.21	**RO status**						
	Status of relay outputs. Displays the status of RO1 … RO3 and the output for the mains contactor (XSMC: 1/2). **Example**: 0000000000000001b = RO1 is energized, RO2 … RO3 are de-energized and XSMC: 1/2 is off. Bit assignment:						

Bit	Name	Value	Remarks
0	RO1	1	Energized.
1	RO2	1	Energized.
2	RO3	1	Energized.
3 … 14	reserved		
15	XSMC: 1/2	1	On.

0000h … FFFFh	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
10.24	**RO1 source**						
	Source for relay output RO1. Selects a signal/parameter bit to be connected to RO1. **Other [bit]**; source selection. 0: **Not energized**; output is not energized. 1: **Energized**; output is energized. 2: **Enabled**; 06.16.b02 Drive status word 1. 3: **Ready on**; 06.16.b03 Drive status word 1. 4: **Ready run**; 06.16.b04 Drive status word 1. 5: **Ready reference**; 06.16.b05 Drive status word 1. 6: **At setpoint**; 06.15.b08 Main status word. 10: **Reverse**; 06.21.b02 Speed control status word. 11: **Zero speed**; 06.21.b00 Speed control status word. 12: **Above limit**; 06.17.b10 Drive status word 2. 13: **Warning**; 06.15.b07 Main status word. 14: **Tripped**; 06.15.b03 Main status word. 15: **Tripped (-1)**; 06.15.b03 Main status word inverted. 16: **Open command**; 44.01.b00 Brake control status. 24: **Remote**; 06.11.b09 Main status word. 40: **RO/DIO control word bit 0**; 10.99.b00 RO/DIO control word. 41: **RO/DIO control word bit 1**; 10.99.b01 RO/DIO control word. 42: **RO/DIO control word bit 2**; 10.99.b02 RO/DIO control word. 43: **RO/DIO control word bit 8**; 10.99.b08 RO/DIO control word. 44: **RO/DIO control word bit 9**; 10.99.b09 RO/DIO control word.						
	0 … 44	Ready on	-	1 = 1	n	y	Parameter
10.25	**RO1 ON delay**						
	Activation delay for relay output RO1. Defines the activation delay for RO1.  t_{On} = 10.25 RO1 ON delay t_{Off} = 10.26 RO1 OFF delay						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.26	**RO1 OFF delay**						
	Deactivation delay for relay output RO1. Defines the deactivation delay for RO1. See 10.25 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.27	**RO2 source**						
	Source for relay output RO2. Selects a signal/parameter bit to be connected to RO2. See 10.24 RO1 source.						
	0 … 44	Ready run	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
10.28	**RO2 ON delay**						
	Activation delay for relay output RO2. Defines the activation delay for RO2. See 10.25 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.29	**RO2 OFF delay**						
	Deactivation delay for relay output RO2. Defines the deactivation delay for RO2. See 10.25 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.30	**RO3 source**						
	Source for relay output RO3. Selects a signal/parameter bit to be connected to RO3. See 10.24 RO1 source.						
	0 … 44	Ready reference	-	1 = 1	n	y	Parameter
10.31	**RO3 ON delay**						
	Activation delay for relay output RO3. Defines the activation delay for RO3 See 10.25 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.32	**RO3 OFF delay**						
	Deactivation delay for relay output RO3. Defines the deactivation delay for RO3. See 10.25 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
10.51	**DI filter time**						
	Filter time constant for 10.01 DI status. Defines a filter time constant for 10.01 DI status.						
	0.3 … 100.0	10.0	ms	10 = 1 ms	n	y	Parameter
10.99	**RO/DIO control word**						

Control word for relay outputs (RO) and digital inputs/outputs (DIO).
Storage parameter to control relay outputs and digital inputs/outputs via e.g. a fieldbus.
To control the relay outputs and the digital inputs/outputs of the drive, send a control word with the bit assignments shown below e.g. as Modbus I/O data (see 58.101 Data I/O 1 … 58.124 Data I/O 24).
Example for relay output RO1:
58.101 Data I/O 1 = RO/DIO control word and 10.24 RO1 source = RO/DIO control word bit 0.
Bit assignment:

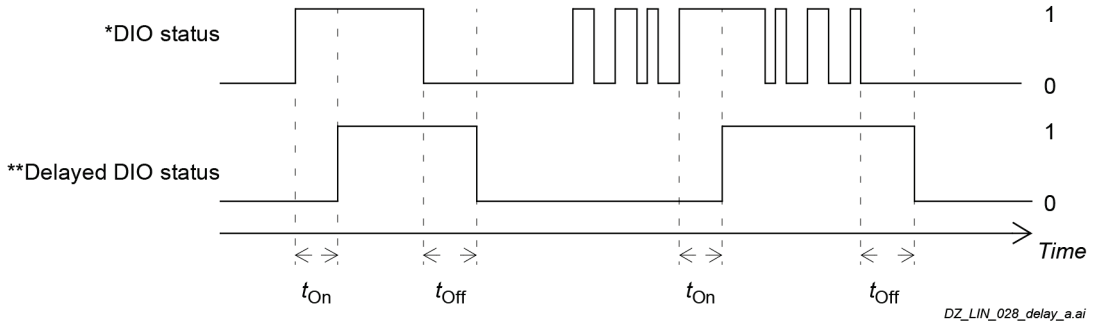
Bit	Name	Value	Remarks
0	RO1	1	Energized. Bit for relay output RO1. See 10.24 RO1 source.
1	RO2	1	Energized. Bit for relay output RO2. See 10.27 RO2 source.
2	RO3	1	Energized. Bit for relay output RO3. See 10.30 RO3 source.
3	reserved		
4	reserved		
5	reserved		
6	reserved		
7	reserved		
8	DIO1	1	Energized. Bit for digital input/output DIO1. See 11.06 DIO1 output source.

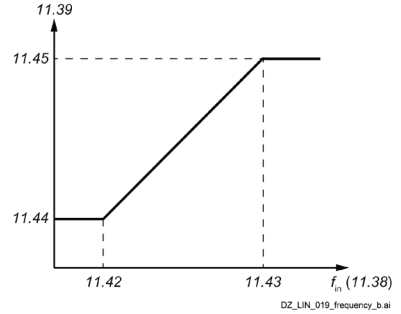
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	9 DIO2	1	Energized. Bit for digital input/output DIO2. See 11.10 DIO2 output source.				
	10 … 15 reserved						
	0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter

11 Standard DIO, FI, FO

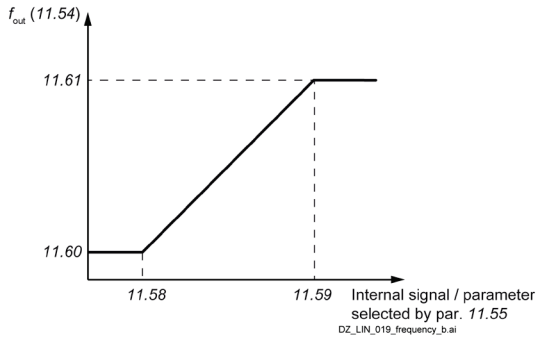
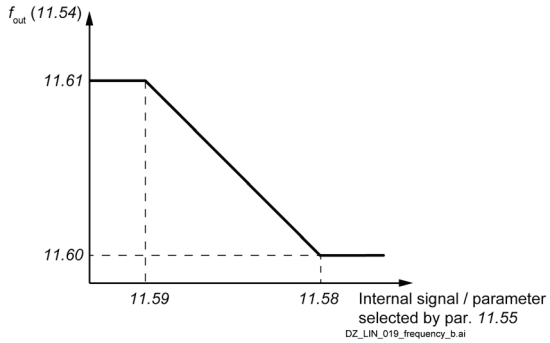
Configuration of digital input/outputs and frequency inputs/outputs.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.01	**DIO status**						
	Status of digital inputs/outputs. Displays the status of DIO1 … DIO2. The activation/deactivation delays (if any are specified) are ignored. A filtering time (for input mode) is defined by 11.81 DIO filter time. Bits 0 … 1 reflect the status of DIO1 … DIO2. **Example**: 000000000000010b = DIO2 is on, DIO1 is off. Bit assignment:						
	Bit / **Name** / **Value** / **Remarks** 0 / DIO1 / 1 / On. 1 / DIO2 / 1 / On. 2 … 15 / reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
11.02	**DIO delayed status**						
	Delayed status of digital inputs/outputs. Displays the delayed status of DIO1 … DIO2. This word is updated only after activation/deactivation delays (if any are specified). Bits 0 … 1 reflect the status of DIO1 … DIO2. **Example**: 000000000000010b = DIO2 is on, DIO1 is off. Bit assignment:						
	Bit / **Name** / **Value** / **Remarks** 0 / DIO1 / 1 / On. 1 / DIO2 / 1 / On. 2 … 15 / reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
11.05	**DIO1 function**						
	Function of digital input/output DIO1. Selects whether DIO1 is used as a digital output or input, or a frequency input. 0: **Output**; DIO1 is used as a digital output. 1: **Input**; DIO1 is used as a digital input. 2: **Frequency**; DIO1 is used as a **frequency input**.						
	0 … 2	Output	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.06	**DIO1 output source**						
	Source for digital input/output DIO1. Selects a signal/parameter bit to be connected to DIO1 when parameter 11.05 DIO1 function = Output. **Other [bit]**; source selection. 0: **Not energized**; output is off. 1: **Energized**; output is on. 2: **Enabled**; 06.16.b02 Drive status word 1. 3: **Ready on**; 06.16.b03 Drive status word 1. 4: **Ready run**; 06.16.b04 Drive status word 1. 5: **Ready reference**; 06.16.b05 Drive status word 1. 6: **At setpoint**; 06.15.b08 Main status word. 10: **Reverse**; 06.21.b02 Speed control status word. 11: **Zero speed**; 06.21.b00 Speed control status word. 12: **Above limit**; 06.17.b10 Drive status word 2. 13: **Warning**; 06.15.b07 Main status word. 14: **Tripped**; 06.15.b03 Main status word. 15: **Tripped (-1)**; 06.15.b03 Main status word inverted. 16: **Open command**; 44.01.b00 Brake control status. 24: **Remote**; 06.11.b09 Main status word. 40: **RO/DIO control word bit 0**; 10.99.b00 RO/DIO control word. 41: **RO/DIO control word bit 1**; 10.99.b01 RO/DIO control word. 42: **RO/DIO control word bit 2**; 10.99.b02 RO/DIO control word. 43: **RO/DIO control word bit 8**; 10.99.b08 RO/DIO control word. 44: **RO/DIO control word bit 9**; 10.99.b09 RO/DIO control word.						
	0 … 44	Tripped (-1)	-	1 = 1	n	y	Parameter
11.07	**DIO1 ON delay**						
	Activation delay for digital input/output DIO1. Defines the activation delay for DIO1 (when used as a digital output or digital input).  t_{On} = 11.07 DIO1 ON delay t_{Off} = 11.08 DIO1 OFF delay *Electrical status of DIO (in input mode) or status of selected source (in output mode). Indicated by 11.01 DIO status. **Indicated by 11.02 DIO delayed status.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
11.08	**DIO1 OFF delay**						
	Deactivation delay for digital input/output DIO1. Defines the deactivation delay for DIO1 (when used as a digital output or digital input). See 11.07 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.09	**DIO2 function**						
	Function of digital input/output DIO2. Selects whether DIO2 is used as a digital output or input, or a frequency output. 0: **Output**; DIO2 is used as a digital output. 1: **Input**; DIO2 is used as a digital input. 2: **Frequency**; DIO2 is used as a **frequency output**.						
	0 … 2	Output	-	1 = 1	n	y	Parameter
11.10	**DIO2 output source**						
	Source for digital input/output DIO2. Selects a signal/parameter bit to be connected to DIO2 when 11.09 DIO2 function = Output. See 11.06 DIO1 output source.						
	0 … 44	Warning	-	1 = 1	n	y	Parameter
11.11	**DIO2 ON delay**						
	Activation delay for digital input/output DIO2. Defines the activation delay for DIO2 (when used as a digital output or digital input). See 11.07 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
11.12	**DIO2 OFF delay**						
	Deactivation delay for digital input/output DIO2. Defines the deactivation delay for DIO2 (when used as a digital output or digital input). See 11.07 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
11.38	**Freq in 1 actual value**						
	Unscaled value of frequency input 1. Displays the value of frequency input 1 in Hz (via DIO1 when it is used as a frequency input) before scaling. See 11.42 Freq in 1 min.						
	0 … 16000	-	Hz	1 = 1 Hz	y	n	Signal
11.39	**Freq in 1 scaled**						
	Scaled value of frequency input 1. Displays the value of frequency input 1 (via DIO1 when it is used as a frequency input) after scaling. See 11.42 Freq in 1 min.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
11.42	**Freq in 1 min**						
	Minimum frequency of frequency input 1 (DIO 1). Defines the minimum input frequency for frequency input 1 in Hz (via DIO1 when it is used as a frequency input). Parameters 11.42 and 11.43 set the low and high limit of the frequency input signal in Hz. Scaling parameters 11.44 and 11.45 define the internal values that correspond to these limits as follows:  						
	0 … 16000	0	Hz	1 = 1 Hz	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.43	**Freq in 1 max**						
	Maximum frequency for frequency input 1 (DIO 1). Defines the maximum input frequency for frequency input 1 in Hz (via DIO1 when it is used as a frequency input). See 11.42 Freq in 1 min.						
	0 … 16000	16000	Hz	1 = 1 Hz	n	y	Parameter
11.44	**Freq in 1 scaled at min**						
	Internal value corresponding to the minimum value of frequency input 1 (DIO 1). Defines the value that corresponds internally to the minimum input frequency defined by 11.42 Freq in 1 min (via DIO1 when it is used as a frequency input). See 11.42 Freq in 1 min.						
	-32768.000 … 32767.000	0.000	-	1 = 1	n	y	Parameter
11.45	**Freq in 1 scaled at max**						
	Internal value corresponding to the maximum value of frequency input 1 (DIO 1). Defines the value that corresponds internally to the maximum input frequency defined by 11.43 Freq in 1 max (via DIO1 when it is used as a frequency input). See 11.42 Freq in 1 min.						
	-32768.000 … 32767.000	1500.000	-	1 = 1	n	y	Parameter
11.54	**Freq out 1 actual value**						
	Value of frequency output 1 (DIO 2). Displays the value of frequency output 1 after scaling in Hz (via DIO2 when it is used as a frequency output). See 11.58 Freq out 1 src min.						
	0 … 16000	-	Hz	1 = 1 Hz	y	n	Signal
11.55	**Freq out 1 source**						
	Source for frequency output 1 (DIO 2). Selects a signal/parameter to be connected to frequency output 1 (via DIO2 when it is used as a frequency output). **Other**; source selection. 0: **Zero**; not in use. 1: **Used motor speed**; 01.01 Used motor speed filtered. 4: **Motor current**; 01.10 Motor current in A. 6: **Motor torque**; 01.17 Motor torque filtered. 8: **Output power**; 01.24 Output power in kW. 10: **Speed reference ramp input**; 23.01 Speed reference ramp input. 11: **Speed reference ramp output**; 23.02 Speed reference ramp output. 12: **Use speed reference**; 24.01 Used speed reference. 13: **Torque reference used**; 26.02 Torque reference used. 16: **Process PID output actual**; 40.01 Process PID output actual. 17: **Process PID feedback actual**; 40.02 Process PID feedback actual. 18: **Process PID setpoint actual**; 40.03 Process PID setpoint actual. 19: **Process PID deviation actual**; 40.04 Process PID deviation actual.						
	0 … 19	Used motor speed	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.58	**Freq out 1 src min**						
	Internal value corresponding to minimum value of frequency output 1 (DIO 2). Defines the internal value that corresponds to the minimum frequency of frequency output 1 (via DIO2 when it is used as a frequency output). Scaling parameters 11.58 and 11.59 set the low and high internal limits that corresponds to the frequency output values in Hz defined by parameters 11.60 and 11.61:  Setting parameter 11.58 as maximum value and parameter 11.59 as minimum value inverts the output:  						
	-32768.000 … 32767.000	0.000	-	1 = 1	n	y	Parameter
11.59	**Freq out 1 src max**						
	Internal value corresponding to maximum value of frequency output 1 (DIO 2). Defines the internal value that corresponds to the maximum frequency of frequency output 1 (via DIO2 when it is used as a frequency output). See 11.58 Freq out 1 src min.						
	-32768.000 … 32767.000	1500.000	-	1 = 1	n	y	Parameter
11.60	**Freq out 1 at src min**						
	Minimum value of frequency output 1 (DIO 2). Defines the minimum frequency of frequency output 1 in Hz (via DIO2 when it is used as a frequency output). See 11.58 Freq out 1 src min.						
	0 … 16000	0	Hz	1 = 1 Hz	n	y	Parameter
11.61	**Freq out 1 at src max**						
	Maximum value of frequency output 1 (DIO 2). Defines the maximum frequency of frequency output 1 in Hz (via DIO2 when it is used as a frequency output). See 11.58 Freq out 1 src min.						
	0 … 16000	16000	Hz	1 = 1 Hz	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
11.81	**DIO filter time**						
	Filter time constant for 11.01 DIO status. Defines a filter time constant for 11.01 DIO status.						
	0.3 … 100.0	10.0	ms	10 = 1 ms	n	y	Parameter

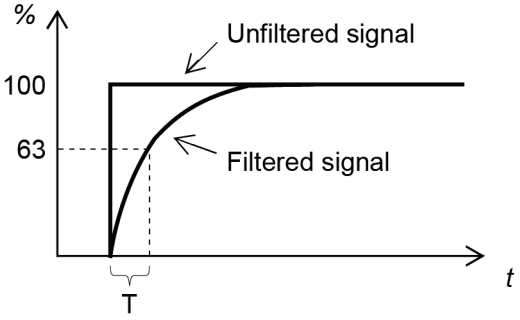
12 Standard AI

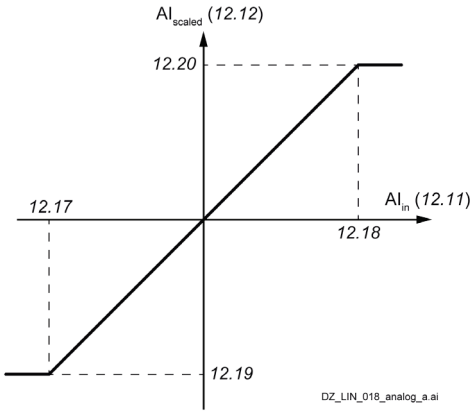
Configuration of standard analog inputs.

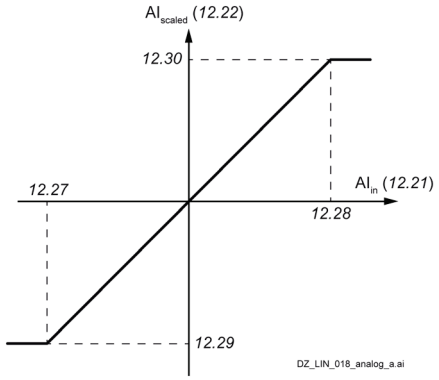
Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.03	**AI supervision function**						
	Supervision function analog inputs. Selects how the drive reacts when AI1 … AI3 signals move out of the minimum and/or maximum limits specified for the input. The inputs and the limits to be observed are selected by 12.04 AI supervision selection. The analog input signal supervision is activated when the analog input is used. E.g. set 22.11 Speed reference 1 = AI1 scaled, AI2 scaled or AI3 scaled. 0: **No action**; none, disable AI supervision function. 1: **Fault**; the event generates fault 80A0 AI supervision. 2: **Warning**; the event generates warning A8A0 AI supervision. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the evet generates warning A8A0 AI supervision and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A8A0 AI supervision and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break.						
	0 … 4	No action	-	1 = 1	n	y	Parameter
12.04	**AI supervision selection**						
	Activation of analog input supervision. Specifies which limits of AI1 … AI3 are supervised by12.03 AI supervision function. Bit assignment:						
	0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter

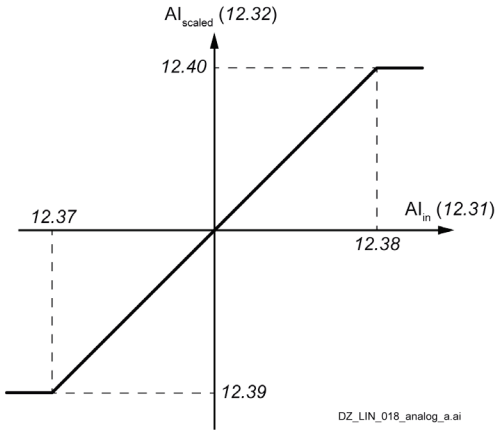
Bit	Name	Value	Remarks
0	AI1 < MIN	1	Minimum limit supervision of AI1 active.
1	AI1 > MAX	1	Maximum limit supervision of AI1 active.
2	AI2 < MIN	1	Minimum limit supervision of AI2 active.
3	AI2 > MAX	1	Maximum limit supervision of AI2 active.
4	AI3 < MIN	1	Minimum limit supervision of AI3 active.
5	AI3 > MAX	1	Maximum limit supervision of AI3 active.
6 … 15	reserved		

The supervision applies a margin of 1.0 V or 2.0 mA, see12.15 AI1 unit selection, to the limits.
Examples:
- 12.18 AI1 max = 7.000 V, then the maximum limit supervision activates at 8.000 V.
- 12.17 AI1 min = 4.000 mA, then the minimum limit supervision activates at 2.000 mA.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.11	**AI1 actual value**						
	Value of analog input AI1. Displays the value of AI1 in mA or V corresponding to the setting of jumper J1 (see chapter *Jumpers and switches* of this manual).						
	-22.000 … 22.000 or -11.000 … 11.000	-	mA or V	1000 = 1 mA or V	y	n	Signal
12.12	**AI1 scaled value**						
	Scaled value of analog input AI1. Displays the value of AI1 after scaling. See 12.19 AI1 scaled at AI1 min and 12.20 AI1 scaled at AI1 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
12.14	**AI1 offset**						
	Offset for analog input AI1. Adds an offset to 12.11 AI1 actual value.						
	-0.100 … 0.100	0.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.15	**AI1 unit selection**						
	Unit selection of analog input AI1. Selects the unit for readings and settings related to AI1. Set to either mA or V corresponding to the setting of jumper J1 (see chapter *Jumpers and switches* of this manual). Control board reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	V	mA or V	1 = 1	n	y	Parameter
12.16	**AI1 filter time**						
	Filter time constant of analog input AI1. Defines the filter time constant for AI1.  $O = I \times (1 - e^{-t/T})$ I = filter input (step) O = filter output *t* = time T = filter time constant SF_880_024_DCS_filter_a.ai The signal is also filtered due to the analog input hardware (approximately 0.25 ms time constant). This cannot be changed by any parameter.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.17	**AI1 min**						
	Minimum value of analog input AI1. Defines the minimum input value for AI1 in mA or V. Parameters 12.17 and 12.18 set the low and high limit of the analog input signal in mA or V. Scaling parameters 12.19 and 12.20 define the internal values that correspond to these limits as follows:  						
	-22.000 … 22.000 or -11.000 … 11.000	-20.000 or -10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.18	**AI1 max**						
	Maximum value of analog input AI1. Defines the maximum input value for AI1 in mA or V. See 12.17 AI1 min.						
	-22.000 … 22.000 or -11.000 … 11.000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.19	**AI1 scaled at AI1 min**						
	Internal value corresponding to minimum analog input AI1 value. Defines the internal value that corresponds to the minimum AI1 value defined by 12.17 AI1 min. Changing the polarity settings of 12.19 and 12.20 can effectively invert the analog input. See 12.17 AI1 min.						
	-32768.000 … 32767.000	-1500.000	-	1 = 1	n	y	Parameter
12.20	**AI1 scaled at AI1 max**						
	Internal value corresponding to maximum analog input AI1 value. Defines the internal value that corresponds to the maximum AI1 value defined by 12.18 AI1 max. See 12.17 AI1 min.						
	-32768.000 … 32767.000	1500.000	-	1 = 1	n	y	Parameter
12.21	**AI2 actual value**						
	Value of analog input AI2. Displays the value of AI2 in mA or V corresponding to the setting of jumper J2 (see chapter *Jumpers and switches* of this manual).						
	-22.000 … 22.000 or -11,000 … 11,000	-	mA or V	1000 = 1 mA or V	y	n	Signal
12.22	**AI2 scaled value**						
	Scaled value of analog input AI2. Displays the value of analog input AI2 after scaling. See 12.29 AI2 scaled at AI2 min and 12.30 AI2 scaled at AI2 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.24	**AI2 offset**						
	Offset for analog input AI2. Adds an offset to 12.21 AI2 actual value.						
	-0.100 … 0.100	0.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.25	**AI2 unit selection**						
	Unit selection of analog input AI2. Selects the unit for readings and settings related to AI2. Set to either mA or V corresponding to the setting of jumper J2 (see chapter *Jumpers and switches* of this manual). Control board reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	V	mA or V	1 = 1	n	y	Parameter
12.26	**AI2 filter time**						
	Filter time constant of analog input AI2. Defines the filter time constant for AI2. See 12.16 AI1 filter time.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter
12.27	**AI2 min**						
	Minimum value of analog input AI2. Defines the minimum input value for analog input AI2 in mA or V. Parameters 12.27 and 12.28 set the low and high limit of the analog input signal in mA or V. Scaling parameters 12.29 and 12.30 define the internal values that correspond to these limits as follows: 						
	-22.000 … 22.000 or -11,000 … 11,000	-20.000 or -10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.28	**AI2 max**						
	Maximum value of analog input AI2. Defines the maximum input value for AI2 in mA or V. See 12.27 AI2 min.						
	-22.000 … 22.000 or -11,000 … 11,000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
12.29	**AI2 scaled at AI2 min**						
	Internal value corresponding to minimum analog input AI2 value. Defines the internal value that corresponds to the minimum AI2 value defined by 12.27 AI2 min. Changing the polarity settings of 12.29 and 12.30 can effectively invert the analog input. See 12.27 AI2 min.						
	-32768.000 … 32767.000	-100.000	-	1 = 1	n	y	Parameter

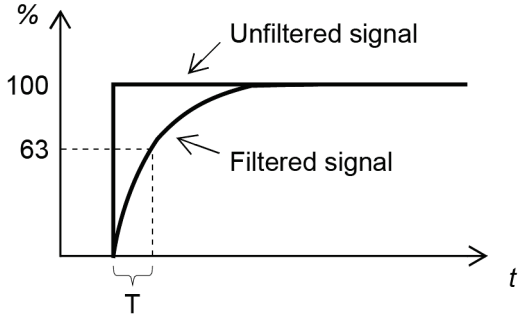
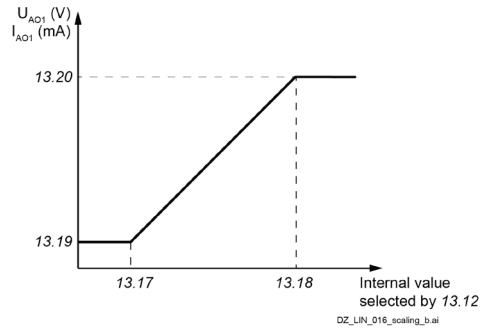
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.30	**AI2 scaled at AI2 max**						
	Internal value corresponding to maximum analog input AI2 value. Defines the internal value that corresponds to the maximum AI2 value defined by 12.28 AI2 max. See 12.27 AI2 min.						
	-32768.000 … 32767.000	100.000	-	1 = 1	n	y	Parameter
12.31	**AI3 actual value**						
	Value of analog input AI3. Displays the value of AI3 in V.						
	-11.000 … 11.000	-	V	1000 = 1 V	y	n	Signal
12.32	**AI3 scaled value**						
	Scaled value of analog input AI3. Displays the value of AI3 after scaling. See 12.39 AI3 scaled at AI3 min and 12.40 AI3 scaled at AI3 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
12.34	**AI3 offset**						
	Offset for analog input AI3. Adds an offset to 12.31 AI3 actual value.						
	-0.100 … 0.100	0.000	V	1000 = 1 V	n	y	Parameter
12.36	**AI3 filter time**						
	Filter time constant of analog input AI3. Defines the filter time constant for analog input AI3. See 12.16 AI1 filter time.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter
12.37	**AI3 min**						
	Minimum value of analog input AI3. Defines the minimum input value for AI3 in V. Parameters 12.37 and 12.38 set the low and high limit of the analog input signal in V. Scaling parameters 12.39 and 12.40 define the internal values that correspond to these limits as follows:  						
	-11.000 … 11.000	-10.000	V	1000 = 1 V	n	y	Parameter
12.38	**AI3 max**						
	Maximum value of analog input AI3. Defines the maximum input value for AI3 in V. See 12.37 AI3 min.						
	-11.000 … 11.000	10.000	V	1000 = 1 V	n	y	Parameter

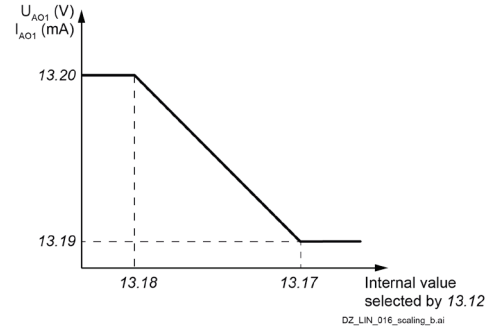
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
12.39	**AI3 scaled at AI3 min**						
	Internal value corresponding to minimum analog input AI3 value. Defines the internal value that corresponds to the minimum AI3 value defined by 12.37 AI3 min. Changing the polarity settings of 12.39 and 12.40 can effectively invert the analog input. See 12.37 AI3 min.						
	-32768.000 … 32767.000	-100.000	-	1 = 1	n	y	Parameter
12.40	**AI3 scaled at AI3 max**						
	Internal value corresponding to maximum analog input AI3 value. Defines the internal value that corresponds to the maximum AI3 value defined by 12.38 AI3 max. See 12.37 AI3 min.						
	-32768.000 … 32767.000	100.000	-	1 = 1	n	y	Parameter

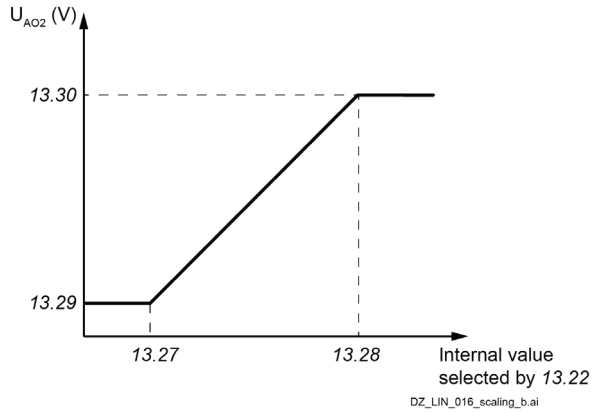
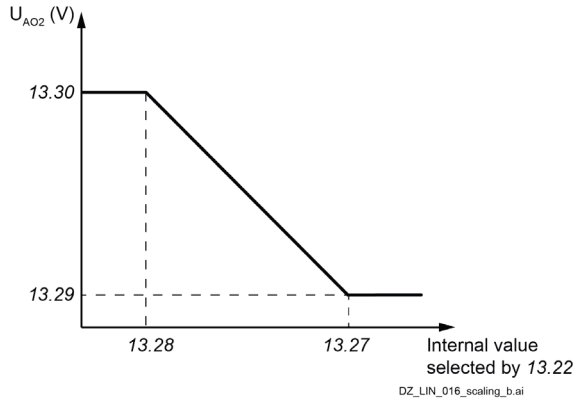
13 Standard AO

Configuration of standard analog outputs.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
13.11	**AO1 actual value**						
	Value of analog output AO1. Displays the value of AO1 in mA or V corresponding to the setting of jumper J5 (see chapter *Jumpers and switches* of this manual).						
	0.000 … 22.000 or -10,000 … 10,000	-	mA or V	1000 = 1 mA or V	y	n	Signal
13.12	**AO1 source**						
	Source for analog output AO1. Selects a signal/parameter to be connected to AO1. Alternatively, sets the output to excitation mode to feed a constant current to a temperature sensor. **Other**; source selection. 0: **Zero**; not in use. 1: **Used motor speed**; 01.01 Used motor speed filtered. 4: **Motor current**; 01.10 Motor current in A. 6: **Motor torque**; 01.17 Motor torque filtered. 8: **Output power**; 01.24 Output power in kW. 10: **Speed reference ramp input**; 23.01 Speed reference ramp input. 11: **Speed reference ramp output**; 23.02 Speed reference ramp output. 12: **Use speed reference**; 24.01 Used speed reference. 13: **Torque reference used**; 26.02 Torque reference used. 16: **Process PID output actual**; 40.01 Process PID output actual. 17: **Process PID feedback actual**; 40.02 Process PID feedback actual. 18: **Process PID setpoint actual**; 40.03 Process PID setpoint actual. 19: **Process PID deviation actual**; 40.04 Process PID deviation actual. 20: **Force PT100 excitation**; AO1 is used to feed an excitation current to 1 … 3 PT100 sensors. See chapter *Motor thermal protection* of this manual. 21: **Force KTY84 excitation**; AO1 is used to feed an excitation current to a KTY84 sensor. See chapter *Motor thermal protection* of this manual. 22: **Force PTC excitation**; AO1 is used to feed an excitation current to 1 … 3 PTC sensors. See chapter *Motor thermal protection* of this manual. 23: **Force PT1000 excitation**; AO1 is used to feed an excitation current to 1 … 3 PT1000 sensors. See chapter *Motor thermal protection* of this manual. 37: **AO1 data storage**; see 13.91 AO1 data storage.						

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	38: **AO2 data storage**; see 13.92 AO2 data storage.						
	0 … 38	Used motor speed	-	1 = 1	n	y	Parameter
13.15	**AO1 unit selection**						
	Unit selection of analog output AO1. Selects the unit for readings and settings related to AO1. Set to either mA or V corresponding to the setting of jumper J5 (see chapter *Jumpers and switches* of this manual). Control board reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	V	mA or V	1 = 1	n	y	Parameter
13.16	**AO1 filter time**						
	Filter time constant of analog output AO1. Defines the filter time constant for AO1.  $O = I \times (1 - e^{-t/T})$ I = filter input (step) O = filter output *t* = time T = filter time constant SF_880_024_DCS_filter_a.ai						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter
13.17	**AO1 source min**						
	Internal value corresponding to minimum analog output AO1 value. Defines the internal value that corresponds to the minimum required AO1 value. Scaling parameters 13.17 and 13.18 set the low and high internal limits that corresponds to the analog output values in mA or V defined by parameters 13.19 and 13.20:  Setting parameter 13.17 as maximum value and parameter 13.18 as minimum value inverts the output:						

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
							
	-32768.0 … 32767.0	-1500.0	-	1 = 1	n	y	Parameter
13.18	**AO1 source max**						
	Internal value corresponding to maximum analog output AO1 value. Defines the internal value that corresponds to the maximum required AO1 value. See 13.17 AO1 source min.						
	-32768.0 … 32767.0	1500.0	-	1 = 1	n	y	Parameter
13.19	**AO1 out at AO1 src min**						
	Minimum analog output AO1 value. Defines the minimum output value for AO1 in mA or V. See 13.17 AO1 source min.						
	0.000 … 22.000 or -10,000 … 10,000	0.000 or -10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
13.20	**AO1 out at AO1 src max**						
	Maximum analog output AO1 value. Defines the maximum output value for AO1 in mA or V. See 13.17 AO1 source min.						
	0.000 … 22.000 or -10,000 … 10,000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
13.21	**AO2 actual value**						
	Value of analog output AO2. Displays the value of AO2 in V.						
	-10.000 … 10.000	-	V	1000 = 1 V	y	n	Signal
13.22	**AO2 source**						
	Source for analog output AO2. Selects a signal/parameter to be connected to AO2. Alternatively, sets the output to excitation mode to feed a constant current to a temperature sensor. See 13.12 AO1 source.						
	0 … 38	Motor current	-	1 = 1	n	y	Parameter
13.26	**AO2 filter time**						
	Filter time constant of analog output AO2. Defines the filter time constant for AO2. See 13.16 AO1 filter time.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
13.27	**AO2 source min**						
	Internal value corresponding to minimum analog output AO2 value. Defines the internal value that corresponds to the minimum required AO2 value. Scaling parameters 13.27 and 13.28 set the low and high internal limits that corresponds to the analog output values in V defined by parameters 13.29 and 13.30:  Setting parameter 13.27 as maximum value and 13.28 as minimum value inverts the output:  						
	-32768.0 … 32767.0	-100.0	-	1 = 1	n	y	Parameter
13.28	**AO2 source max**						
	Internal value corresponding to maximum analog output AO2 value. Defines the internal value that corresponds to the maximum required AO2 value. See 13.27 AO2 source min.						
	-32768.0 … 32767.0	100.0	-	1 = 1	n	y	Parameter
13.29	**AO2 out at AO2 src min**						
	Minimum analog output AO2 value. Defines the minimum output value for AO2 in V. See 13.27 AO2 source min.						
	-10.000 … 10.000	-10.000	V	1000 = 1 V	n	y	Parameter
13.30	**AO2 out at AO2 src max**						
	Maximum analog output AO2 value. Defines the maximum output value for AO2 in V. See 13.27 AO2 source min.						
	-10.000 … 10.000	10.000	V	1000 = 1 V	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
13.80	**Scaling of fixed current output**						
	Scaling of fixed armature current output (IACT). Displays the scaling of the analog output for the armature current in amperes/10 V output voltage. This output is used to measure the armature current using an oscilloscope. See terminals SDCS-CON-H01 XAO:4 and XAO:5.						
	-32500 … 32500	-	A	1 = 1 A	y	n	Signal
13.91	**AO1 data storage**						
	Storage parameter for analog output AO1. Storage parameter to set analog output AO1 via e.g. a fieldbus. To set analog output AO1 send a value e.g. via embedded fieldbus (see 58.101 Data I/O 1 … 58.124 Data I/O 24). **Example**: Set 58.101 Data I/O 1 = AO1 data storage and 13.12 AO1 source = AO1 data storage.						
	-327.68 … 327.67	0.00	-	100 = 1	n	y	Parameter
13.92	**AO2 data storage**						
	Storage parameter for analog output AO2. Storage parameter to set analog output AO2 via e.g. a fieldbus. To set analog output AO2 send a value e.g. via embedded fieldbus (see 58.101 Data I/O 1 … 58.124 Data I/O 24). **Example**: Set 58.101 Data I/O 1 = AO2 data storage and 13.22 AO2 source = AO2 data storage.						
	-327.68 … 327.67	0.00	-	100 = 1	n	y	Parameter

14 I/O extension module 1

Configuration of I/O extension module 1.
The contents of the parameter group varies according to the selected I/O extension module type.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.01	**Module 1 type**						
	First I/O extension module. Activates (and specifies the type of) I/O extension module 1. 0: **None**; inactive. 1: **FIO-01**; adds 4 DIO and 2 RO. 2: **FIO-11**; adds 2 DIO, 3 AI and 1 AO. 3: **FDIO-01**; adds 3 DI and 2 RO. 4: **FAIO-01**; adds 2 AI and 2 AO.						
	0 … 4	None	-	1 = 1	n	n	Parameter
14.02	**Module 1 location**						
	First I/O extension module location. Activates and specifies the slot (1 … 3) on the drive's control board into which the I/O extension module 1 is installed. Alternatively, specifies the node ID of the slot on a FEA-03 extension module. 1: **Slot1**; I/O extension module 1 is located in Slot1. 2: **Slot2**; I/O extension module 1 is located in Slot2. 3: **Slot3**; I/O extension module 1 is located in Slot3. 4 … 254: Node ID of the slot on the FEA-03 extension module.						
	1 … 254	Slot1	-	1 = 1	n	n	Parameter
14.03	**Module 1 status**						
	First I/O extension module status. 0: **No option**; no module detected in the specified slot. 1: **No communication**; a module has been detected but cannot be communicated with. 2: **Unknown**; the module type is unknown. 15: **FIO-01**; a FIO-01 has been detected and is active.						

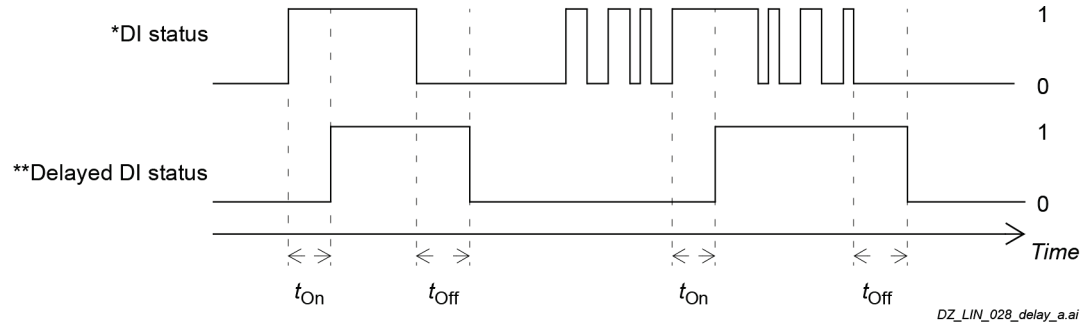
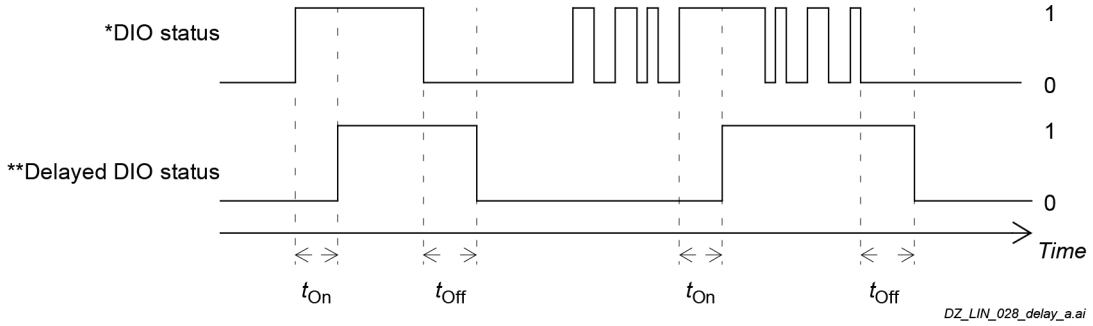
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	20: **FIO-11**; a FIO-11 has been detected and is active. 23: **FDIO-01**; a FDIO-01 has been detected and is active. 24: **FAIO-01**; a FAIO-01 has been detected and is active.						
	0 … 24	-	-	1 = 1	y	n	Signal
14.05	**DI status** Status of digital inputs. (Visible when 14.01 Module 1 type = FDIO-01) Displays the electrical status of DI1 … DI3. The activation/deactivation delays of the inputs (if any are specified) are ignored. A filtering time is defined by 14.08 DI filter time. Bits 0 … 2 reflect the status of DI1 … DI3. Example: 0000000000000011b = DI2 and DI1 are on, DI3 is off. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
14.05	**DIO status** Status of digital input/outputs. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Displays the status of DIO1 … DIO2/DIO4 on the extension module. The activation/deactivation delays (if any are specified) are ignored. A filtering time (for input mode) is defined by 14.08 DIO filter time. Bit 0 … 3 reflect the status of DIO1 … DIO4. The number of active bits in this parameter depends on the number of digital input/outputs on the extension module. **Example**: 0000000000001001b = DIO1 and DIO4 are on, remainder are off. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
14.06	**DI delayed status** Delayed status of digital inputs. (Visible when 14.01 Module 1 type = FDIO-01) Displays the delayed status of DI1 … DI3. This word is updated only after activation/deactivation delays (if any are specified). Bits 0 … 2 reflect the status of DI1 … DI3. **Example**: 0000000000000011b = DI2 and DI1 are on, DI3 is off. Bit assignment:						

Bit	Name	Value	Remarks
0	DI1	1	On.
1	DI2	1	On.
2	DI3	1	On.
3 … 15	reserved		

Bit	Name	Value	Remarks
0	DIO1	1	On.
1	DIO2	1	On.
2	DIO3	1	On.
3	DIO4	1	On.
4 … 15	reserved		

Bit	Name	Value	Remarks
0	DI1	1	On.
1	DI2	1	On.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	2 DI3 — 1 — On. 3 … 15 reserved						
	0000h … FFFFh	0000h	-	1 = 1	y	y	Parameter
14.06	**DIO delayed status**						
	Delayed status of digital input/outputs. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Displays the delayed status of DIO1 … DIO2/DIO4 on the extension module. This word is updated only after activation/deactivation delays (if any are specified). Bit 0 … 3 reflect the status of DIO1 … DIO4. The number of active bits in this parameter depends on the number of digital input/outputs on the extension module. **Example**: 000000000000001001b = DIO1 and DIO4 are on, remainder are off. Bit assignment:						
	Bit / **Name** / **Value** / **Remarks** 0 — DIO1 — 1 — On. 1 — DIO2 — 1 — On. 2 — DIO3 — 1 — On. 3 — DIO4 — 1 — On. 4 … 15 — reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
14.08	**DI filter time**						
	Filter time constant for 14.05 DI status. (Visible when 14.01 Module 1 type = FDIO-01) Defines a filter time constant for 14.05 DI status.						
	0.3 … 100.0	10.0	ms	10 = 1 ms	n	y	Parameter
14.08	**DIO filter time**						
	Filter time constant for 14.05 DIO status. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Defines a filter time constant for 14.05 DIO status.						
	0.3 … 100.0	10.0	ms	10 = 1 ms	n	y	Parameter
14.09	**DIO1 function**						
	Function of digital input/output DIO1. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Selects whether DIO1 of the extension module is used as a digital input or output. 0: Output; DIO1 is used as a digital output. 1: Input; DIO1 is used as a digital input.						
	0 … 1	Input	-	1 = 1	n	y	Parameter
14.11	**DIO1 output source**						
	Source for digital input/output DIO1. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Selects a signal/parameter bit to be connected to DIO1 of the extension module when parameter 14.09 DIO1 function = Output. **Other [bit]**; source selection. 0: **Not energized**; output is off. 1: **Energized**; output is on. 2: **Enabled**; 06.16.b02 Drive status word 1. 3: **Ready on**; 06.16.b03 Drive status word 1. 4: **Ready run**; 06.16.b04 Drive status word 1. 5: **Ready reference**; 06.16.b05 Drive status word 1.						

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	6: **At setpoint**; 06.15.b08 Main status word. 10: **Reverse**; 06.21.b02 Speed control status word. 11: **Zero speed**; 06.21.b00 Speed control status word. 12: **Above limit**; 06.17.b10 Drive status word 2. 13: **Warning**; 06.15.b07 Main status word. 14: **Tripped**; 06.15.b03 Main status word. 15: **Tripped (-1)**; 06.15.b03 Main status word inverted. 16: **Open command**; 44.01.b00 Brake control status. 24: **Remote**; 06.11.b09 Main status word. 40: **RO/DIO control word bit 0**; 10.99.b00 RO/DIO control word. 41: **RO/DIO control word bit 1**; 10.99.b01 RO/DIO control word. 42: **RO/DIO control word bit 2**; 10.99.b02 RO/DIO control word. 43: **RO/DIO control word bit 8**; 10.99.b08 RO/DIO control word. 44: **RO/DIO control word bit 9**; 10.99.b09 RO/DIO control word.						
	0 … 44	Not energized	-	1 = 1	n	y	Parameter
14.12	**DI1 ON delay** Activation delay for digital input DI1. (Visible when 14.01 Module 1 type = FDIO-01) Defines the activation delay for DI1.  t_{On} = 14.12 DI1 ON delay t_{Off} = 14.13 DI1 OFF delay *Electrical status of digital input. Indicated by 14.05 DI status. **Indicated by 14.06 DI delayed status.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.12	**DIO1 ON delay** Activation delay for digital input/output DIO1. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Defines the activation delay for DIO1.  t_{On} = 14.12 DIO1 ON delay t_{Off} = 14.13 DIO1 OFF delay						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	*Electrical status of DIO (in input mode) or status of selected source (in output mode). Indicated by 14.05 DIO status. **Indicated by 14.06 DIO delayed status.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.13	**DI1 OFF delay**						
	Deactivation delay for digital input DI1. (Visible when 14.01 Module 1 type = FDIO-01) Defines the deactivation delay for DI1. See 14.12 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.13	**DIO1 OFF delay**						
	Deactivation delay for digital input/output DIO1. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Defines the deactivation delay for DIO1 (when used as a digital output or digital input). See 14.12 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.14	**DIO2 function**						
	Function of digital input/output DIO2. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Selects whether DIO2 of the extension module is used as a digital input or output. 0: **Output**; DIO2 is used as a digital output. 1: **Input**; DIO2 is used as a digital input.						
	0 … 1	Input	-	1 = 1	n	y	Parameter
14.16	**DIO2 output source**						
	Source for digital input/output DIO2. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Selects a signal/parameter bit to be connected to DIO2 when parameter 14.14 DIO2 function = Output. See 14.11 DIO1 output source.						
	0 … 44	Not energized	-	1 = 1	n	y	Parameter
14.17	**DI2 ON delay**						
	Activation delay for digital input DI2. (Visible when 14.01 Module 1 type = FDIO-01) Defines the activation delay for DI2. See 14.12 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.17	**DIO2 ON delay**						
	Activation delay for digital input/output DIO2. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Defines the activation delay for DIO2. See 14.12 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.18	**DI2 OFF delay**						
	Deactivation delay for digital input DI2. (Visible when 14.01 Module 1 type = FDIO-01) Defines the deactivation delay for DI2. See 14.12 DI1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.18	**DIO2 OFF delay**						
	Deactivation delay for digital input/output DIO2. (Visible when 14.01 Module 1 type = FIO-01 or FIO-11) Defines the deactivation delay for DIO2. See 14.12 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.19	**DIO3 function**						
	Function of digital input/output DIO3. (Visible when 14.01 Module 1 type = FIO-01) Selects whether DIO3 of the extension module is used as a digital input or output. 0: **Output**; DIO3 is used as a digital output. 1: **Input**; DIO3 is used as a digital input.						
	0 … 1	Input	-	1 = 1	n	y	Parameter
14.19	**AI supervision function**						
	Supervision function analog inputs. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Selects how the unit reacts when AI1 … AI2/AI3 signals move out of the minimum and/or maximum limits specified for the input. The inputs and the limits to be observed are selected by parameter 14.20 AI supervision selection. The analog input signal supervision is activated when the analog input is used. E.g. set 22.11 Speed reference 1 = AI1 scaled, AI2 scaled or AI3 scaled. 0: **No action**; none, disable AI supervision function. 1: **Fault**; the event generates fault 80A0 AI supervision. 2: **Warning**; the event generates warning A8A0 AI supervision. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the event generates warning A8A0 AI supervision and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A8A0 AI supervision and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break.						
	0 … 4	No action	-	1 = 1	n	y	Parameter
14.20	**AI supervision selection**						
	Activation of analog input supervision. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Specifies which limits of AI1 … AI2/AI3 are supervised by 14.19 AI supervision function. Bit assignment:						

Bit	Name	Value	Remarks
0	AI1 < MIN	1	Minimum limit supervision of AI1 active.
1	AI1 > MAX	1	Maximum limit supervision of AI1 active.
2	AI2 < MIN	1	Minimum limit supervision of AI2 active.
3	AI2 > MAX	1	Maximum limit supervision of AI2 active.
4	AI3 < MIN	1	Minimum limit supervision of AI3 active.
5	AI3 > MAX	1	Maximum limit supervision of AI3 active.
6 … 15	reserved		

The supervision applies a margin of 1.0 V or 2.0 mA, see14.30 AI1 unit selection, to the limits.
Examples:

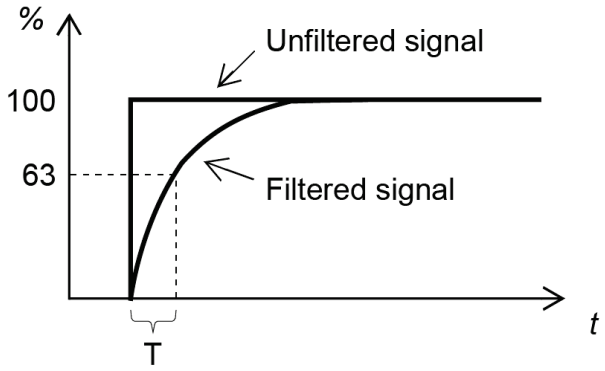
<table>
<tr><th>Index</th><td colspan="7">Name</td></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">14.34 AI1 max = 7.000 V, then the maximum limit supervision activates at 8.000 V.
14.33 AI1 min = 4.000 mA, then the minimum limit supervision activates at 2.000 mA.</td></tr>
<tr><td></td><td>0000h … FFFFh</td><td>0000h</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.21</td><td colspan="7">DIO3 output source</td></tr>
<tr><td></td><td colspan="7">Source for digital input/output DIO3.
(Visible when 14.01 Module 1 type = FIO-01)
Selects a signal/parameter bit to be connected to DIO3 when 14.19 DIO3 function = Output.
See 14.11 DIO1 output source.</td></tr>
<tr><td></td><td>0 … 44</td><td>Not energized</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.22</td><td colspan="7">DI3 ON delay</td></tr>
<tr><td></td><td colspan="7">Activation delay for digital input DI3.
(Visible when 14.01 Module 1 type = FDIO-01)
Defines the activation delay for DI3.
See 14.12 DI1 ON delay.</td></tr>
<tr><td></td><td>0.0 … 3000.0</td><td>0.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.22</td><td colspan="7">DIO3 ON delay</td></tr>
<tr><td></td><td colspan="7">Activation delay for digital input/output DIO3.
(Visible when 14.01 Module 1 type = FIO-01)
Defines the activation delay for DIO3.
See 14.12 DIO1 ON delay.</td></tr>
<tr><td></td><td>0.0 … 3000.0</td><td>0.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.22</td><td colspan="7">AI force selection</td></tr>
<tr><td></td><td colspan="7">Forced values selector for analog inputs.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
The true readings of AI1 … AI2/AI3 can be overridden for e.g. testing purposes. A forced value parameter (see table below) is provided for each analog input and its value is applied whenever the corresponding bit in 14.22 AI force selection is 1.
Bit assignment:

<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Remarks</th></tr>
<tr><td>0</td><td>AI1</td><td>1</td><td>Force mode: Force AI1 to value of 14.28 AI1 force data.</td></tr>
<tr><td>1</td><td>AI2</td><td>1</td><td>Force mode: Force AI2 to value of 14.43 AI2 force data.</td></tr>
<tr><td>2</td><td>AI3</td><td>1</td><td>Force mode: Force AI3 to value of 14.58 AI3 force data (FIO-11 only).</td></tr>
<tr><td>3 … 15</td><td>reserved</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td></td><td>0000h … FFFFh</td><td>0000h</td><td>-</td><td>1 = 1</td><td>y</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.23</td><td colspan="7">DI3 OFF delay</td></tr>
<tr><td></td><td colspan="7">Deactivation delay for digital input DI3.
(Visible when 14.01 Module 1 type = FDIO-01)
Defines the deactivation delay for DI3.
See 14.12 DI1 ON delay.</td></tr>
<tr><td></td><td>0.0 … 3000.0</td><td>0.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.23</td><td colspan="7">DIO3 OFF delay</td></tr>
<tr><td></td><td colspan="7">Deactivation delay for digital input/output DIO3.
(Visible when 14.01 Module 1 type = FIO-01)
Defines the deactivation delay for DIO3.
See 14.12 DIO1 ON delay.</td></tr>
<tr><td></td><td>0.0 … 3000.0</td><td>0.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

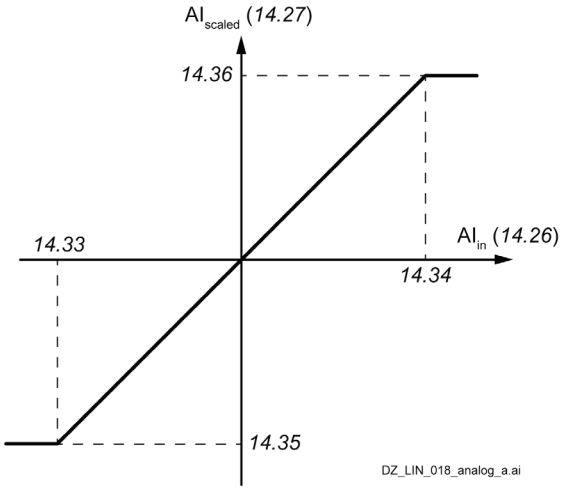
Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.24	**DIO4 function**						
	Function of digital input/output DIO4. (Visible when 14.01 Module 1 type = FIO-01) Selects whether DIO4 of the extension module is used as a digital input or output. 0: **Output**; DIO4 is used as a digital output. 1: **Input**; DIO4 is used as a digital input.						
	0 … 1	Input	-	1 = 1	n	y	Parameter
14.26	**DIO4 output source**						
	Source for digital input/output DIO4. (Visible when 14.01 Module 1 type = FIO-01) Selects a signal/parameter bit to be connected to DIO4 when 14.24 DIO4 function = Output. See 14.11 DIO1 output source.						
	0 … 44	Not energized	-	1 = 1	n	y	Parameter
14.26	**AI1 actual value**						
	Value of analog input AI1. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Displays the value of AI1 in mA or V, depending on whether the input is set to current or voltage.						
	-22.000 … 22.000 or -11.000 … 11.000	-	mA or V	1000 = 1 mA or V	y	n	Signal
14.27	**DIO4 ON delay**						
	Activation delay for digital input/output DIO4. (Visible when 14.01 Module 1 type = FIO-01) Defines the activation delay for DIO4. See 14.12 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.27	**AI1 scaled value**						
	Scaled value of analog input AI1. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Displays the value of AI1 after scaling. See 14.35 AI1 scaled at AI1 min and 14.36 AI1 scaled at AI1 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
14.28	**DIO4 OFF delay**						
	Deactivation delay for digital input/output DIO4. (Visible when 14.01 Module 1 type = FIO-01) Defines the deactivation delay for DIO4. See 14.12 DIO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.28	**AI1 force data**						
	Forced value of analog input AI1. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Forced value that can be used instead of the true input value. See 14.22 AI force selection.						
	-22.000 … 22.000 or -11.000 … 11.000	0.000	mA or V	1000 = 1 mA or V	y	y	Parameter

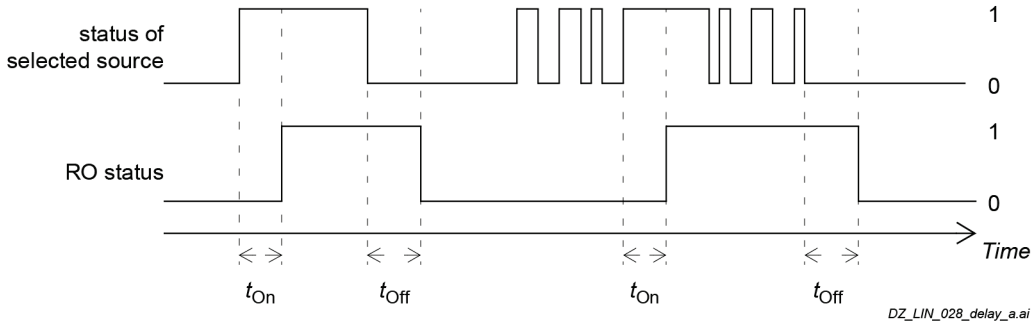
<table>
<tr><th>Index</th><td colspan="7">Name</td></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>14.29</td><td colspan="7">AI1 HW switch position</td></tr>
<tr><td></td><td colspan="7">Unit selection switch of analog input AI1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Displays the position of the hardware current/voltage selector on the I/O extension module.
The setting of the current/voltage selector must match the unit selection made in 14.30 AI1 unit selection. I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings.
2: V; volts.
10: mA; milli amperes.</td></tr>
<tr><td></td><td>2 … 10</td><td>-</td><td>mA or V</td><td>1 = 1</td><td>y</td><td>n</td><td>Signal</td></tr>
<tr><td>14.30</td><td colspan="7">AI1 unit selection</td></tr>
<tr><td></td><td colspan="7">Unit selection of analog input AI1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Selects the unit for readings and settings related to AI1. Set to either mA or V corresponding to the setting of the I/O extension module (see manual of the I/O extension module). The hardware setting is also shown in 14.29 AI1 HW switch position.
I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings.
2: V; volts.
10: mA; milli amperes.</td></tr>
<tr><td></td><td>2 … 10</td><td>mA</td><td>mA or V</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.31</td><td colspan="7">RO status</td></tr>
<tr><td></td><td colspan="7">Status of relay outputs.
(Visible when 14.01 Module 1 type = FIO-01or FDIO-01)
Displays the status of RO1 … RO2 on the I/O extension module.
Example: 0000000000000001b = RO1 is energized, RO2 is de-energized.
Bit assignment:

<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Remarks</th></tr>
<tr><td>0</td><td>RO1</td><td>1</td><td>Energized</td></tr>
<tr><td>1</td><td>RO2</td><td>1</td><td>Energized</td></tr>
<tr><td>2 … 15</td><td>reserved</td><td></td><td></td></tr>
</table></td></tr>
<tr><td></td><td>0000h … FFFFh</td><td>-</td><td>-</td><td>1 = 1</td><td>y</td><td>n</td><td>Signal</td></tr>
<tr><td>14.31</td><td colspan="7">AI1 filter gain</td></tr>
<tr><td></td><td colspan="7">Hardware filter time constant of analog input AI1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Selects a hardware filter time constant for AI1.
See 14.32 AI1 filter time.
0: No filtering; no filtering.
1: 125 µs; 125 microseconds.
2: 250 µs; 250 microseconds.
3: 500 µs; 500 microseconds.
4: 1 ms; 1 millisecond.
5: 2 ms; 2 milliseconds.
6: 4 ms; 4 milliseconds.
7: 7.9375 ms; 7.9375 milliseconds.</td></tr>
<tr><td></td><td>0 … 7</td><td>1 ms</td><td>µs or ms</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

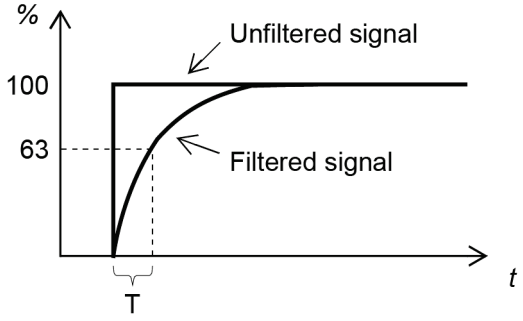
<table>
<tr><td rowspan="3">Index</td><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>14.32</td><td colspan="7">AI1 filter time
Filter time constant of analog input AI1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Defines the filter time constant for AI1.
 

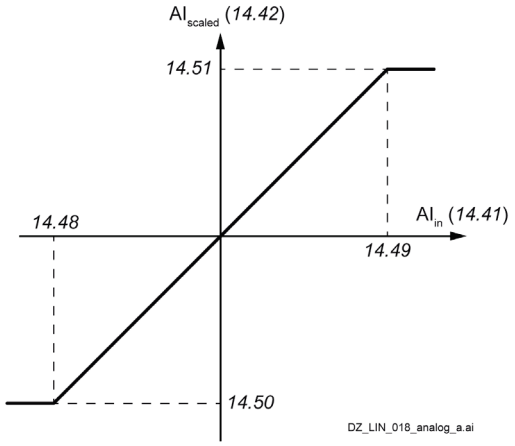
$O = I \times (1 - e^{-t/T})$

I = filter input (step)
O = filter output
t = time
T = filter time constant
SF_880_024_DCS_filter_a.ai
The signal is also filtered due to the analog input hardware. See 14.31 AI1 filter gain.</td></tr>
<tr><td>0.000 … 30.000</td><td>0.100</td><td>s</td><td>1000 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.33</td><td colspan="7">AI1 min
Minimum value of analog input AI1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Defines the minimum value for AI1 in mA or V.
Parameters 14.33 and 14.34 set the low and high limit of the analog input signal in mA or V. Scaling parameters 14.35 and 14.36 define the internal values that correspond to these limits as follows:
 
</td></tr>
<tr><td>-22.000 … 22.000 or
-11.000 … 11.000</td><td>-20.000 or
-10.000</td><td>mA or V</td><td>1000 = 1 mA or V</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

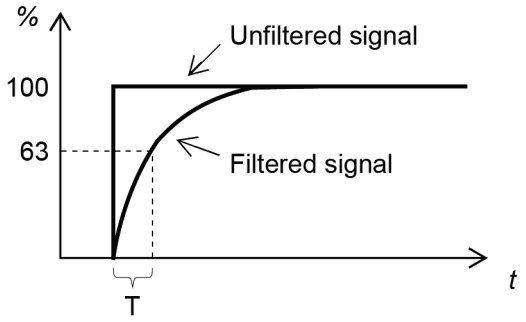
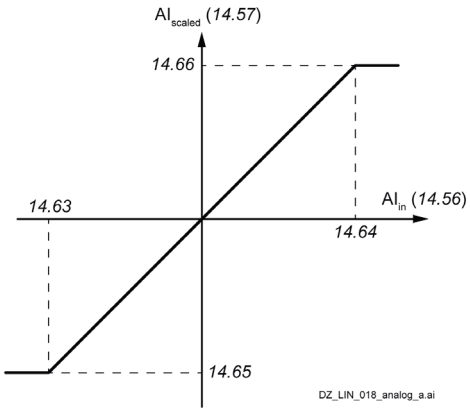
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.34	**RO1 source** Source for relay output RO1. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Selects a signal/parameter bit to be connected to RO1. See 14.11 DIO1 output source.						
	0 … 44	Not energized	-	1 = 1	n	y	Parameter
14.34	**AI1 max** Maximum value of analog input AI1. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the maximum value for AI1 in mA or V. See 14.33 AI1 min.						
	-22.000 … 22.000 or -11.000 … 11.000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
14.35	**RO1 ON delay** Activation delay for relay output RO1. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Defines the activation delay for RO1.  t_{On} = 14.35 RO1 ON delay t_{Off} = 14.36 RO1 OFF delay						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.35	**AI1 scaled at AI1 min** Internal value corresponding to minimum analog input AI1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the minimum AI1 value defined by 14.33 AI1 min. See 14.33 AI1 min.						
	-32768.000 … 32767.000	-100.000	-	1 = 1	n	y	Parameter
14.36	**RO1 OFF delay** Deactivation delay for relay output RO1. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Defines the deactivation delay for RO1. See 14.35 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.36	**AI1 scaled at AI1 max** Internal value corresponding to maximum analog input AI1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the maximum AI1 value defined by 14.34 AI1 max. See 14.33 AI1 min.						
	-32768.000 … 32767.000	100.000	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.37	**RO2 source**						
	Source for relay output RO2. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Selects a signal/parameter bit to be connected to RO2. See 14.11 DIO1 output source.						
	0 … 44	Not energized	-	1 = 1	n	y	Parameter
14.38	**RO2 ON delay**						
	Activation delay for relay output RO2. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Defines the activation delay for RO2. See 14.35 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.39	**RO2 OFF delay**						
	Deactivation delay for relay output RO2. (Visible when 14.01 Module 1 type = FIO-01or FDIO-01) Defines the deactivation delay for RO2. See 14.35 RO1 ON delay.						
	0.0 … 3000.0	0.0	s	10 = 1 s	n	y	Parameter
14.41	**AI2 actual value**						
	Value of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Displays the value of AI2 in mA or V, depending on whether the input is set to current or voltage.						
	-22.000 … 22.000 or -11.000 … 11.000	-	mA or V	1000 = 1 mA or V	y	n	Signal
14.42	**AI2 scaled value**						
	Scaled value of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Displays the value of AI2 after scaling. See 14.50 AI2 scaled at AI2 min and 14.51 AI2 scaled at AI2 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
14.43	**AI2 force data**						
	Forced value of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Forced value that can be used instead of the true input value. See 14.22 AI force selection.						
	-22.000 … 22.000 or -11.000 … 11.000	0.000	mA or V	1000 = 1 mA or V	y	y	Parameter
14.44	**AI2 HW switch position**						
	Unit selection switch of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Displays the position of the hardware current/voltage selector on the I/O extension module. The setting of the current/voltage selector must match the unit selection made in 14.45 AI2 unit selection. I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	-	mA or V	1 = 1	y	n	Signal

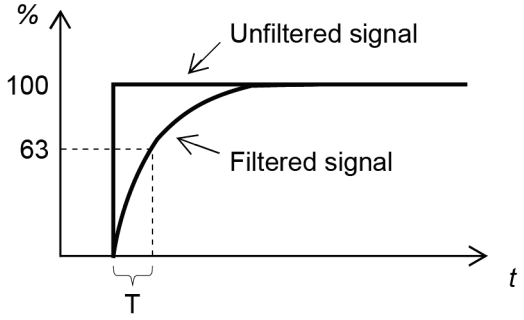
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.45	**AI2 unit selection**						
	Unit selection of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Selects the unit for readings and settings related to AI2. Set to either mA or V corresponding to the setting of the I/O extension module (see the manual of the I/O extension module). The hardware setting is also shown in 14.44 AI2 HW switch position. I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	mA	mA or V	1 = 1	n	y	Parameter
14.46	**AI2 filter gain**						
	Hardware filter time constant of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Selects a hardware filter time constant for AI2. See 14.47 AI2 filter time. 0: **No filtering**; no filtering. 1: **125 µs**; 125 microseconds. 2: **250 µs**; 250 microseconds. 3: **500 µs**; 500 microseconds. 4: **1 ms**; 1 millisecond. 5: **2 ms**; 2 milliseconds. 6: **4 ms**; 4 milliseconds. 7: **7.9375 ms**; 7.9375 milliseconds.						
	0 … 7	1 ms	µs or ms	1 = 1	n	y	Parameter
14.47	**AI2 filter time**						
	Filter time constant of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the filter time constant for AI2.  $O = I \times (1 - e^{-t/T})$ I = filter input (step) O = filter output *t* = time T = filter time constant SF_880_024_DCS_filter_a.ai The signal is also filtered due to the analog input hardware. See 14.46 AI2 filter gain.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.48	**AI2 min**						
	Minimum value of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the minimum value for AI2 in mA or V. Parameters 14.48 and 14.49 set the low and high limit of the analog input signal in mA or V. Scaling parameters 14.50 and 14.51 define the internal values that correspond to these limits as follows:  						
	-22.000 … 22.000 or -11.000 … 11.000	-20.000 or -10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
14.49	**AI2 max**						
	Maximum value of analog input AI2. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the maximum value for AI2 in mA or V. See 14.48 AI2 min.						
	-22.000 … 22.000 or -11.000 … 11.000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
14.50	**AI2 scaled at AI2 min**						
	Internal value corresponding to minimum analog input AI2 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the minimum AI2 value defined by 14.48 AI2 min. See 14.48 AI2 min.						
	-32768.000 … 32767.000	-100.000	-	1 = 1	n	y	Parameter
14.51	**AI2 scaled at AI2 max**						
	Internal value corresponding to maximum analog input AI2 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the maximum AI2 value defined by 14.49 AI2 max. See 14.48 AI2 min.						
	-32768.000 … 32767.000	100.000	-	1 = 1	n	y	Parameter
14.56	**AI3 actual value**						
	Value of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Displays the value of AI3 in mA or V, depending on whether the input is set to current or voltage.						
	-22.000 … 22.000 or -11.000 … 11.000	-	mA or V	1000 = 1 mA or V	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.57	**AI3 scaled value**						
	Scaled value of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Displays the value of AI3 after scaling. See 14.65 AI3 scaled at AI3 min and 14.66 AI3 scaled at AI3 max.						
	-32768.000 … 32767.000	-	-	1 = 1	y	n	Signal
14.58	**AI3 force data**						
	Forced value of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Forced value that can be used instead of the true input value. See 14.22 AI force selection.						
	-22.000 … 22.000 or -11.000 … 11.000	0.000	mA or V	1000 = 1 mA or V	y	y	Parameter
14.59	**AI3 HW switch position**						
	Unit selection switch of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Displays the position of the hardware current/voltage selector on the I/O extension module. The setting of the current/voltage selector must match the unit selection made in 14.60 AI3 unit selection. I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	-	mA or V	1 = 1	y	n	Signal
14.60	**AI3 unit selection**						
	Unit selection of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Selects the unit for readings and settings related to AI3. Set to either mA or V corresponding to the setting of the I/O extension module (see manual of the I/O extension module). The hardware setting is also shown in 14.59 AI3 HW switch position. I/O module reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings. 2: V; volts. 10: mA; milli amperes.						
	2 … 10	mA	mA or V	1 = 1	n	y	Parameter
14.61	**AI3 filter gain**						
	Hardware filter time constant of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Selects a hardware filter time constant for AI3. See 14.62 AI3 filter time. 0: **No filtering**; no filtering. 1: **125 µs**; 125 microseconds. 2: **250 µs**; 250 microseconds. 3: **500 µs**; 500 microseconds. 4: **1 ms**; 1 millisecond. 5: **2 ms**; 2 milliseconds. 6: **4 ms**; 4 milliseconds. 7: **7.9375 ms**; 7.9375 milliseconds.						
	0 … 7	1 ms	µs or ms	1 = 1	n	y	Parameter

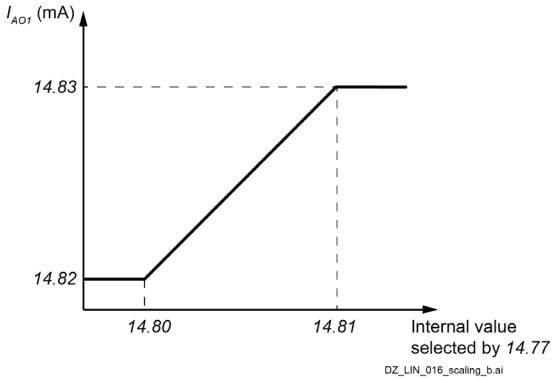
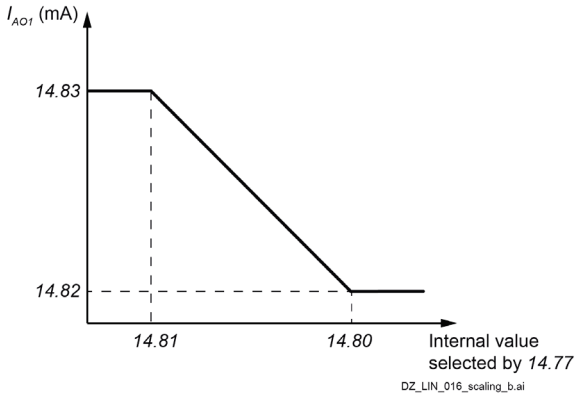
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.62	**AI3 filter time**						
	Filter time constant of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Defines the filter time constant for AI3.  $O = I \times (1 - e^{-t/T})$ I = filter input (step) O = filter output *t* = time T = filter time constant SF_880_024_DCS_filter_a.ai The signal is also filtered due to the analog input hardware. See 14.61 AI3 filter gain.						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter
14.63	**AI3 min**						
	Minimum value of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Defines the minimum value for AI3 mA or V. Parameters 14.63 and 14.64 set the low and high limit of the analog input signal in mA or V. Scaling parameters 14.65 and 14.66 define the internal values that correspond to these limits as follows:  						
	-22.000 … 22.000 or -11.000 … 11.000	-20.000 or -10.000	mA or V	1000 = 1 mA or V	n	y	Parameter
14.64	**AI3 max**						
	Maximum value of analog input AI3. (Visible when 14.01 Module 1 type = FIO-11) Defines the maximum value for AI3 in mA or V. See 14.63 AI3 min.						
	-22.000 … 22.000 or -11.000 … 11.000	20.000 or 10.000	mA or V	1000 = 1 mA or V	n	y	Parameter

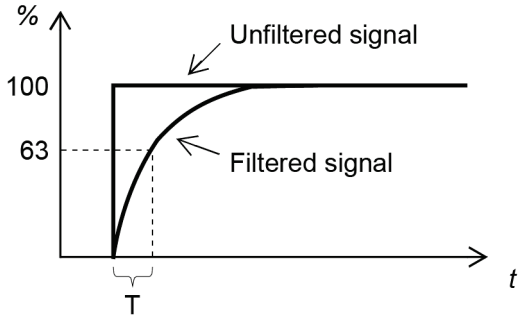
<table>
<tr><th>Index</th><th colspan="7">Name</th></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>14.65</td><td colspan="7">AI3 scaled at AI3 min</td></tr>
<tr><td></td><td colspan="7">Internal value corresponding to minimum analog input AI3 value.
(Visible when 14.01 Module 1 type = FIO-11)
Defines the internal value that corresponds to the minimum AI3 value defined by 14.63 AI3 min.
See 14.63 AI3 min.</td></tr>
<tr><td></td><td>-32768.000 … 32767.000</td><td>-100.000</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.66</td><td colspan="7">AI3 scaled at AI3 max</td></tr>
<tr><td></td><td colspan="7">Internal value corresponding to maximum analog input AI3 value.
(Visible when 14.01 Module 1 type = FIO-11)
Defines the internal value that corresponds to the maximum AI3 value defined by 14.64 AI3 max.
See 14.63 AI3 min.</td></tr>
<tr><td></td><td>-32768.000 … 32767.000</td><td>100.000</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.71</td><td colspan="7">AO force selection</td></tr>
<tr><td></td><td colspan="7">Forced values selector for analog outputs.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
The value of AO1 … AO1/AO2 can be overridden for e.g. testing purposes. A forced value parameter (see table below) is provided for each analog output and its value is applied whenever the corresponding bit in 14.71 AO fore selection is 1.
Bit assignment:
<table><tr><th>Bit</th><th>Name</th><th>Value</th><th>Remarks</th></tr><tr><td>0</td><td>AO1</td><td>1</td><td>Force mode: Force AO1 to value of 14.78 AO1 force data.</td></tr><tr><td>1</td><td>AO2</td><td>1</td><td>Force mode: Force AO2 to value of 14.88 AO2 force data (FAIO-01 only).</td></tr><tr><td>2 … 15</td><td>reserved</td><td></td><td></td></tr></table></td></tr>
<tr><td></td><td>0000h … FFFFh</td><td>0000h</td><td>-</td><td>1 = 1</td><td>y</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.76</td><td colspan="7">AO1 actual value</td></tr>
<tr><td></td><td colspan="7">Value of analog output AO1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Displays the value of AO1 in mA.</td></tr>
<tr><td></td><td>0.000 … 22.000</td><td>-</td><td>mA</td><td>1000 = 1 mA</td><td>y</td><td>n</td><td>Signal</td></tr>
<tr><td>14.77</td><td colspan="7">AO1 source</td></tr>
<tr><td></td><td colspan="7">Source for analog output AO1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Selects a signal/parameter to be connected to AO1. Alternatively, sets the output to excitation mode to feed a constant current to a temperature sensor.
Other; source selection.
0: Zero; not in use.
1: Used motor speed; 01.01 Used motor speed filtered.
4: Motor current; 01.10 Motor current in A.
6: Motor torque; 01.17 Motor torque filtered.
8: Output power; 01.24 Output power in kW.
10: Speed reference ramp input; 23.01 Speed reference ramp input.
11: Speed reference ramp output; 23.02 Speed reference ramp output.
12: Use speed reference; 24.01 Used speed reference.
13: Torque reference used; 26.02 Torque reference used.
16: Process PID output actual; 40.01 Process PID output actual.
17: Process PID feedback actual; 40.02 Process PID feedback actual.
18: Process PID setpoint actual; 40.03 Process PID setpoint actual.
19: Process PID deviation actual; 40.04 Process PID deviation actual.</td></tr>
</table>

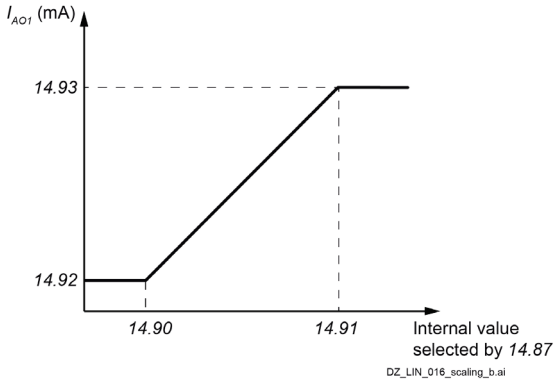
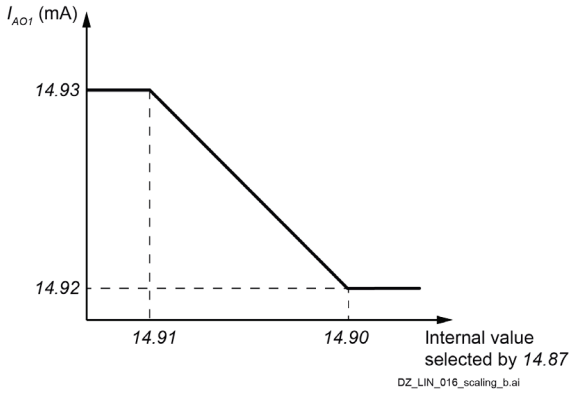
<table>
<tr><th rowspan="3">Index</th><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">20: Force PT100 excitation; AO1 is used to feed an excitation current to 1 … 3 PT100 sensors. See chapter Motor thermal protection of this manual.
21: Force KTY84 excitation; AO1 is used to feed an excitation current to a KTY84 sensor. See chapter Motor thermal protection of this manual.
22: Force PTC excitation; AO1 is used to feed an excitation current to 1 … 3 PTC sensors. See chapter Motor thermal protection of this manual.
23: Force PT1000 excitation; AO1 is used to feed an excitation current to 1 … 3 PT1000 sensors. See chapter Motor thermal protection of this manual.
37: AO1 data storage; see 13.91 AO1 data storage.
38: AO2 data storage; see 13.92 AO2 data storage.</td></tr>
<tr><td></td><td>0 … 38</td><td>Zero</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.78</td><td colspan="7">AO1 force data</td></tr>
<tr><td></td><td colspan="7">Forced value of analog output AO1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Forced value that can be used instead of the selected output signal.
See 14.71 AO force selection.</td></tr>
<tr><td></td><td>0.000 … 22.000</td><td>0.000</td><td>mA</td><td>1000 = 1 mA</td><td>y</td><td>y</td><td>Parameter</td></tr>
<tr><td>14.79</td><td colspan="7">AO1 filter time</td></tr>
<tr><td></td><td colspan="7">Filter time constant of analog output AO1.
(Visible when 14.01 Module 1 type = FIO-11 or FAIO-01)
Defines the filter time constant for AO1.
 

$O = I \times (1 - e^{-t/T})$

I = filter input (step)
O = filter output
t = time
T = filter time constant
SF_880_024_DCS_filter_a.ai</td></tr>
<tr><td></td><td>0.000 … 30.000</td><td>0.100</td><td>s</td><td>1000 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.80	**AO1 source min**						
	Internal value corresponding to minimum analog output AO1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the minimum required AO1 value. Scaling parameters 14.80 and 14.81 set the low and high internal limits that corresponds to the analog output values in mA defined by parameters 14.82 and 14.83:  Setting parameter 14.82 as maximum value and 14.83 as minimum value inverts the output:  						
	-32768.0 … 32767.0	0.0	-	1 = 1	n	y	Parameter
14.81	**AO1 source max**						
	Internal value corresponding to maximum analog output AO1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the internal value that corresponds to the maximum required AO1 value. See 14.80 AO1 source min.						
	-32768.0 … 32767.0	100.0	-	1 = 1	n	y	Parameter
14.82	**AO1 out at AO1 src min**						
	Minimum analog output AO1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the minimum output value for AO1 in mA. See 14.80 AO1 source min.						
	0.000 … 22.000	0.000	mA	1000 = 1 mA	n	y	Parameter
14.83	**AO1 out at AO1 src max**						
	Maximum analog output AO1 value. (Visible when 14.01 Module 1 type = FIO-11 or FAIO-01) Defines the maximum output value for AO1 in mA. See 14.80 AO1 source min.						
	0.000 … 22.000	20.000	mA	1000 = 1 mA	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.86	**AO2 actual**						
	Value of analog output AO2. (Visible when 14.01 Module 1 type = FAIO-01) Displays the value of AO2 in mA.						
	0.000 … 22.000	-	mA	1000 = 1 mA	y	n	Signal
14.87	**AO2 source**						
	Source for analog output AO2. (Visible when 14.01 Module 1 type = FAIO-01) Selects a signal/parameter to be connected to AO2. Alternatively, sets the output to excitation mode to feed a constant current to a temperature sensor. See 14.77 AO1 source.						
	0 … 38	Zero	-	1 = 1	n	y	Parameter
14.88	**AO2 force data**						
	Forced value of analog output AO2. (Visible when 14.01 Module 1 type = FAIO-01) Forced value that can be used instead of the selected output signal. See 14.71 AO force selection.						
	0.000 … 22.000	0.000	mA	1000 = 1 mA	y	y	Parameter
14.89	**AO2 filter time**						
	Filter time constant of analog output AO2. (Visible when 14.01 Module 1 type = FAIO-01) Defines the filter time constant for AO2.  $O = I \times (1 - e^{-t/T})$ I = filter input (step) O = filter output *t* = time T = filter time constant SF_880_024_DCS_filter_a.ai						
	0.000 … 30.000	0.100	s	1000 = 1 s	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
14.90	**AO2 source min**						
	Internal signal value corresponding to minimum analog output AO2 value. (Visible when 14.01 Module 1 type = FAIO-01) Defines the internal value that corresponds to the minimum required AO2 value. Scaling parameters 14.90 and 14.91 set the low and high internal limits that corresponds to the analog output values in mA defined by parameters 14.92 and 14.93:  Setting parameter 14.92 as maximum value and 14.93 as minimum value inverts the output:  						
	-32768.0 … 32767.0	0.0	-	1 = 1	n	y	Parameter
14.91	**AO2 source max**						
	Internal value corresponding to maximum analog output AO2 value. (Visible when 14.01 Module 1 type = FAIO-01) Defines the internal value that corresponds to the maximum required AO2 value. See 14.90 AO2 source min.						
	-32768.0 … 32767.0	100.0	-	1 = 1	n	y	Parameter
14.92	**AO2 out at AO2 src min**						
	Minimum analog output AO2 value. (Visible when 14.01 Module 1 type = FAIO-01) Defines the minimum output value for AO2. See 14.90 AO2 source min.						
	0.000 … 22.000	0.000	mA	1000 = 1 mA	n	y	Parameter
14.93	**AO2 out at AO2 src max**						
	Maximum analog output AO2 value. (Visible when 14.01 Module 1 type = FAIO-01) Defines the maximum output value for AO2. See 14.90 AO2 source min.						
	0.000 … 22.000	20.000	mA	1000 = 1 mA	n	y	Parameter

15 I/O extension module 2

Configuration of I/O extension module 2.
The contents of the parameter group varies according to the selected I/O extension module type.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
15.01 … 15.93	**See corresponding signal/parameter in Group 14 I/O extension module 1.**						
	See corresponding signal/parameter in Group 14 I/O extension module 1.						

16 I/O extension module 3

Configuration of I/O extension module 3.
The contents of the parameter group varies according to the selected I/O extension module type.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
16.01 … 16.93	**See corresponding signal/parameter in Group 14 I/O extension module 1.**						
	See corresponding signal/parameter in Group 14 I/O extension module 1.						

19 I/O Operation mode

Selection of local and external control locations and operating modes.

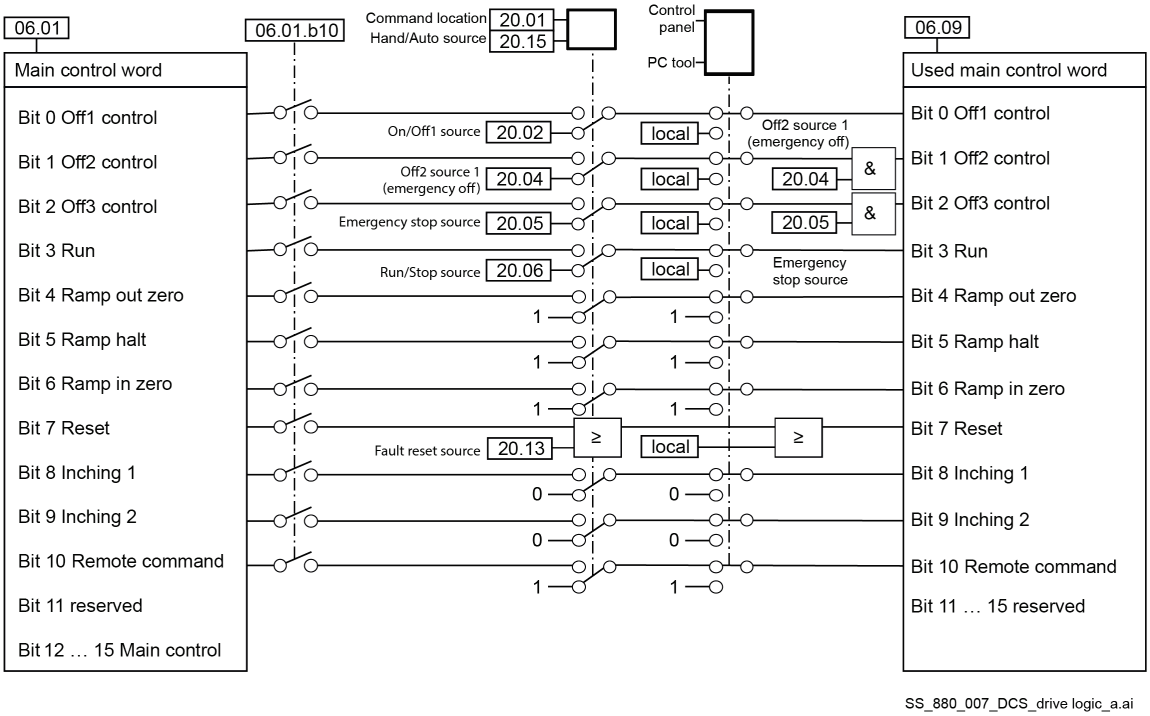
Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
19.01	**Present operation mode**						
	Currently used operating mode. Displays the operating mode currently used. See parameters 19.11 … 19.14. 1: **Zero**; output of the torque selector has been set to zero. 2: **Speed**; speed control, torque reference taken from 25.01 Torque reference speed control. 3: **Torque**; torque control, torque reference taken from 26.74 Torque reference ramp output. 4: **Min**; minimum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output. The smaller of the two is used. 5: **Max**; maximum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output. The greater of the two is used. 6: **Add**; sum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output is used. 7: **Limitation**; limitation control, 26.74 Torque reference ramp output is limited by 25.01 Torque reference speed control. **Example**: If 26.74 Torque reference ramp output = 50 %, then 25.01 Torque reference speed control is limited to ±50 %. 8: Current; current control, current reference taken from 27.22 Current reference source.						
	1 … 8	-	-	1 = 1	y	n	Signal
19.11	**Ext1/Ext2 selection**						
	Selection of control location. Selects the source for the control location. Thus, a change of the operating mode is possible. 0 = EXT1. 1 = EXT2. **Other [bit]**; source selection. 0: **EXT1**; 0, select EXT1. Normal operation. 1: **EXT2**; 1, select EXT2.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	EXT1	-	1 = 1	n	y	Parameter
19.12	**Ext1 control mode**						
	Operating mode of control location EXT1. Selects the operating mode for control location EXT1. 1: **Zero**; set the output of the torque selector to zero. 2: **Speed**; speed control, set torque reference to 25.01 Torque reference speed control. 3: **Torque**; torque control, set torque reference to 26.74 Torque reference ramp output. 4: **Min**; combination of selections Speed and Torque. Use the minimum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output. If speed error becomes negative, the drive follows the speed controller output until the speed error becomes positive again. This prevents the drive from accelerating uncontrollably if the load is lost in torque control. 5: **Max**; combination of selections Speed and Torque. Use the maximum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output. If speed error becomes positive, the drive follows the speed controller output until speed error becomes negative again. This prevents the drive from accelerating uncontrollably if the load is lost in torque control. 6: **Add**; combination of selections Speed and Torque. Use the sum of 25.01 Torque reference speed control and 26.74 Torque reference ramp output. 7: **Limitation**; limitation control, 26.74 Torque reference ramp output limits 25.01 Torque reference speed control. **Example**: If 26.74 Torque reference ramp output = 50 %, then 25.01 Torque reference speed control is limited to ±50 %.						
	1 … 7	Speed	-	1 = 1	n	y	Parameter
19.14	**Ext2 control mode**						
	Operating mode of control location EXT1. Selects the operating mode for control location EXT1. See 19.12 Ext1 control mode.						
	1 … 6	Speed	-	1 = 1	n	y	Parameter
19.16	**Local control mode**						
	Operating mode of local control. Selects the operating mode for local control. 0: **Speed**; speed control, set torque reference to 25.01 Torque reference speed control. 1: **Torque**; torque control, set torque reference to 26.74 Torque reference ramp output.						
	0 … 1	Speed	-	1 = 1	n	y	Parameter
19.20	**Follower force ramp stop**						
	Force follower to speed control (follower only). Forces or selects a source that forces a torque-controlled follower drive to switch to speed control upon a ramp stop by an Off1- or Off3 (emergency stop) command. This is required for an independent ramp stop of the follower. 0 = Keep control mode. 1 = Force speed control. **Other [bit]**; source selection. 0: **Keep control mode**; 0, keep the current control mode. Normal operation.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	1: **Force speed control**; 1, ramp stop forces speed control. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Keep control mode	-	1 = 1	n	y	Parameter

20 Start/Stop/Direction

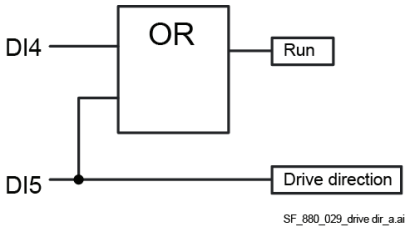
Start/Stop/Direction and run/start/jog enable signal source selection. Positive/Negative reference enable source selection. Breaker and acknowledge source selection.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	Command location: 						
20.01	**Command location**						
	Command location. Selector for 06.09 Used main control word. 0: **Local I/O**; drive is controlled via local I/O: – 20.02 On/Off1 source = DI1. – 20.04 Off2 source 1 (emergency off) = DI2. – 20.05 Emergency stop source = DI3. – 20.06 Run/Stop source = DI4. – 20.13 Fault reset source = DI5. 1 = **Main control word**; drive is controlled via 06.01 Main control word.						

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	2 = **Key**; automatic switchover from Main control word to Local I/O in case of 6681 EFB communication, 7510 FBA A communication or 7520 FBA B communication. It is still possible to control the drive via Local I/O. The used speed reference is set by means of 22.32 Constant speed 7. 3 = **12-pulse link**; the drive is controlled from the 12-pulse master, Off1 control, Off2 control, Run and Reset. Only available when 99.06 Operation mode = 12-pulse parallel slave or 12-pulse serial slave. 4 = **Field exciter link**; The drive is controlled from the master of the field exciter, Off1 control, Off2 control, Run and Reset. Only available when 99.06 Operation mode = Field exciter. **Notes**: – Local control mode has higher priority than the selection made with 20.01 Command location. – Commands from 20.04 Off2 source 1 (emergency off), 20.05 Emergency stop source and 20.13 Fault reset source are always valid, if activated. This is regardless of 20.01 Command location setting.						
	0 … 4	Local I/O	-	1 = 1	n	y	Parameter
20.02	**On/Off1 source**						
	On/Off1 command source. Binary signal for Off1 control. See 06.09.b00 Used main control word. The state transition is edge-triggered. 0 = Off1 command. 0 → 1 = On command, edge-triggered. **Note**: To give On- and Run command at the same time set 20.02 On/Off1 source = 20.06 Run/Stop source. **Other [bit]**; source selection. 0: **Off1 command**; 0. 1: **On command**; 1. 2: **None**; inactive. Off1 command is forced. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 20: **DI5 and DI6**; 3-wire control. On- and Run command by rising edge (0 → 1) of DI5. Stop- and Off1 command by falling edge (1 → 0) of DI6. Following settings apply: 20.02 On/Off1 source = 20.06 Run/Stop source = DI5 and DI6. See 20.28 3-wire jogging off delay time. **Note:** DI6 = 0 stops the drive.						
	0 … 20	DI1	-	1 = 1	n	n	Parameter
20.04	**Off2 source 1 (emergency off)**						
	1st Off2 command source. 1st binary signal for Off2 control (emergency off/fast current off). See 06.09.b01 Used main control word. Via an AND with 20.08 Off2 source 2 (emergency off). 0 = Off2 command. 1 = Off2 inactive. **Other [bit]**; source selection. 0: **Off2 command**; 0, emergency off/fast current off. 1: **Off2 inactive**; 1, normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	DI2	-	1 = 1	n	n	Parameter
20.05	**Emergency stop source**						
	Off3 (emergency stop) command source. Binary signal for Off3 control (emergency stop). See 06.09.b02 Used main control word. The stop mode is selected by 21.03 Emergency stop mode. 0 = Off3 command. 1 = Off3 inactive. **Other [bit]**; source selection. 0: **Off3 command**; 0, emergency stop. 1: **Off3 inactive**; 1, normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	DI3	-	1 = 1	n	n	Parameter
20.06	**Run/Stop source**						
	Run/Stop command source. Binary signal for Run. See 06.09.b03 Used main control word. The state transition is edge-triggered. 0 = Stop command. 0 → 1 = Run command, edge-triggered. **Note**: To give On- and Run command at the same time set 20.02 On/Off1 source = 20.06 Run/Stop source. **Other [bit]**; source selection. 0: **Stop command**; 0. 1: **Run command**; 1. 2: **None**; inactive. Stop command is forced. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 20: **DI5 and DI6**; 3-wire control. On- and Run command by rising edge (0 → 1) of DI5. Stop- and Off1 command by falling edge (1 → 0) of DI6. Following settings apply: 20.02 On/Off1 source = 20.06 Run/Stop source = DI5 and DI6. See 20.28 3-wire jogging off delay time. **Note:** DI6 = 0 stops the drive.						
	0 … 20	DI4	-	1 = 1	n	n	Parameter
20.08	**Off2 source 2 (emergency off)**						
	2nd Off2 command source. 2nd binary signal for Off2 control (emergency off/fast current off). See 06.09.b01 Used main control word. Via an AND with 20.04 Off2 source 1 (emergency off). 0 = Off2 command.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	1 = Off2 inactive. **Other [bit]**; source selection. 0: **Off2 command**; 0, emergency off/fast current off. 1: **Off2 inactive**; 1, normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	DIL	-	1 = 1	n	n	Parameter
20.13	**Fault reset source**						
	Reset source. Binary signal for Reset. See 06.09.b07 Used main control word. The signal resets the drive after a fault trip if the cause of the fault no longer exists. The state transition is edge-triggered. 0 = Not selected. 0 → 1 = Reset. **Other [bit]**; source selection. 0: **No Reset**; 0. 1: **Reset**; 1. 2: **None**; inactive. No Reset is forced. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 30: **FBA A MCW bit 7**; 06.03.b07 FBA A transparent control word. 31: **FBA B MCW bit 7**; 06.04.b07 FBA B transparent control word. 32: **EFB MCW bit 7**; 06.05.b07 EFB transparent control word.						
	0 … 32	DI5	-	1 = 1	n	y	Parameter
20.14	**Direction of rotation source**						
	Direction source. Binary signal for Direction. 20.14 Direction of rotation source allows changing the direction of rotation by negating the speed reference in remote operation. **Example:** 20.06 Run/Stop source = DI4 and 20.14 Direction of rotation source = DI5 set Run:						



DI4	DI5	06.09.b03 Used main control word = Run	06.10.b91Auxiliary control word 1 = Drive direction
0	0	0 = Stop command	0 = Forward

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type

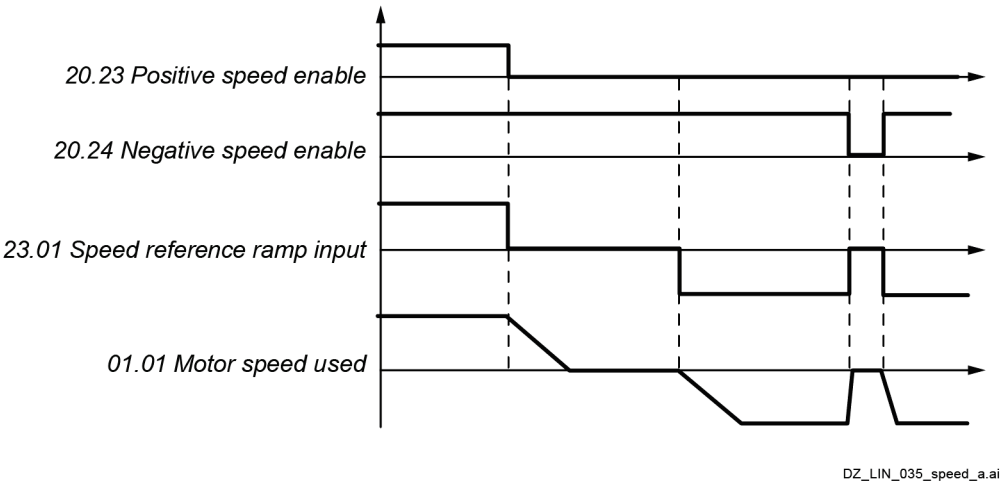
0	1	1 = Run command	1 = Reverse
1	0	1 = Run command	0 = Forward
1	1	1 = Run command	1 = Reverse

0 = Forward.
1 = Reverse.
Other [bit]; source selection.
0: **Forward**; 0, normal operation.
1: **Reverse**; 1.
3: **DI1**; 10.02.b00 DI delayed status.
4: **DI2**; 10.02.b01 DI delayed status.
5: **DI3**; 10.02.b02 DI delayed status.
6: **DI4**; 10.02.b03 DI delayed status.
7: **DI5**; 10.02.b04 DI delayed status.
8: **DI6**; 10.02.b05 DI delayed status.
11: **DIO1**; 11.02.b00 DIO delayed status.
12: **DIO2**; 11.02.b01 DIO delayed status.
19: **DIL**; 10.02.b15 DI delayed status.
40: **DI1 set Run**; 10.02.b00 DI delayed status. DI1 = 1: Direction reverse and set Run command. DI1 = 0: normal operation, see 20.06 Run/Stop source.
41: **DI2 set Run**; 10.02.b01 DI delayed status. DI2 = 1: Direction reverse and set Run command. DI2 = 0: normal operation, see 20.06 Run/Stop source.
42: **DI3 set Run**; 10.02.b02 DI delayed status. DI3 = 1: Direction reverse and set Run command. DI3 = 0: normal operation, see 20.06 Run/Stop source.
43: **DI4 set Run**; 10.02.b03 DI delayed status. DI4 = 1: Direction reverse and set Run command. DI4 = 0: normal operation, see 20.06 Run/Stop source.
44: **DI5 set Run**; 10.02.b04 DI delayed status. DI5 = 1: Direction reverse and set Run command. DI5 = 0: normal operation, see 20.06 Run/Stop source.
45: **DI6 set Run**; 10.02.b05 DI delayed status. DI6 = 1: Direction reverse and set Run command. DI6 = 0: normal operation, see 20.06 Run/Stop source.
46: **DIO1 set Run**; 11.02.b00 DIO delayed status. DIO1 = 1: Direction reverse and set Run command. DIO1 = 0: normal operation, see 20.06 Run/Stop source.
47: **DIO2 set Run**; 11.02.b01 DIO delayed status. DIO2 = 1: Direction reverse and set Run command. DIO2 = 0: normal operation, see 20.06 Run/Stop source.
48: **DIL set Run**; 10.02.b15 DI delayed status. DIL = 1: Direction reverse and set Run command. DIL = 0: normal operation, see 20.06 Run/Stop source.

0 … 48	Forward	-	1 = 1	n	y	Parameter

20.15	**Hand/Auto source**

Hand/Auto source.
Binary signal to switch between Hand (Local I/O) and Auto (Main control word) control. The selection made by 20.01 Command location is overwritten.
0 = Hand.
1 = Auto.
Other [bit]; source selection.
0: **Hand**; 0.
1: **Auto**; 1.
2: **None**; inactive. Hand is forced.
3: **DI1**; 10.02.b00 DI delayed status.
4: **DI2**; 10.02.b01 DI delayed status.
5: **DI3**; 10.02.b02 DI delayed status.
6: **DI4**; 10.02.b03 DI delayed status.
7: **DI5**; 10.02.b04 DI delayed status.
8: **DI6**; 10.02.b05 DI delayed status.
11: **DIO1**; 11.02.b00 DIO delayed status.
12: **DIO2**; 11.02.b01 DIO delayed status.

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	None	-	1 = 1	n	y	Parameter
20.23	**Positive speed enable**						
	Enable positive speed source. Binary signal to enable positive speed. 0 = Disable positive speed. 1 = Enable positive speed. In the figure below, positive speed reference is set to zero after the positive speed enable signal has been cleared. Actions: If in speed control, the speed reference is set to zero and the motor is stopped along the currently active deceleration ramp. If in torque control, the rotation direction of the motor is monitored.  **Example**: The motor is rotating in the forward direction. To stop the motor, the positive speed enable signal is cleared by a hardware limit switch (e.g. via digital input). If the positive speed enable signal remains deactivated and the negative speed enable signal is active, only reverse rotation of the motor is allowed. **Other [bit]**; source selection. 0: **Disable positive speed**; 0; positive speed reference is set to zero. 1: **Enable positive speed**; 1; normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Enable positive speed	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
20.24	**Negative speed enable**						
	Enable negative speed source. Binary signal to enable negative speed. 0 = Disable negative speed. 1 = Enable negative speed. See 20.23 Positive speed enable.						
	0 … 19	Enable negative speed	-	1 = 1	n	y	Parameter
20.25	**Jog function enable**						
	Enable jog function source. Binary signal for the jog function. Jogging itself is selected by 20.26 Jogging 1 start source or 20.27 Jogging 2 start source. 0 = Disable jog function. 1 = Enable jog function. **Note**: As long as a start command is on, 20.25 Jog function enable is ignored. As long as 20.25 Jog function enable is on, all start commands are ignored, apart from jogging and inching. See 06.02.b08/b09 Main control word. **Other [bit]**; source selection. 0: **Disable jog function**; 0, normal operation. 1: **Enable jog function**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Disable jog function	-	1 = 1	n	y	Parameter
20.26	**Jogging 1 start source**						
	Enable jogging 1 start source. Binary signal for jogging 1 start. If enabled by 20.25 Jog function enable, selects the source for the activation of jogging 1. 0 = Disable jogging 1. 1 = Enable jogging 1. **Notes**: – 20.01 Command location = Local I/O: The drive has to be in state Ready run. Mark, that only the On command has been given. When jogging 1 start is given the drives sets automatically the Run command and Ramp out zero = Ramp halt = Ramp in zero = 0. The motor accelerates to the speed set in 22.42 Jogging 1 reference. Acceleration and deceleration time for jogging is selected by 23.20 Acceleration time jogging and 23.21 Deceleration time jogging. If both jogging 1 and 2 are activated, the one that was activated first has priority. Inching is not possible. – 20.01 Command location = Main control word: Use Inching 1. See 06.02.b08 Main control word. Acceleration and deceleration time for jogging is selected by 23.20 Acceleration time jogging and 23.21 Deceleration time jogging. If both inching 1 and 2 are activated, the one that was activated first has priority. Jogging is not possible. **Other [bit]**; source selection.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	0: **Disable jogging 1**; 0, normal operation. 1: **Enable jogging 1**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 40: **DI1 plus direction**; 10.02.b00 DI delayed status. 20.14 Direction of rotation source is taken into account. 41: **DI2 plus direction**; 10.02.b01 DI delayed status. 20.14 Direction of rotation source is taken into account. 42: **DI3 plus direction**; 10.02.b02 DI delayed status. 20.14 Direction of rotation source is taken into account. 43: **DI4 plus direction**; 10.02.b03 DI delayed status. 20.14 Direction of rotation source is taken into account. 44: **DI5 plus direction**; 10.02.b04 DI delayed status. 20.14 Direction of rotation source is taken into account. 45: **DI6 plus direction**; 10.02.b05 DI delayed status. 20.14 Direction of rotation source is taken into account. 46: **DIO1 plus direction**; 11.02.b00 DIO delayed status. 20.14 Direction of rotation source is taken into account. 47: **DIO2 plus direction**; 11.02.b01 DIO delayed status. 20.14 Direction of rotation source is taken into account. 48: **DIL plus direction**; 10.02.b15 DI delayed status. 20.14 Direction of rotation source is taken into account.						
	0 … 48	Disable jogging 1	-	1 = 1	n	y	Parameter
20.27	**Jogging 2 start source**						
	Enable jogging 2 start source. Binary signal for jogging 2 start. If enabled by 20.25 Jog function enable, selects the source for the activation of jogging 2. 0 = Disable jogging 2. 1 = Enable jogging 2. **Notes**: – 20.01 Command location = Local I/O: The drive has to be in state Ready run. Mark, that only the On command has been given. When jogging 1 start is given the drives sets automatically the Run command and Ramp out zero = Ramp halt = Ramp in zero = 0. The motor accelerates to the speed set in 22.43 Jogging 2 reference. Acceleration and deceleration time for jogging is selected by 23.20 Acceleration time jogging and 23.21 Deceleration time jogging. If both jogging 1 and 2 are activated, the one that was activated first has priority. Inching is not possible. – 20.01 Command location = Main control word: Use Inching 2. See 06.02.b09 Main control word. Acceleration and deceleration time for jogging is selected by 23.20 Acceleration time jogging and 23.21 Deceleration time jogging. If both inching 1 and 2 are activated, the one that was activated first has priority. Jogging is not possible. If **Other [bit]**; source selection. 0: **Disable jogging 2**; 0, normal operation.						

<table>
<tr><td>Index</td><td colspan="7">Name</td></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">1: Enable jogging 2; 1.
3: DI1; 10.02.b00 DI delayed status.
4: DI2; 10.02.b01 DI delayed status.
5: DI3; 10.02.b02 DI delayed status.
6: DI4; 10.02.b03 DI delayed status.
7: DI5; 10.02.b04 DI delayed status.
8: DI6; 10.02.b05 DI delayed status.
11: DIO1; 11.02.b00 DIO delayed status.
12: DIO2; 11.02.b01 DIO delayed status.
19: DIL; 10.02.b15 DI delayed status.</td></tr>
<tr><td></td><td>0 … 19</td><td>Disable jogging 2</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>20.28</td><td colspan="7">3-wire jogging off delay time</td></tr>
<tr><td></td><td colspan="7">Delay time for 3-wire jogging.
Mains contactor off delay when using 96.14 Macro select = 3-wire jogging. After jogging is taken away the opening of the mains contactor is delayed by 20.28 3-wire jogging off delay time. That means the mains contactor is held during cyclic jogging.</td></tr>
<tr><td></td><td>0.0 … 3250.0</td><td>5.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td></td><td colspan="7"><table><tr><th>Bit</th><th>Name</th><th>Value</th><th>Remarks</th></tr></table></td></tr>
<tr><td>20.33</td><td colspan="7">Mains contactor control mode</td></tr>
<tr><td></td><td colspan="7">Control mode for mains contactor or DC breaker.
20.33 Mains contactor control mode determines the reaction to On- and Run command. See 06.09.b03 Used main control word.
Notes:
– If the DC voltage measurement is located at the motor terminals use setting On (modified H6 … H8 drives).
– The DC contactor (US style) K1.1 is a special designed DC contactor with one normally closed contact for the dynamic braking resistor R_B and two normally open contacts for C1 and D1. The DC contactor should be controlled by 06.24.10 Current controller status word 1. The acknowledge signal can be connected to either 20.34 Mains contactor acknowledge source or 20.35 DC breaker acknowledge source. Use setting DC contactor.

0: On; mains contactor or DC breaker closes with the On command.
1: On and Run; mains contactor or DC breaker closes with On- and Run command.
3: DC contactor; if a DC breaker or a DC contactor (US style) is used as a mains contactor, it will be closed with the On command:
– The manual voltage balancing is used, if 95.35 DC voltage measurement offset = -10.0 … +10.1. The automatic voltage balancing is switch off and the offset is set to zero, if 95.35 DC voltage measurement offset = 10.1.
– The armature voltage measurements are adapted to an open DC breaker by clamping 01.21 Armature voltage in V, 28.05 Armature voltage, 28.06 EMF voltage and 94.01 EMF speed to zero when the drive is Off. The clamping is released either 100 ms after an On command is given in case 20.35 DC breaker acknowledge source = None or when using the DC breaker acknowledge with 20.35 DC breaker acknowledge source = DIxx until the acknowledge signal indicates that the DC breaker is closed.</td></tr>
<tr><td></td><td>0 … 3</td><td>On</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>20.34</td><td colspan="7">Mains contactor acknowledge source</td></tr>
<tr><td></td><td colspan="7">Mains contactor acknowledge source.
The event generates fault F524 Main contactor acknowledge:
– Immediately, when the acknowledge signal is selected and the feedback is lost during operation.
– After 10 seconds, when the drive is being switched on, the acknowledge is selected and the feedback is missing for longer than 10 seconds.</td></tr>
</table>

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	The mains contactor acknowledge is also dependent on the setting of 20.33 Mains contactor control mode. 0 = No acknowledge. 1 = Acknowledge. **Other [bit]**; source selection. 0: **No acknowledge**; 0. 1: **Acknowledge**; 1. 2: **None**; inactive. Mains contactor acknowledge is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	None	-	1 = 1	n	y	Parameter
20.35	**DC breaker acknowledge source**						
	DC breaker acknowledge source. The event generates warning A103 DC-breaker acknowledge, if the DC breaker acknowledge is selected and the feedback is missing. The motor will coast if the warning is set. 0 = No acknowledge. 1 = Acknowledge. **Other [bit]**; source selection. 0: **No acknowledge**; 0. 1: **Acknowledge**; 1. 2: **None**; inactive. DC breaker acknowledge is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	None	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
20.38	**Drive fan acknowledge source**						
	Drive fan acknowledge source. The event generates fault 5080 Drive fan acknowledge, if the drive fan acknowledge is selected, 31.41 Main fan fault function = Fault and the feedback is missing for longer than 10 seconds. The event generates warning A581 Drive fan acknowledge, as soon as the feedback is missing if 31.41 Main fan fault function = Warning or Fault. The warning is reset automatically if the drive fan acknowledge is coming back before the 10 seconds are elapsed. 0 = No acknowledge. 1 = Acknowledge. **Other [bit]**; source selection. 0: **No acknowledge**; 0. 1: **Acknowledge**; 1. 2: **None**; inactive. Drive fan acknowledge is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	None	-	1 = 1	n	y	Parameter
20.39	**Motor fan acknowledge source**						
	Motor/External fan acknowledge source. The event generates fault 71B1 Motor fan acknowledge, if the motor/external fan acknowledge is selected and the feedback is missing for longer than 10 seconds. The event generates warning A781 Motor fan acknowledge, as soon as the feedback is missing. The warning is reset automatically if the motor/external fan acknowledge is coming back before the 10 seconds are elapsed. 0 = No acknowledge. 1 = Acknowledge. **Other [bit]**; source selection. 0: **No acknowledge**; 0. 1: **Acknowledge**; 1. 2: **None**; inactive. Motor fan acknowledge is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	None	-	1 = 1	n	y	Parameter
20.40	**Drive/Motor fan delay time**						
	Delay time for drive/motor fan. After the drive has given an Off command all fans, drive and motor, continue to run until 20.40 Drive/Motor fan delay time elapses. If drive or motor overtemperature is pending, the delay starts after the temperature has dropped below the overtemperature level.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter

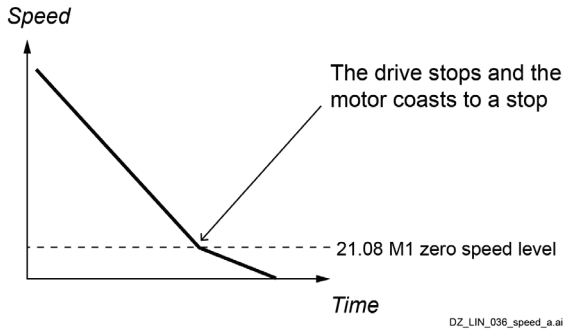
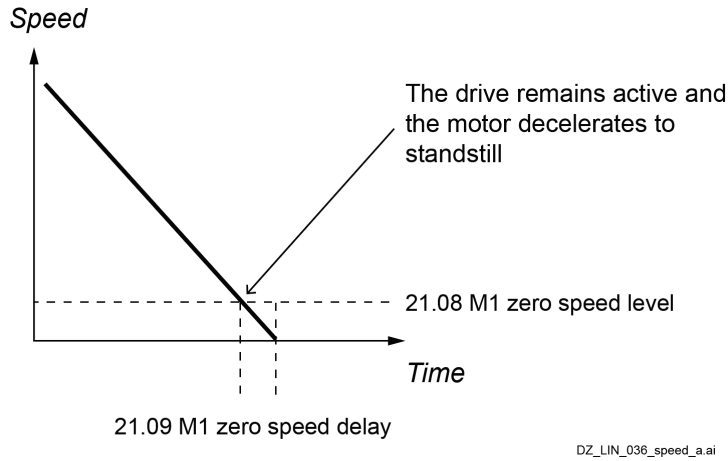
Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
20.43	**Dynamic braking acknowledge source**						
	Dynamic braking acknowledge source. The event generates warning A103 DC-breaker acknowledge, if dynamic braking acknowledge is selected and the feedback dynamic braking active is still present when an On command is given. This prevents the drive from starting, while dynamic braking is active. 0 = Dynamic braking inactive. 1 = Dynamic braking active. **Other [bit]**; source selection. 0: **Dynamic braking inactive**; 0, normal operation. 1: **Dynamic braking active**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	Dynamic braking inactive	-	1 = 1	n	y	Parameter
20.44	**Dynamic braking delay**						
	Delay time for Dynamic braking. In case of dynamic braking with EMF feedback, see 90.41 M1 feedback selection, or a speed feedback fault there is no valid information about the motor speed and thus no zero speed information. To prevent an interlocking of the drive after dynamic braking the speed is assumed zero after 20.44 Dynamic braking delay is elapsed. **≤ -0.1 s**; the motor voltage is measured directly at the motor terminals and is thus valid during dynamic braking. **= 0.0 s**; during dynamic braking, no zero speed signal is generated. **≥ 0.1 s**; during dynamic braking, a zero speed signal is generated after the programmed time is elapsed.						
	-1.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
20.47	**Overvoltage protection trigger source**						
	Overvoltage protection trigger source. The event generates warning A120 Overvoltage protection active, if the overvoltage protection trigger is selected and triggered. The drive has to be in field exciter mode. See 99.06 Operation mode. 0 = No trigger command. 1 = Trigger. **Other [bit]**; source selection. 0: **No trigger command**; 0, normal operation. 1: **Trigger**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	No trigger command	-	1 = 1	n	y	Parameter

21 Start/Stop mode

Start and stop modes, emergency stop mode and zero speed.

Index	Name / Text / Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
21.01	**Start mode**						
	Start mode of the drive. Selects the motor start function in response to a Run command. 0: **Start from zero**; wait until the motor has reached zero speed, then restart. See 21.08 M1 zero speed level. In case the restart command comes before zero speed is reached, A137 Speed not zero is generated. 1: **Flying start**; start the drive into a rotating motor, when stopping via Coast stop, Ramp stop or Torque limit. Stop via Dynamic braking or Off3 (emergency stop) is not interrupted. Wait until zero speed is reached. 2: **Flying start dynamic braking**; start the drive into a rotating motor, when stopping via Coast stop, Ramp stop, Torque limit or Dynamic braking. Dynamic braking is interrupted. Make sure, that the hardware, e.g. the switch disconnecting the braking resistor, is able to disconnect the current.						
	0 … 2	1	-	1 = 1	n	y	Parameter
21.02	**Off1 mode**						
	Mode for Off1 control. Selects the way the motor is stopped when an Off1 command is given. In case Off1 command and Stop command are given at the same time or nearly contemporary 21.02 Off1 mode and 21.04 Stop mode must have the same setting. Priority list: 1. 21.03 Emergency stop mode. 2. 21.02 Off1 mode. 3. 21.04 Stop mode. 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. 1: **Ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the active deceleration ramp. See 23.11 Ramp set selection. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 3: **Torque limit**; the output of the drive ramp is set to zero. Thus, the motor stops at the active torque limit. When reaching 21.08 M1 zero speed level the firing pulses are set to 150 ° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 4: **Dynamic braking**; the motor stops by means of dynamic braking.						
	0 … 4	Ramp stop	-	1 = 1	n	y	Parameter
21.03	**Emergency stop mode**						
	Mode for Off3 control (emergency stop). Selects the way the motor is stopped when an Off3 (emergency stop) command is given. Priority list: 1. 21.03 Emergency stop mode. 2. 21.02 Off1 mode. 3. 21.04 Stop mode. 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. See Off3 stop mode 0 in 06.20.b10 Run inhibit status word.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
	1: **Ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the active deceleration ramp. See 23.11 Ramp set selection. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. See Off3 stop mode 1 in 06.20.b11 Run inhibit status word. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 2: **Emergency ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the emergency stop ramp. See 23.23 Emergency stop time. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. See Off3 stop mode 2 in 06.20.b12 Run inhibit status word. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 3: **Torque limit**; the output of the drive ramp is set to zero. Thus, the motor stops at the active torque limit. When reaching 21.08 M1 zero speed level the firing pulses are set to 150 ° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. See Off3 stop mode 3 in 06.20.b13 Run inhibit status word. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 4: **Dynamic braking**; the motor stops by means of dynamic braking. See Off3 stop mode 4 in 06.20.b14 Run inhibit status word.						
	1 … 4	Emergency ramp stop	-	1 = 1	n	y	Parameter
21.04	**Stop mode**						
	Mode for Run. Selects the way the motor is stopped when a Stop command is given. In case Off1 command and Stop command are given at the same time or nearly contemporary 21.02 Off1 mode and 21.04 Stop mode must have the same setting. Priority list: 1. 21.03 Emergency stop mode. 2. 21.02 Off1 mode. 3. 21.04 Stop mode. 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. 1: **Ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the active deceleration ramp. See 23.11 Ramp set selection. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 3: **Torque limit**; the output of the drive ramp is set to zero. Thus, the motor stops at the active torque limit. When reaching 21.08 M1 zero speed level the firing pulses are set to 150 ° to decrease the armature current. When the armature current is zero the firing pulses are blocked. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 4: **Dynamic braking**; the motor stops by means of dynamic braking.						
	0 … 4	Ramp stop	-	1 = 1	n	y	Parameter

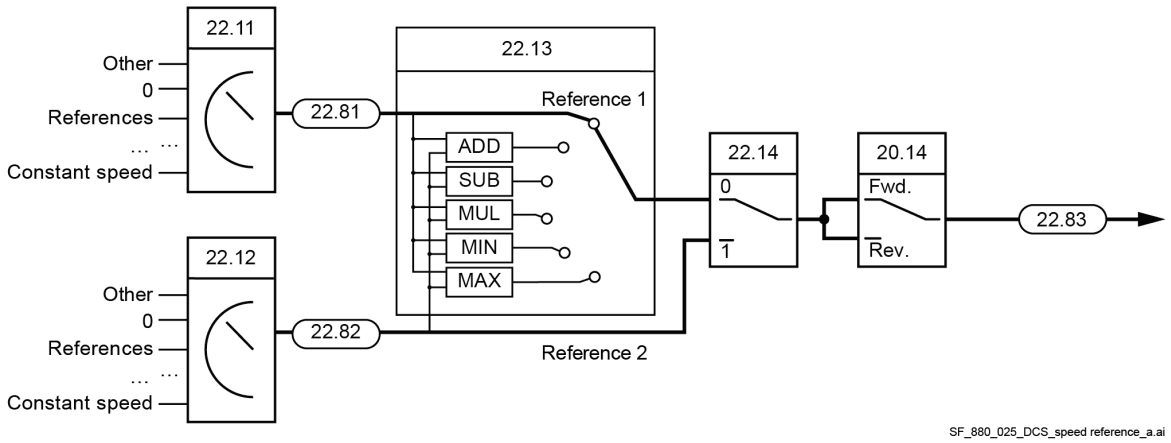
Index	Name						
	Text						
	Range	Default	Unit	Scale/Fbeq16	Volatile	Change running	Type
21.08	**M1 zero speed level**						
	Motor 1 zero speed level. When a Stop command is given, the motor decelerates along a speed ramp or at torque limit until the zero speed level is reached and 21.09 M1 zero speed delay is elapsed. See 21.04 Stop mode. Afterwards the motor will coast. At that moment, existing brakes are closed (applied). While the speed feedback is in the level, Zero speed is set high. See 06.21.b00 Speed control status word. **Notes**: – In case 21.01 Start mode = Start from zero and in case the restart command comes before zero speed is reached, A137 Speed not zero is generated. – Setting 21.08 M1 zero speed level = 30000.00 rpm disables the zero speed supervision.						
	0.00 … 30000.00	75.00	rpm	See 46.02	n	y	Parameter
21.09	**M1 zero speed delay**						
	Motor 1 zero speed delay. The zero speed delay compensates for the time the motor needs to decelerate from 21.08.M1 zero speed level to standstill. Until 21.09 M1 zero speed delay elapses the brake is kept open (lifted). Without zero speed delay: The drive receives a Stop command and decelerates along a speed ramp or at torque limit. When the motor speed feedback falls below 21.08 M1 zero speed level, the drive stops and the motor coasts to standstill.  With zero speed delay: The drive receives a Stop command and decelerates along a speed ramp or at torque limit. When the motor speed feedback falls below 21.08 M1 zero speed level the zero speed delay is activated. Until the zero delay elapses, the drive keeps on working and thus the motor can decelerate to standstill.  						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter

22 Speed reference selection

Speed reference selection and motor potentiometer settings.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
22.01	**Speed reference unlimited**						
	Speed reference after selections. Displays the speed reference after selections like constant speeds, jogging, local control from control panel and safe speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.07	**Speed reference**						
	Main speed reference input. Main speed reference input of the drive. Can be connected via 22.11 Speed reference 1 source and/or 22.12 Speed reference 2 source.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.08	**Auxiliary speed reference**						
	Auxiliary speed reference input. Auxiliary speed reference input of the drive. Can be connected via 22.11 Speed reference 1 source and/or 22.12 Speed reference 2 source.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.11	**Speed reference 1 source**						

Selects speed reference source 1.
Two signal sources can be defined. See 22.11 Speed reference 1 source and 22.12 Speed reference 2 source. 22.14 Speed reference 1/2 selection switches between the two sources or a mathematical function. The mathematical function depends on 22.13 Speed reference function. Direction on rotation depends on 20.14 Direction of rotation source.



Other; source selection.
0: **Zero**; 0, not in use.
1: **Speed reference**; 22.07 Speed reference.
3: **Auxiliary speed reference**; 22.08 Auxiliary speed reference.
4: **AI1 scaled**; 12.12 AI1 scaled value.
5: **AI2 scaled**; 12.22 AI2 scaled value.
6: **AI3 scaled**; 12.32 AI3 scaled value.
7: **FBA A reference 1**; 03.05 FBA A reference 1.
8: **FBA A reference 2**; 03.06 FBA A reference 2.
11: **EFB reference 1**; 03.09 EFB reference 1.
12: **EFB reference 2**; 03.10 EFB reference 2.
17: **Motor potentiometer reference**; 22.80 Motor potentiometer reference.
18: **Process PID output actual**; 40.01 Process PID output actual.
19: **Encoder 1 speed**; 90.10 Encoder 1 speed.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	20: **Encoder 2 speed**; 90.20 Encoder 2 speed. 26: **Constant speed 6**; 22.31 Constant speed 6. 27: **Constant speed 7**; 22.32 Constant speed 7.						
	0 … 27	AI1 scaled	-	1 = 1	n	y	Parameter
22.12	**Speed reference 2 source**						
	Selects speed reference source 2. For selections and diagram, see 22.11 Speed reference 1 source.						
	0 … 20	Zero	-	1 = 1	n	y	Parameter
22.13	**Speed reference function**						
	Speed reference function. Selects a mathematical function between speed reference 1 and speed reference 2. See 22.11 Speed reference 1 source. 0: **Ref 1**; speed reference 1 selected by 22.11 Speed reference 1 source is used. 1: **Add (ref 1 + ref 2)**; the sum of the two speed references is used. 2: **Sub (ref 1 - ref 2)**; the result of speed reference 1 minus speed reference 2 is used. 3: **Mul (ref 1 • ref 2)**; the multiplication of the two speed references is used. 4: **Min (ref 1, ref 2)**; the smaller of the two speed references is used. 5: **Max (ref 1, ref 2)**; the greater of the two speed references is used.						
	0 … 5	Ref 1	-	1 = 1	n	y	Parameter
22.14	**Speed reference 1/2 selection**						
	Selection between speed reference 1 and speed reference 2. Configures the selection between speed reference 1 and speed reference 2. See 22.11 Speed reference 1 source. 0 = Speed reference 1. 1 = Speed reference 2. **Other [bit]**; source selection. 0: **Speed reference 1**; 0, normal operation. 1: **Speed reference 2**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	Speed reference 1	-	1 = 1	n	y	Parameter
22.15	**Speed additive 1 source**						
	1st additive speed reference. Defines a speed reference to be added to 22.83 Speed reference 3. See 22.11 Speed reference 1 source. **Note**: Due to safety reasons, the additive speed reference is not applied when any of the stop functions are active.						
	0 … 20	Zero	-	1 = 1	n	y	Parameter
22.16	**Speed share**						
	Speed reference scaling factor. Defines a scaling factor between 22.84 Speed reference 4 and 22.85 Speed reference 5.						
	-8.000 … 8.000	1.000	-	1000 = 1	n	y	Parameter
22.17	**Speed additive 2 source**						
	2nd additive speed reference.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Defines a speed reference to be added to 22.85 Speed reference 5. See 22.11 Speed reference 1 source. **Note**: Due to safety reasons, the additive speed reference is not applied when any of the stop functions are active.						
	0 … 20	Zero	-	1 = 1	n	y	Parameter

22.21 Constant speed function

Constant speed configuration word.
Determines how constant speeds are selected and whether 20.14 Direction of rotation source is considered or not when applying a constant speed.
Bit assignment:

Bit	Name	Value	Remarks
0	Constant speed mode	1	Packed: 7 constant speeds are selectable using the three sources defined by 22.22 Constant speed sel 1, 22.23 Constant speed sel 2 and 22.24 Constant speed sel 3.
		0	Separate: Constant speeds 1, 2 and 3 are separately activated by the sources defined by 22.22 Constant speed sel 1, 22.23 Constant speed sel 2 and 22.24 Constant speed sel 3. In case of conflict, the constant speed with the smaller number takes priority.
1	Direction enable	1	Depending on direction: To determine the direction of rotation for a constant speed, the sign of the constant speed setting is multiplied by 20.14 Direction of rotation source. This effectively allows the drive to have 14 (7 forward and 7 reverse) constant speeds. **WARNING!** If the direction signal is reverse and the active constant speed is negative, the drive will run in the forward direction.
		0	According to parameter: The running direction for the constant speed is determined by the sign of the constant speed setting parameters.
2 … 15	reserved		

0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter

22.22 Constant speed sel 1

Constant speed selector 1.
22.21.b00 Constant speed function = 1 (Packed) activates the constant speeds according to the following table.

Source defined by. 22.22 Constant speed sel 1	Source defined by 22.23 Constant speed sel 2	Source defined by 22.24 Constant speed sel 3	Active constant speed
0	0	0	None
1	0	0	Constant speed 1
0	1	0	Constant speed 2
1	1	0	Constant speed 3
0	0	1	Constant speed 4
1	0	1	Constant speed 5
0	1	1	Constant speed 6
1	1	1	Constant speed 7

22.21.b00 Constant speed function = 0 (Separate) activates a source that selects constant speed 1.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0 = Always off. 1 = Always on. **Other [bit]**; source selection. 0: **Not selected**; 0, normal operation. 1: **Selected**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19 or 0000h … FFFFh	Not selected or 0000h	-	1 = 1	n	y	Parameter
22.23	**Constant speed sel 2**						
	Constant speed selector 2. See 22.22 Constant speed sel 1.						
	0 … 19 or 0000h … FFFFh	Not selected or 0000h	-	1 = 1	n	y	Parameter
22.24	**Constant speed sel 3**						
	Constant speed selector 3. See 22.22 Constant speed sel 1.						
	0 … 19 or 0000h … FFFFh	Not selected or 0000h	-	1 = 1	n	y	Parameter
22.26	**Constant speed 1**						
	Constant speed 1. Defines constant speed 1, the speed the motor will turn when constant speed 1 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.27	**Constant speed 2**						
	Constant speed 2. Defines constant speed 2, the speed the motor will turn when constant speed 2 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.28	**Constant speed 3**						
	Constant speed 3. Defines constant speed 3, the speed the motor will turn when constant speed 3 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.29	**Constant speed 4**						
	Constant speed 4. Defines constant speed 4, the speed the motor will turn when constant speed 4 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.30	**Constant speed 5**						
	Constant speed 5. Defines constant speed 5, the speed the motor will turn when constant speed 5 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
22.31	**Constant speed 6**						
	Constant speed 6. Defines constant speed 6, the speed the motor will turn when constant speed 6 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.32	**Constant speed 7**						
	Constant speed 7. Defines constant speed 7, the speed the motor will turn when constant speed 7 is selected.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.42	**Jogging 1 reference**						
	Speed reference for jogging function 1. Defines the speed reference for jogging 1. See 20.26 Jogging 1 start source.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.43	**Jogging 2 reference**						
	Speed reference for jogging function 2. Defines the speed reference for jogging 2. See 20.27 Jogging 2 start source.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.46	**Speed reference safe**						
	Defines a safe speed reference value that is used with supervision functions such as: – 12.03 AI supervision function. – 49.05 Communication loss action. – 50.02 FBA A comm loss func. – 50.32 FBA B comm loss func. – 58.14 Communication loss action.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.71	**Motor potentiometer function**						
	Motor potentiometer function. Activates and selects the mode of the motor potentiometer. 0: **Disable**; disable the motor potentiometer and set its value to 0. 1: **Enable (initialization at stop/power-up)**; the motor potentiometer first adopts the value defined by 22.72 Motor potentiometer initial value. When the drive is running, the value can be adjusted from the up and down sources defined by 22.73 Motor potentiometer up source and 22.74 Motor potentiometer down source. A stop or a power cycle will reset the motor potentiometer to the value 22.72 Motor potentiometer initial value. 2: **Enable (resume always)**; function see Enable (initialization at stop/power-up), but the motor potentiometer value is retained over a stop or a power cycle.						
	0 … 2	Enable (initialization at stop/power-up)	-	1 = 1	n	y	Parameter
22.72	**Motor potentiometer initial value**						
	Initial value for motor potentiometer. Defines an initial value (starting point) for the motor potentiometer. See 21.71 Motor potentiometer function.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.73	**Motor potentiometer up source**						
	Source for motor potentiometer up. Selects the source for motor potentiometer up signal. 0 = No change. 1 = Increase. **Other [bit]**; source selection. 0: **No change**; 0, hold the motor potentiometer value.						

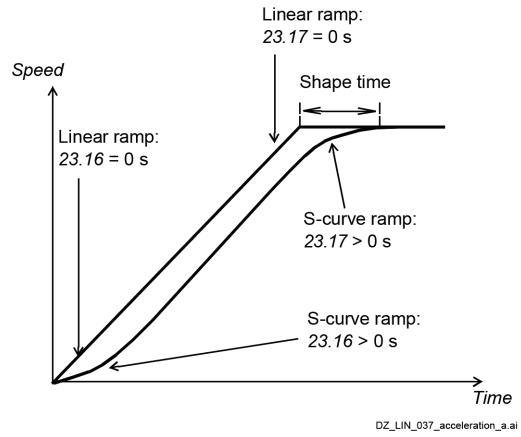
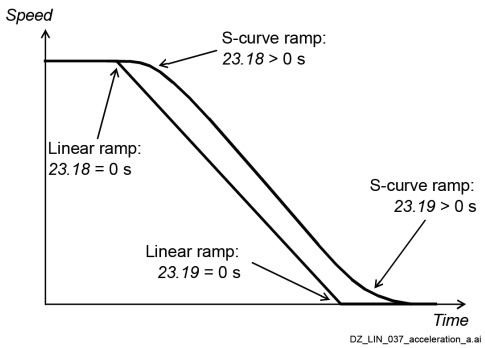
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	1: **Increase**; 1, increase the motor potentiometer value. If both the up and down sources are on, the potentiometer value will not change. 2: **None**; inactive. Motor potentiometer up is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	None	-	1 = 1	n	y	Parameter
22.74	**Motor potentiometer down source**						
	Source for motor potentiometer down. Selects the source for motor potentiometer down signal. 0 = No change. 1 = Decrease. **Other [bit]**; source selection. 0: **No change**; 0, hold the motor potentiometer value. Normal operation. 1: **Decrease**; 1, decrease the motor potentiometer value. If both the up and down sources are on, the potentiometer value will not change. 2: **None**; inactive. Motor potentiometer down is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status 40: **DI1 or stop**; 10.02.b00 DI delayed status plus stop. DI1 = 1 or stop command active → the motor potentiometer value is decreased, DI1 = 0: the motor potentiometer value is held. 41: **DI2 or stop**; 10.02.b01 DI delayed status plus stop. DI2 = 1 or stop command active → the motor potentiometer value is decreased, DI2 = 0: the motor potentiometer value is held. 42: **DI3 or stop**; 10.02.b02 DI delayed status plus stop. DI3 = 1 or stop command active → the motor potentiometer value is decreased, DI3 = 0: the motor potentiometer value is held. 43: **DI4 or stop**; 10.02.b03 DI delayed status plus stop. DI4 = 1 or stop command active → the motor potentiometer value is decreased, DI4 = 0: the motor potentiometer value is held. 44: **DI5 or stop**; 10.02.b04 DI delayed status plus stop. DI5 = 1 or stop command active → the motor potentiometer value is decreased, DI5 = 0: the motor potentiometer value is held. 45: **DI6 or stop**; 10.02.b05 DI delayed status plus stop. DI6 = 1 or stop command active → the motor potentiometer value is decreased, DI6 = 0: the motor potentiometer value is held. 46: **DIO1 or stop**; 11.02.b00 DIO delayed status plus stop. DIO1 = 1 or stop command active → the motor potentiometer value is decreased, DIO1 = 0: the motor potentiometer value is held. 47: **DIO2 or stop**; 11.02.b01 DIO delayed status plus stop. DIO2 = 1 or stop command active → the motor potentiometer value is decreased, DIO2 = 0: the motor potentiometer value is held. 48: **DIL or stop**; 10.02.b15 DI delayed status plus stop. DIL = 1 or stop command active → the motor potentiometer value is decreased, DIL = 0: the motor potentiometer value is held.						
	0 … 48	None	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
22.75	**Motor potentiometer ramp time**						
	Motor potentiometer change time. Defines the change rate of the motor potentiometer. This is the time required for the motor potentiometer to change from 22.76 Motor potentiometer min value to 22.77 Motor potentiometer max value. The same change rate applies in both directions (up and down).						
	0.0 … 3250.0	10.0	s	10 = 1 s	n	y	Parameter
22.76	**Motor potentiometer min value**						
	Motor potentiometer minimum. Defines the minimum value of the motor potentiometer.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
22.77	**Motor potentiometer max value**						
	Motor potentiometer maximum. Defines the maximum value of the motor potentiometer.						
	-30000.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter
22.80	**Motor potentiometer reference**						
	Value of the motor potentiometer. Displays the output of the motor potentiometer function. It can directly be set as the source of parameters such as 22.11 Speed reference 1 source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.81	**Speed reference 1**						
	Value of speed reference 1 source. Displays the speed reference after speed reference 1 source. See 22.11 Speed reference 1 source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.82	**Speed reference 2**						
	Value of speed reference 2 source. Displays the speed reference after speed reference 2 source. See 22.12 Speed reference 2 source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.83	**Speed reference 3**						
	Speed reference after source selection. Displays the speed reference after the mathematical function, speed reference 1/2 selection and rotation direction. See 22.13 Speed reference function, 22.14 Speed reference 1/2 selection and 20.14 Direction of rotation source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.84	**Speed reference 4**						
	Speed reference after additive 1. Displays the speed reference after 1st additive speed. See 22.15 Speed additive 1 source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.85	**Speed reference 5**						
	Speed reference after speed share. Displays the speed reference after scaling by means of speed share. See 22.16 Speed share.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
22.86	**Speed reference 6**						
	Speed reference after additive 2. Displays the speed reference after 2nd additive speed. See 22.17 Speed additive 2 source.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal

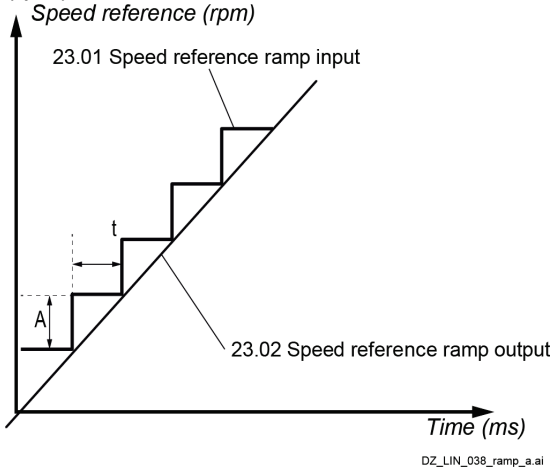
23 Speed reference ramp

Speed reference ramp settings (programming of the acceleration and deceleration rates for the drive).

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
23.01	**Speed reference ramp input**						
	Speed reference at the ramp input. Displays the speed reference after limitation and before ramping and shaping. See 30.11 M1 minimum speed and 30.12 M1 maximum speed.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
23.02	**Speed reference ramp output**						
	Speed reference at the ramp output. Displays the ramped and shaped speed reference.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
23.03	**Speed reference 7**						
	Speed reference after direct speed reference. Displays the speed reference after direct speed reference. See 23.32 Direct speed reference.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
23.04	**dv/dt**						
	Deviation of the speed reference. Displays the acceleration/deceleration (speed reference change) at the output of the speed reference ramp.						
	-30000.00 … 30000.00	-	rpm/s	See 46.02	y	n	Signal
23.11	**Ramp set selection**						
	Select active ramp parameters. Selects the source that switches between the two sets of acceleration/deceleration ramp times. See 23.12 Acceleration time 1, 23.13 Deceleration time 1, 23.14 Acceleration time 2 and 23.15 Deceleration time 2. 0 = Acc/Dec time 1. 1 = Acc/Dec time 2. **Other [bit]**; source selection. 0: **Acc/Dec time 1**; 0, acceleration time 1 and deceleration time 1 are active. Normal operation. 1: **Acc/Dec time 2**; 1, acceleration time 2 and deceleration time 2 are active. 2: **Speed level**; if |23.03 Speed reference 7| ≤ |46.31 Above speed level|, then Acc/Dec time 1 is active. If |23.03 Speed reference 7| > |46.31 Above speed level|, then Acc/Dec time 2 is active. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 21: **Motor1/Motor2**; used acceleration/deceleration time depends on setting of 42.01 Motor 1/2 selection. If 42.01 Motor 1/2 selection = Motor 1 use Acc/Dec time 1. If 42.01 Motor 1/2 selection = Motor 2 use Acc/Dec time 2.						
	0 … 21	Acc/Dec time 1	-	1 = 1	n	y	Parameter
23.12	**Acceleration time 1**						
	Acceleration time 1. The time within the drive will accelerate from zero speed to 46.02 M1 speed scaling actual. If the speed reference increases faster than the set acceleration time, the motor speed will follow the set acceleration time. If the speed reference increases slower than the set acceleration time, the motor speed will follow the reference. If the set acceleration time is set too short, the drive will accelerate at the active torque limit.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0.0 … 3250.0	20.0	s	10 = 1 s	n	y	Parameter
23.13	**Deceleration time 1**						
	Deceleration time 1. The time within the drive will decelerate from 46.02 M1 speed scaling actual to zero speed. If the speed reference decreases faster than the set deceleration time, the motor speed will follow the deceleration time. If the speed reference decreases slower than the set deceleration time, the motor speed will follow the reference. If the set deceleration time is set too short, the drive will decelerate at the active torque limit.						
	0.0 … 3250.0	20.0	s	10 = 1 s	n	y	Parameter
23.14	**Acceleration time 2**						
	Acceleration time 1. See 23.12 Acceleration time 1.						
	0.0 … 3250.0	60.0	s	10 = 1 s	n	y	Parameter
23.15	**Deceleration time 2**						
	Deceleration time 2. See 23.13 Deceleration time 1.						
	0.0 … 3250.0	60.0	s	10 = 1 s	n	y	Parameter
23.16	**Shape time acceleration 1**						
	Ramp shape at acceleration start. Defines the shape of the acceleration ramp at the start of the acceleration. 0.0 s: Linear ramp. Suitable for steady acceleration or deceleration and for slow ramps. 0.1 … 3250.0 s: S-curve ramp. S-curve ramps are ideal for lifting applications. The S-curve consists of curves at both ends of the ramp and a linear part in between. **Note**: For safety reasons, shape times are not applied during an emergency stop. Acceleration:  Deceleration:  						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
23.17	**Shape time acceleration 2**						
	Ramp shape at acceleration end. Defines the shape of the acceleration ramp at the end of the acceleration. See 23.16 Shape time acceleration 1.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
23.18	**Shape time deceleration 1**						
	Ramp shape at deceleration start. Defines the shape of the deceleration ramp at the start of the deceleration. See 23.16 Shape time acceleration 1.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
23.19	**Shape time deceleration 2**						
	Ramp shape at deceleration end. Defines the shape of the deceleration ramp at the end of the deceleration. See 23.16 Shape time acceleration 1.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
23.20	**Acceleration time jogging**						
	Acceleration time for jogging. The time within the drive will accelerate from zero speed to 46.02 M1 speed scaling actual in case of jogging or inching.						
	0.0 … 3250.0	60.0	s	10 = 1 s	n	y	Parameter
23.21	**Deceleration time jogging**						
	Deceleration time for jogging. The time within the drive will decelerate from 46.02 M1 speed scaling actual to zero speed in case of jogging or inching.						
	0.0 … 3250.0	60.0	s	10 = 1 s	n	y	Parameter
23.23	**Emergency stop time**						
	Deceleration time for Off3 (emergency stop) command. The time within the drive will decelerate from 46.02 M1 speed scaling actual to zero speed. With an Off3 (emergency stop) command and 21.03 Emergency stop mode = Ramp stop or as reaction to a fault of fault level 4 and 31.15 Fault stop mode fault level 4 = Ramp stop. This applies also to torque control, because the drive automatically switches to speed control with an Off3 (emergency stop) command. For followers see 19.20 Follower force ramp stop.						
	0.0 … 3250.0	10.0	s	10 = 1 s	n	y	Parameter
23.24	**Speed ramp in zero source**						
	Force speed ramp input to zero. Selects a source that forces the speed ramp input to zero. Via an AND with 06.09.b06 Used main control word. 0 = Zero input. 1 = Enable input. **Other [bit]**; source selection. 0: **Zero input**; 0, force speed ramp input to zero. 1: **Enable input**; 1, enable speed ramp input. Normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Enable input	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
23.26	**Ramp out balancing enable**						
	Force speed ramp output to 23.27 Ramp out balancing reference. Selects the source to force the speed ramp output balancing. This function is used to generate a smooth, bumpless transfer from a torque- or tension-controlled motor back to being speed controlled. The balancing output is tracking the present (line) speed of the application. When a transfer is required, the speed reference can then be quickly set to the needed (line) speed. Balancing is also possible in the speed controller. See 25.09 Speed balancing enable. 0 = Enable output. 1 = Balance output. **Other [bit]**; source selection. 0: **Enable output**; 0, enable speed ramp output. Normal operation. 1: **Balance output**; 1, force speed ramp output to 23.27 Ramp out balancing reference. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Enable output	-	1 = 1	n	y	Parameter
23.27	**Ramp out balancing reference**						
	Speed ramp output balancing reference. Defines the reference for speed ramp output balancing. The output of the ramp generator is forced to this value when speed ramp output balancing is enabled. See 23.26 Ramp out balancing enable.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
23.28	**Variable slope enable**						
	Enable variable slope. Activates the variable slope function, which controls the slope of the speed ramp during a speed reference change from the overriding control system. Variable slope rate and the internal drive ramp are connected in series. Thus, the ramp acceleration and deceleration times have to be faster than the complete variable slope rate time. See 23.12 Acceleration time 1 and 23.13 Deceleration time 1. 23.29 Variable slope rate defines the speed ramp time t (ms) for the speed reference change A (rpm).  t (ms) = cycle time of the speed reference from the overriding control system. A (rpm) = speed reference change during cycle time t (ms).						

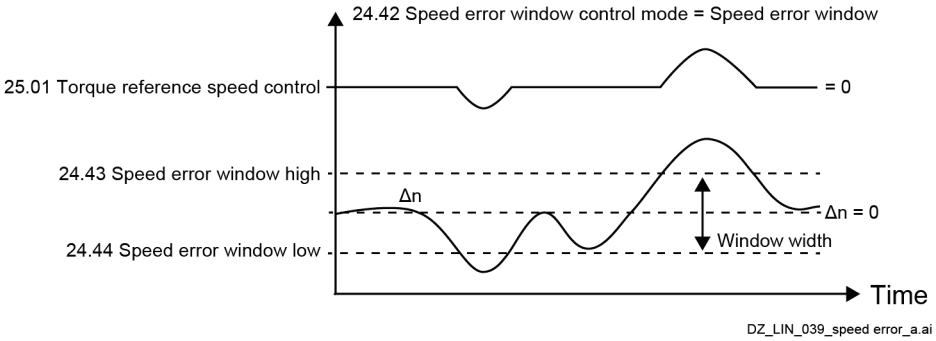
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Note: If the cycle time t (ms) of the speed reference from the overriding control system and 23.29 Variable slope rate are equal, the shape of 23.02 Speed reference ramp output is a straight line. **Other [bit]**; source selection. 0: **Disable**; disable variable slope. 1: **Enable**; enable variable slope (not available in local control).						
	0 … 1	Off	-	1 = 1	n	y	Parameter
23.29	**Variable slope rate**						
	Variable slope rate. Defines the rate of the speed reference change when variable slope is enabled. See 23.28 Variable slope enable. For the best results, use the speed reference cycle time.						
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter
23.32	**Direct speed reference**						
	Direct speed reference. Feeds the speed reference direct into the speed error calculation. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **Speed reference**; 22.07 Speed reference. 2: **Speed ramp output**; 23.02 Speed reference ramp output. 3: **Auxiliary speed reference**; 22.08 Auxiliary speed reference. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 7: **FBA A reference 1**; 03.05 FBA A reference 1. 8: **FBA A reference 2**; 03.06 FBA A reference 2. 11: **EFB reference 1**; 03.09 EFB reference 1. 12: **EFB reference 2**; 03.10 EFB reference 2. 17: **Motor potentiometer reference**; 22.80 Motor potentiometer reference. 18: **Process PID output actual**; 40.01 Process PID output actual. 19: **Encoder 1 speed**; 90.10 Encoder 1 speed. 20: **Encoder 2 speed**; 90.20 Encoder 2 speed.						
	0 … 20	Speed ramp output	-	1 = 1	n	y	Parameter

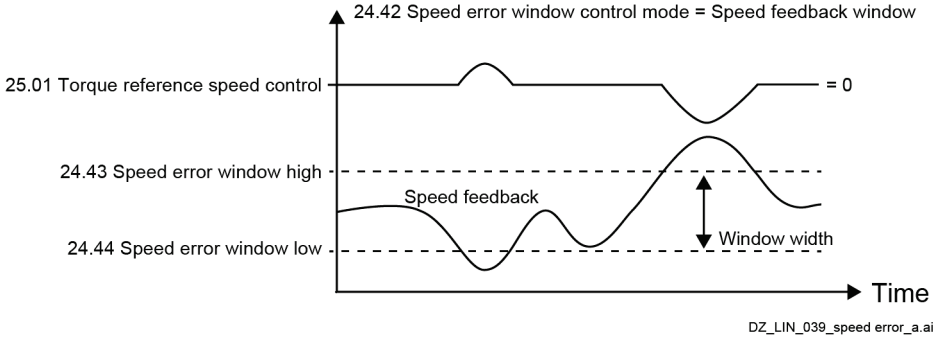
24 Speed reference conditioning

Speed error calculation, speed error window control configuration and speed error (Δn) step.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
24.01	**Used speed reference**						
	Speed reference after speed reference scaling. Displays the speed reference after speed correction, limitation and speed reference scaling. See 24.11 Speed correction, 30.11 M1 minimum speed, 30.12 M1 maximum speed and 24.14 Speed reference scaling. Used for speed error calculation.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
24.02	**Used speed feedback**						
	Speed feedback after speed feedback scaling. Displays the speed feedback after speed feedback scaling. See 24.15 Speed feedback scaling. Used for speed error calculation.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
24.03	**Speed error filtered**						
	Filtered speed error (Δn). Displays the speed error after filters and window control. See 24.18 Speed error filter time 1 and 24.19 Speed error filter time 2. Δn = 24.01 Used speed reference - 24.02 Used speed feedback.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
24.04	**Speed error inverted**						
	Inverted speed error (-Δn). Displays the inverted speed error (unfiltered). Δn = 24.01 Used speed reference - 24.02 Used speed feedback.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
24.11	**Speed correction**						
	Speed reference correction. The speed reference correction is added to 23.03 Speed reference 7 between ramping and limitation. This is useful to trim the speed if necessary, for example to adjust draw between sections of a paper machine. **Note**: Due to safety reasons, the speed correction is not applied when any of the stop functions are active.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
24.14	**Speed reference scaling**						
	Speed reference scaling factor. Defines a scaling factor between 23.03 Speed reference 7 and 24.01 Used speed reference.						
	-325.00 … 250.00	1.00	-	100 = 1	n	y	Parameter
24.15	**Speed feedback scaling**						
	Speed feedback scaling factor. Defines a scaling factor between 90.01 Motor speed for control and 24.02 Used speed feedback.						
	-250.00 … 250.00	1.00	-	100 = 1	n	y	Parameter
24.18	**Speed error filter time 1**						
	Speed error (Δn) filter time constant 1. Defines the filter time constant of the speed error low-pass filter 1. Reducing the ripple with this filter may cause speed controller tuning problems. A long filter time constant and fast acceleration times contradict one another. A very long filter time constant results in unstable control. **Note**: There are three different filters for speed feedback and speed error: – 90.42 Motor speed filter time is filtering the speed feedback and should be used for filter time constants smaller than 30 ms. – 24.18 Speed error filter time 1 and 24.19 Speed error filter time 2 are filtering the speed error and should be used for filter time constants greater than 30 ms. Set 24.18 Speed error filter time 1 = 24.19 Speed error filter time 2.						
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter
24.19	**Speed error filter time 2**						
	Speed error (Δn) filter time constant 2. See 24.18 Speed error filter time 1.						
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter
	Concept of window control: The concept of window control is to block the speed controller as long as the speed error (Δn) or the speed feedback remains within the window set by 24.43 Speed error window high and 24.44 Speed error window low. This allows the external torque reference to affect the process directly. See 26.74 Torque reference ramp output. If the speed error or the speed feedback exceeds the programmed window, the speed controller becomes active and influences the process by means of 25.01 Torque reference speed control. The activation is indicated by 06.21.b03 Speed control status word.						

<table>
<tr><td>Index</td><td colspan="7">Name</td></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">To release window control use 24.42 Speed error window control mode and set the drive to Add operating mode. See 19.12 Ext1 control mode and 19.14 Ext2 control mode.
This function is sometimes also called deadband control or strip break protection. It forms a speed supervision function for a torque-controlled drive, preventing the motor from running away if the material, which is under tension, breaks.
 

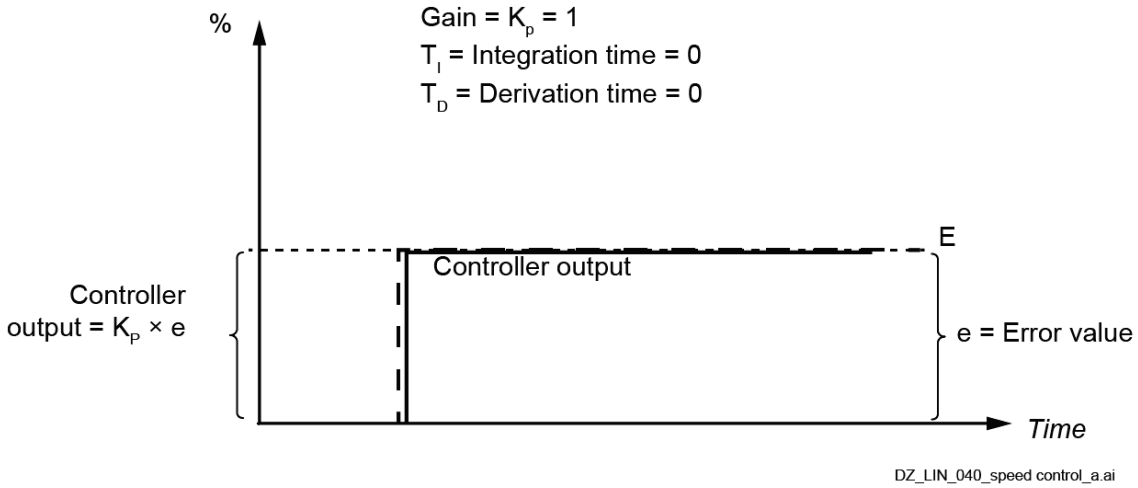


Note: To open a window with a width of 100 rpm set 24.43 Speed error window high = 50 rpm and 24.44 Speed error window low = -50 rpm.</td></tr>
<tr><td>24.41</td><td colspan="7">Speed error window control enable</td></tr>
<tr><td></td><td colspan="7">Source to enable window control.
Enables/disables window control.
0 = Disable window control.
1 = Enable window control.
Other [bit]; source selection.
0: Disable window control; 0, normal operation.
1: Enable window control; 1, enable speed error window control.
3: DI1; 10.02.b00 DI delayed status.
4: DI2; 10.02.b01 DI delayed status.
5: DI3; 10.02.b02 DI delayed status.
6: DI4; 10.02.b03 DI delayed status.
7: DI5; 10.02.b04 DI delayed status.
8: DI6; 10.02.b05 DI delayed status.
11: DIO1; 11.02.b00 DIO delayed status.
12: DIO2; 11.02.b01 DIO delayed status.
19: DIL; 10.02.b15 DI delayed status.</td></tr>
<tr><td></td><td>0 … 19</td><td>Disable window control</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

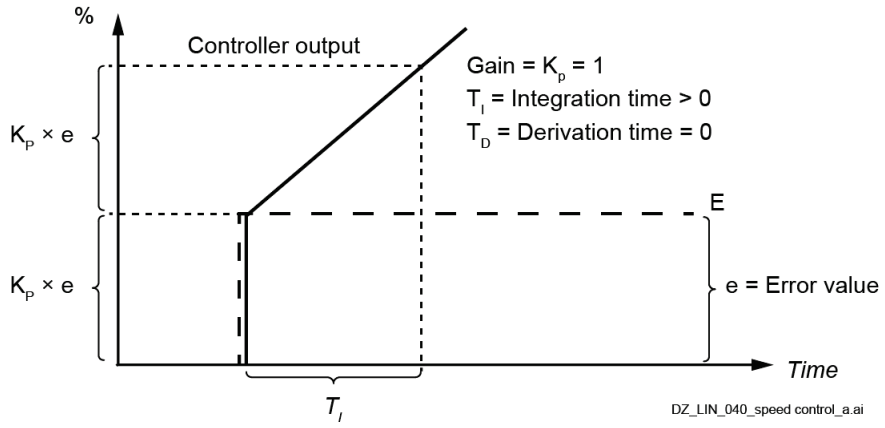
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
24.42	**Speed error window control mode**						
	Mode for window control. Determines the used type of window control. Additionally the integration time of the speed controller can be enabled/disabled. 0 = **Speed error window + TI = on**; standard window control. The speed error (Δn) has to be in a window set by 24.43 Speed error window high and 24.44 Speed error window low. The integration time (T_I) of the speed controller is enabled when window control is released. 1 = **Speed error window + TI = off**; standard window control. The speed error has to be in a window set by 24.43 Speed error window high and 24.44 Speed error window low. The integration time of the speed controller is disabled when window control is released. Typically used for torque followers to limit differential speed. 10: **Speed feedback window**; the speed feedback has to be in a window set by 24.43 Speed error window high and 24.44 Speed error window low. The integration time of the speed controller is disabled when window control is released. Typically used for torque controlled test rigs to limit the no load speed or winders. **Example 1**: To get a window of 10 rpm width around the speed error set: 24.42 Speed error window control mode = Speed error window + TI = off. 24.43 Speed error window high = 5 rpm. 24.44 Speed error window low = -5 rpm **Example 2**: To get a window of 500 … 1000 rpm around the speed feedback set: 24.42 Speed error window control mode = Speed feedback window. 24.43 Speed error window high = 1000 rpm. 24.44 Speed error window low = 500 rpm. **Example 3**: To get a window of -50 … 100 rpm around the speed feedback set: 24.42 Speed error window control mode = Speed feedback window. 24.43 Speed error window high = 100 rpm. 24.44 Speed error window low = -50 rpm.						
	0 … 10	Speed error window + TI = off	-	1 = 1	n	y	Parameter
24.43	**Speed error window high**						
	Upper boundary of the speed error window. Upper boundary for the window control, when the speed error (Δn = 24.01 Used speed reference - 24.02 Used speed feedback) is positive.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
24.44	**Speed error window low**						
	Lower boundary of the speed error window. Lower boundary for the window control, when the speed error (Δn = 24.01 Used speed reference - 24.02 Used speed feedback) is negative.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
24.46	**Speed error step**						
	Speed error (Δn) step. Defines an additional speed error step given to the input of the speed controller. The given min/max values are limited by 30.11 M1 minimum speed and 30.12 M1 maximum speed. Note: Make sure the speed error step is removed when a stop command is given.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter

25 Speed control

Speed controller settings.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.01	**Torque reference speed control**						
	Limited speed controller output torque. Displays the torque reference in percent of 99.02 M1 nominal torque after limitation. See 30.13 Speed control min torque and 30.14 Speed control max torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
25.02	**Speed proportional gain 1**						
	Proportional gain 1 (K_P) of the speed controller. The proportional gain of the speed controller can be released by means of 25.13 Speed controller set selection. Too high a gain may cause speed oscillation. The figure below shows a controller output after an error step when the error remains constant:  **Example**: The speed controller generates 15 % of motor nominal torque with 25.02 Speed proportional gain 1 = 3, if the speed error (Δn) is 5 % of 46.02 M1 speed scaling actual.						
	0.00 … 325.00	5.00	-	100 = 1	n	y	Parameter
25.03	**Speed integration time 1**						
	Integration time 1 (T_I) of the speed controller. The integration time of the speed controller can be released by means of 25.13 Speed controller set selection. Setting the integration time to zero disables the integral part of the speed controller and resets the integrator. The integration time defines the time within the integral part of the speed controller achieves the same value as the proportional part, when the error value is constant. The integrator has anti-windup control for operation at torque or current limit. The figure below shows a controller output after an error step when the error remains constant:						

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type



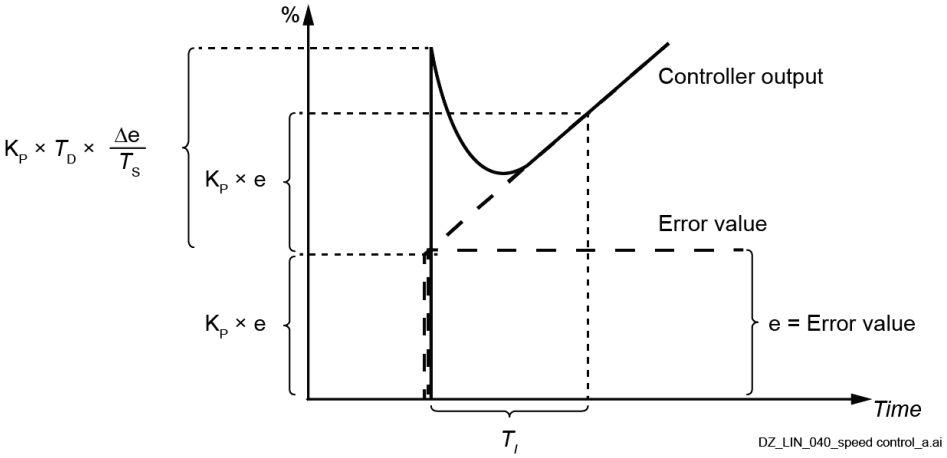
Example: The speed controller generates 15 % of motor nominal torque with 25.02 Speed proportional gain 1 = 3, if the speed error (Δn) is 5 % of 46.02 M1 speed scaling actual. On that condition and with 25.03 Speed integration time 1 = 300 ms follows:

– The speed controller generates 30 % of motor nominal torque, if the speed error is constant, after 300 ms are elapsed. 15 % derive from the proportional part and 15 % derive from the integral part.

	0 … 32500	2500	ms	1 = 1 ms	n	y	Parameter

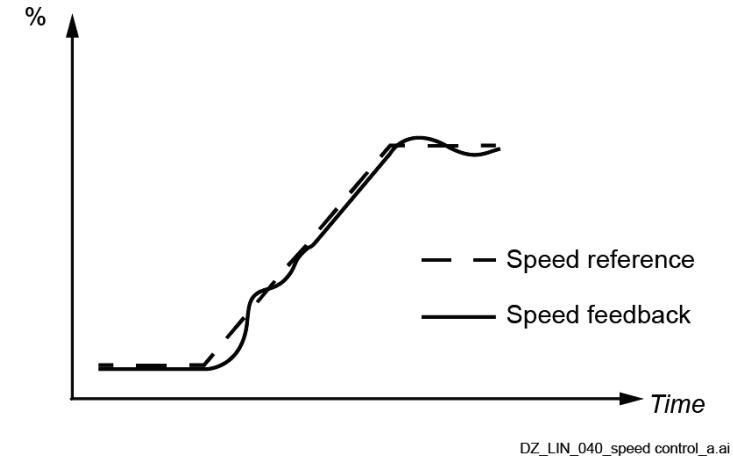
25.04 Speed derivation time

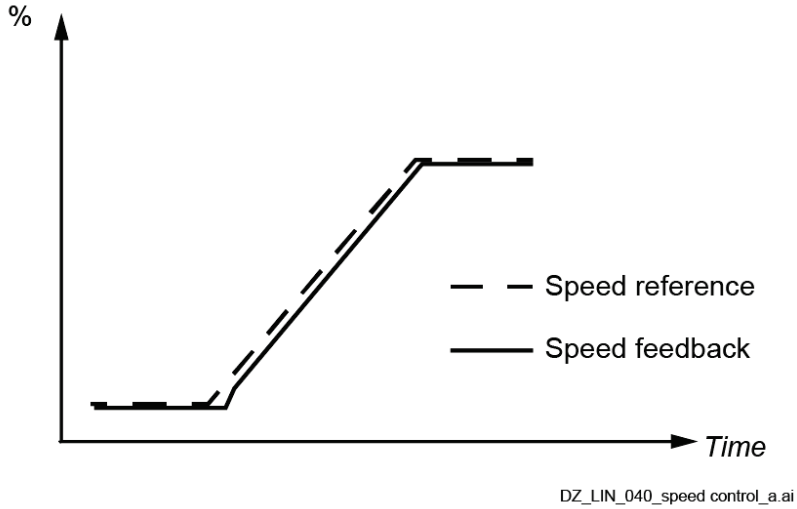
Derivation time (T_D) of the speed controller.
Speed controller derivation time. If the derivation time is set to zero, the controller works as a PI controller, otherwise as a PID controller.
For normal applications, derivation time should be left at zero.
Derivative action boosts the controller output if the error value changes. The longer the derivation time, the more the speed controller output is boosted during the change. The derivation makes the control more responsive for disturbances. The speed error derivative must be filtered with a low pass filter to eliminate external disturbances. See 25.05 Derivation filter time.
The figure below shows a controller output after an error step when the error remains constant:

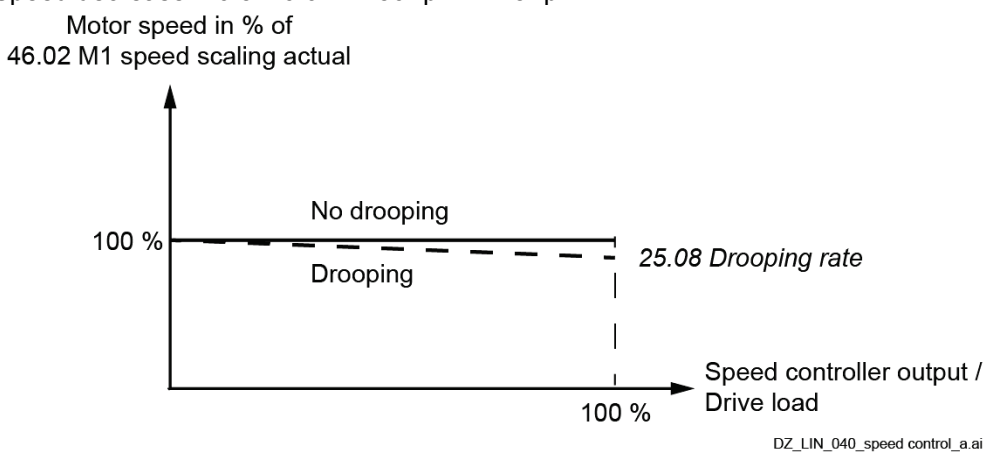


Gain = K_P = 1
T_I = integration time > 0
T_D = derivation time > 0
T_S= sample time period = 500 µs
Δe = error value change between two samples

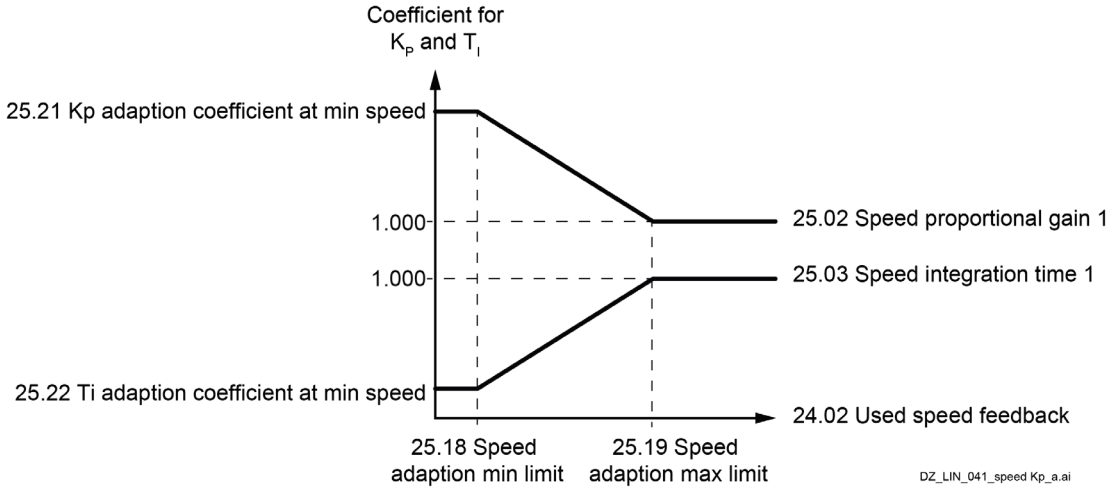
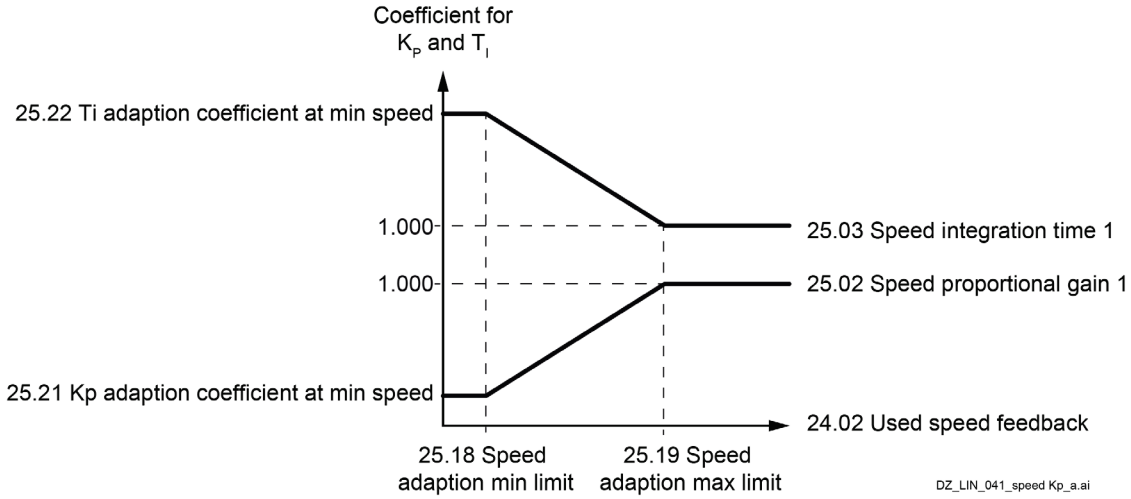
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter

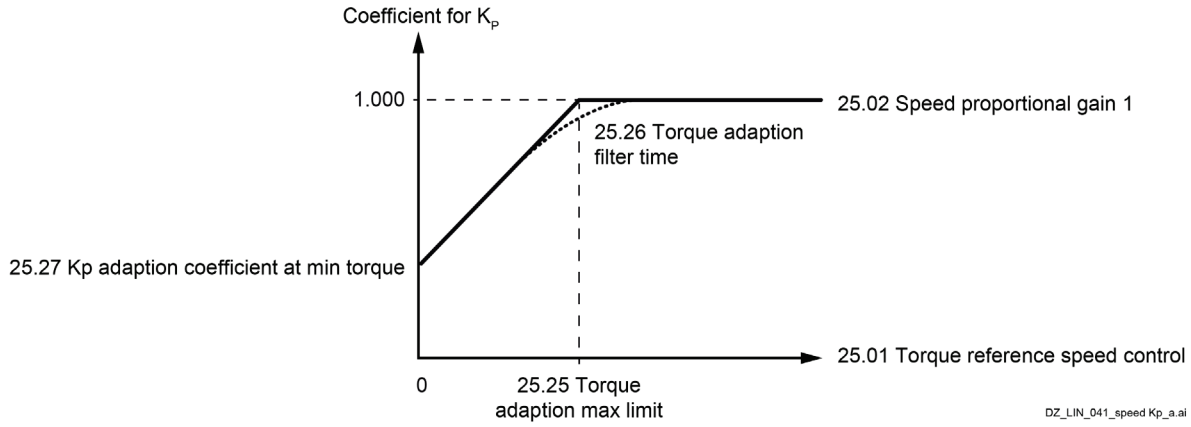
<table>
<tr><td rowspan="3">Index</td><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>25.05</td><td colspan="7">Derivation filter time</td></tr>
<tr><td rowspan="2"></td><td colspan="7">Derivation filter time constant.
Derivation filter time constant for 25.04 Speed derivation time.</td></tr>
<tr><td>0 … 32500</td><td>8</td><td>ms</td><td>1 = 1 ms</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>25.06</td><td colspan="7">Acceleration compensation derivation time</td></tr>
<tr><td rowspan="2"></td><td colspan="7">Acceleration compensation derivation time.
Derivation time for the acceleration compensation. Setting the acceleration compensation to zero disables it.
In order to compensate for high inertia loads during acceleration/deceleration, a derivative of 23.03 Speed reference 7 is added to the output of the speed controller.
Note: As a rule, use a value between 50 … 100 % of the sum of the mechanical time constants of the motor and the driven machinery.
The figures below shows the speed responses when a high inertia load is accelerated along a ramp.
Without acceleration compensation:
 

With acceleration compensation:
 
</td></tr>
<tr><td>0.0 … 3250.0</td><td>0.0</td><td>s</td><td>10 = 1 s</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>25.07</td><td colspan="7">Acceleration compensation filter time</td></tr>
<tr><td rowspan="2"></td><td colspan="7">Acceleration compensation filter time constant.
Acceleration compensation filter time constant for 25.06 Acceleration compensation derivation time.</td></tr>
<tr><td>0 … 32500</td><td>8</td><td>ms</td><td>1 = 1 ms</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.08	**Drooping rate**						
	Droop rate. Droop rate in percent of 46.02 M1 speed scaling actual. Drooping decreases the drive speed slightly as the drive load increases. The amount of speed drop caused by the load is determined by 25.08 Drooping rate. Drooping may become necessary for proper load sharing between drives that are linked via material (e.g. paper, steel, foil) and running with a common speed reference. The correct droop rate for a process must be found out case by case in practice. **Example**: following formula is valid: Speed decrease = Speed controller output • Drooping • Speed scaling With: – Speed controller output = 25.57 Torque reference unbalanced = 50 %. – Drooping = 25.08 Drooping rate = 1 %. – Speed scaling = 46.02 M1 speed scaling actual = 1500 rpm. Follows: Speed decrease = 0.5 x 0.01 x 150 rpm = 7.5 rpm.  						
	0.00 … 100.00	0.00	%	100 = 1 %	n	y	Parameter
25.09	**Speed control balancing enable**						
	Force speed controller output to 25.10 Speed control balancing reference. Selects the source to force the speed controller output balancing. This function is used to generate a smooth, bumpless transfer from a torque- or tension-controlled motor back to being speed controlled. Balancing is also possible in the speed ramp. See 23.26 Ramp out balancing enable. 0 = Enable output. 1 = Balance output. **Other [bit]**; source selection. 0: **Enable output**; 0, enable speed controller output. Normal operation. 1: **Balance output**; 1, force speed controller to 25.10 Speed control balancing reference. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Enable output	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.10	**Speed control balancing reference**						
	Speed controller output balancing reference. Defines the reference for speed controller output balancing in percent of 99.02 M1 nominal torque. The output of the speed controller is forced to this value when speed controller output balancing is enabled. See 25.09 Speed control balancing enable.						
	-325.00 … 325.00	0.00	%	See 46.04	n	y	Parameter
25.11	**Proportional gain emergency stop**						
	Proportional gain (K_P) upon an Off3 (emergency stop) command. Proportional gain of the speed controller when an Off3 (emergency stop) command is active. Overrides the value in 25.02 Speed proportional gain 1 or 25.14 Speed proportional gain 2.						
	0.00 … 325.00	5.00	-	100 = 1	n	y	Parameter
25.13	**Speed controller set selection**						
	Select active speed controller parameters. Selects the source that switches between the two sets of speed controller parameters. 25.02 Speed proportional gain 1, 25.03 Speed integration time 1, 25.14 Speed proportional gain 2 and 25.15 Speed integration time 2. 0 = Speed controller set 1. 1 = Speed controller set 2. **Other [bit]**; source selection. 0: **Speed controller set 1**; 0, proportional gain 1 and integration time 1 are active. Normal operation. 1: **Speed controller set 2**; 1, proportional gain 2 and integration time 2 are active. 2: **Speed level**; if |90.01 Motor speed for control| ≤ |46.31 Above speed level|, then Speed controller set 1 is active. If |90.01 Motor speed for control| > |46.31 Above speed level|, then Speed controller set 2 is active. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 20: **Speed error**; if |24.04 Speed error inverted| ≤ |46.31 Above speed level|, then Speed controller set 1 is active. If |24.04 Speed error inverted| > |46.31 Above speed level|, then Speed controller set 2 is active. 21: **Motor1/Motor2**; used speed controller set depends on setting of 42.01 Motor 1/2 selection. If 42.01 Motor 1/2 selection = Motor 1 use Speed controller set 1. If 42.01 Motor 1/2 selection = Motor 2 use Speed controller set 2.						
	0 … 21	Speed controller set 1	-	1 = 1	n	y	Parameter
25.14	**Speed proportional gain 2**						
	Proportional gain 2 (K_P) of the speed controller. See 25.02 Speed proportional gain 1.						
	0.00 … 325.00	5.00	-	100 = 1	n	y	Parameter
25.15	**Speed integration time 2**						
	Integration time 2 (T_I) of the speed controller. See 25.03 Speed integration time 1.						
	0 … 32500	2500	ms	1 = 1 ms	n	y	Parameter
	Speed adaptive proportional gain and integration time: In certain applications, it is useful to increase/decrease proportional gain and decrease/increase integration time of the speed controller at low speeds to improve the performance of the speed controller. Thus, it is possible to adapt proportional gain and integration time according to the speed						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	feedback. See 25.02 Speed proportional gain 1, 25.03 Speed integration time 1 and 24.02 Used speed feedback. This is done by multiplying proportional gain and integration time by coefficients at certain speeds. The coefficients are defined individually for both proportional gain and integration time. When the speed feedback is below or equal to 25.18 Speed adaption min limit, proportional gain is multiplied by 25.21 Kp adaption coefficient at min speed and integration time is multiplied by 25.22 Ti adaption coefficient at min speed. When the speed feedback is between 25.18 Speed adaption min limit and 25.19 Speed adaption max limit, the coefficients for proportional gain and integration time are calculated linearly. When the speed feedback is equal to or above 25.19 Speed adaption max limit, no adaptation takes place. Thus, the coefficient is 1. The speed adaptation is valid for positive and negative speeds. Increase the proportional gain (K_P) and decrease the integration time (T_I):  Decrease the proportional gain (K_P) and increase the integration time(TI):  						
25.18	**Speed adaption min limit**						
	Minimum speed feedback for the speed controller adaptation. The speed feedback limit below that the proportional gain is defined by 25.21 Kp adaption coefficient at min speed and the integration time is defined 25.22 Ti adaption coefficient at min speed. The speed feedback is 24.02 Used speed feedback.						
	0.00 … see 25.19	0.00	rpm	See 46.02	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.19	**Speed adaption max limit**						
	Maximum speed feedback for the speed controller adaptation. The speed feedback limit above that the proportional gain is defined by 25.02 Speed proportional gain 1 and the integration time is defined by 25.03 Speed integration time 1. The speed feedback is 24.02 Used speed feedback.						
	See 25.18 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
25.21	**Kp adaption coefficient at min speed**						
	Proportional gain (K_P) coefficient at minimum speed feedback. Determines the proportional gain coefficient at the speed feedback defined by 25.18 Speed adaption min limit.						
	0.000 … 10.000	1.000	-	1000 = 1	n	y	Parameter
25.22	**Ti adaption coefficient at min speed**						
	Integration time (T_I) coefficient at minimum speed feedback. Determines the integration time coefficient at the speed feedback defined by 25.18 Speed adaption min limit.						
	0.000 … 10.000	1.000	-	1000 = 1	n	y	Parameter
	Torque adaptive proportional gain: It is possible to adapt proportional gain of the speed controller according to the torque reference. See 25.02 Speed proportional gain 1 and 25.01 Torque reference speed control. This can be used to smooth out disturbances caused by small loads and backlashes. This is done by multiplying proportional gain by a coefficient within a certain torque range. When the torque reference is 0 %, proportional gain is multiplied by 25.27 Kp adaption coefficient at min torque. When the torque reference is between 0 % and 25.25 Torque adaption max limit, the coefficient for proportional gain is calculated linearly. When the torque reference is equal to or above 25.25 Torque adaption max limit, no adaptation takes place. Thus, the coefficient is 1. Filtering can be applied on the torque reference using 25.26 Torque adaption filter time. The load adaptation is valid for positive and negative torque.  						
25.25	**Torque adaption max limit**						
	Maximum torque reference for the speed controller adaptation. The torque reference limit in percent of 99.02 M1 nominal torque above which the proportional gain is defined by 25.02 Speed proportional gain 1. The torque reference is 25.01 Torque reference speed control.						
	0.00 … 325.00	0.00	%	See 46.04	n	y	Parameter

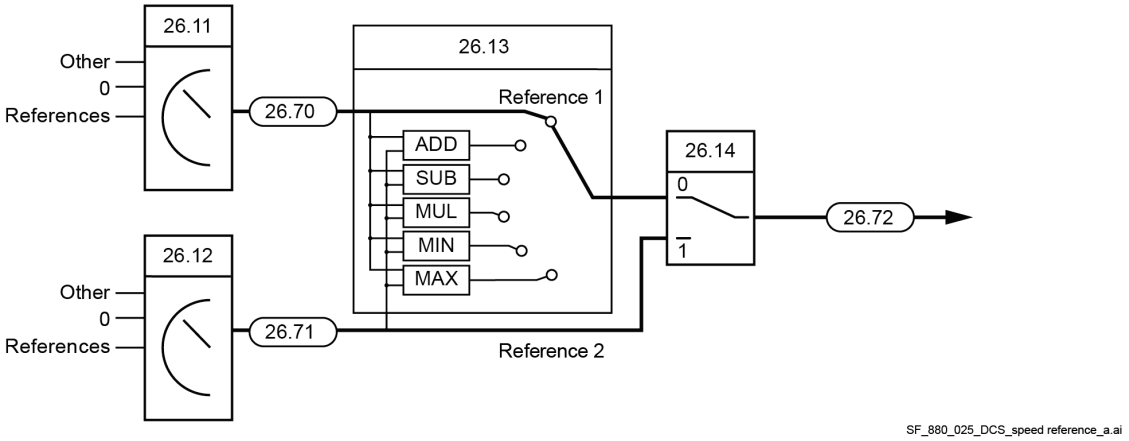
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.26	**Torque adaption filter time**						
	Filter time constant for the speed controller adaptation. Filter time constant to soften the proportional gain rate of change.						
	0 … 32500	100	ms	1 = 1 ms	n	y	Parameter
25.27	**Kp adaption coefficient at min torque**						
	Proportional gain (K_P) coefficient at 0 % torque reference. Determines the proportional gain coefficient at 0 % torque reference.						
	0.000 … 10.000	1.000	-	1000 = 1	n	y	Parameter
25.30	**Integration time initial enable**						
	Force integration time (T_I) to 25.31 Integration time initial reference. Selects the source to force the integration time. 0 = Automatic. 1 = Initial reference. **Other [bit]**; source selection. 0: **Automatic**; 0, the integration time is set to 25.31 Integration time initial reference as soon as Ready reference is set, see 06.15.b02 Main Status Word, or if 19.01 Present operation mode changes from Torque to Speed. Normal operation. 1: **Initial reference**; 1, force integration time (T_I) to 25.31 Integration time initial reference. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Automatic	-	1 = 1	n	y	Parameter
25.31	**Integration time initial reference**						
	Initial reference of the integration time (T_I). Initial value of the speed controller integration time in percent of 99.02 M1 nominal torque. The integration time is set: – As soon as Ready reference is set. See 06.15.b02 Main Status Word. – If 19.01 Present operation mode changes from Torque to Speed.						
	-325.00 … 325.00	0.00	%	See 46.04	n	y	Parameter
25.53	**Torque proportional reference**						
	Proportional gain (K_P) part of the speed controller. Displays the proportional gain (K_P) part of the speed controller in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
25.54	**Torque integral reference**						
	Integration time (T_I) part of the speed controller. Displays the integration time (T_I) part of the speed controller in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
25.55	**Torque derivative reference**						
	Derivation time (T_D) part of the speed controller. Displays the derivation time (T_D) part of the speed controller in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
25.56	**Torque acceleration compensation**						
	Output of the acceleration compensation function. Displays the output of the acceleration compensation function in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
25.57	**Torque reference unbalanced**						
	Unlimited speed controller output torque. Displays the unlimited speed controller output torque after acceleration compensation in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

26 Torque reference chain

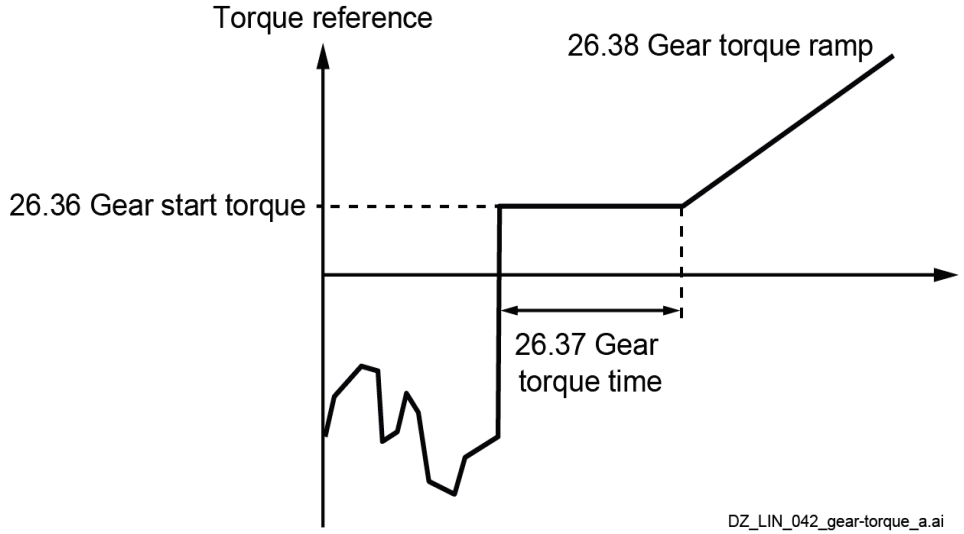
Settings for the torque reference chain.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
26.01	**Torque reference to limitation**						
	Torque reference after gear backlash compensation. Displays the torque reference in percent of 99.02 M1 nominal torque after gear backlash compensation and before limitation.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.02	**Torque reference used**						
	Torque reference after torque correction. Displays the final torque reference in percent of 99.02 M1 nominal torque after torque correction and before current control.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.05	**Motor torque unfiltered from 97.32**						
	Unfiltered motor torque. Displays the unfiltered motor torque in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.07	**External torque reference 1**						
	1st external torque reference. External torque reference 1 in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	0.00	%	See 46.04	n	y	Parameter
26.08	**External torque reference 2**						
	2nd external torque reference. External torque reference 2 in percent of 99.02 M1 nominal torque.						
	-325.00 … 325.00	0.00	%	See 46.04	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
26.11	**Torque reference 1 source** Selects torque reference source 1. Two signal sources can be defined. See 26.11 Torque reference 1 source and 26.12 Torque reference 2 source. 26.14 Torque reference 1/2 selection switches between the two sources or a mathematical function. The mathematical function depends on 26.13 Torque reference function.  **Other**; source selection. 0: **Zero**; 0, not in use. 1: **External torque reference 1**; 26.07 External torque reference 1. 2: **External torque reference 2**; 26.08 External torque reference 2. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 7: **FBA A reference 1**; 03.05 FBA A reference 1. 8: **FBA A reference 2**; 03.06 FBA A reference 2. 11: **EFB reference 1**; 03.09 EFB reference 1. 12: **EFB reference 2**; 03.10 EFB reference 2. 17: **Motor potentiometer reference**; 22.80 Motor potentiometer reference. 18: **Process PID output actual**; 40.01 Process PID output actual.						
	0 … 18	Zero	-	1 = 1	n	y	Parameter
26.12	**Torque reference 2 source** Selects torque reference source 2. For selections and diagram, see 26.11 Torque reference 1 source.						
	0 … 18	Zero	-	1 = 1	n	y	Parameter
26.13	**Torque reference function** Torque reference function. Selects a mathematical function between torque reference 1 and torque reference 2. See 26.11 Torque reference 1 source. 0: **Ref 1**; torque reference 1 selected by 26.11 Torque reference 1 source is used. 1: **Add (ref 1 + ref 2)**; the sum of the two torque references is used. 2: **Sub (ref 1 - ref 2)**; the result of torque reference 1 minus torque reference 2 is used. 3: **Mul (ref 1 • ref 2)**; the multiplication of the two torque references is used. 4: **Min (ref 1, ref 2)**; the smaller of the two torque references is used. 5: **Max (ref 1, ref 2)**; the greater of the two torque references is used.						
	0 … 5	Ref 1	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
26.14	**Torque reference 1/2 selection**						
	Selection between torque reference 1 and torque reference 2. Configures the selection between torque reference 1 and torque reference 2. See 26.11 Torque reference 1. 0 = Torque reference 1. 1 = Torque reference 2. **Other [bit]**; source selection. 0: **Torque reference 1**; 0, normal operation. 1: **Torque reference 2**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	Torque reference 1	-	1 = 1	n	y	Parameter
26.15	**Load share**						
	Torque reference scaling factor. Defines a scaling factor between 26.72 Torque reference 3 and 26.73 Torque reference 4. This allows drives sharing the load between two motors on the same mechanical plant to be tailored to share the correct amount each, yet use the same master torque reference.						
	-8.000 … 8.000	1.000	-	1000 = 1	n	y	Parameter
26.16	**Torque additive 1 source**						
	1st additive torque reference. Defines a torque reference to be added to the torque reference after load sharing. See 26.11 Torque reference 1 source. Note: Due to safety reasons, the additive torque reference is not applied during an emergency stop.						
	0 … 18	Zero	-	1 = 1	n	y	Parameter
26.17	**Torque reference filter time**						
	Filter time constant for the torque reference. Low-pass filter time constant for the torque reference.						
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter
26.18	**Torque ramp up time**						
	Torque reference ramp-up time. The time within the torque reference will increase from zero to 99.02 M1 nominal torque.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
26.19	**Torque ramp down time**						
	Torque reference ramp-down time. The time within the torque reference will decrease from 99.02 M1 nominal torque to zero.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
26.24	**Torque additive 2 enable**						
	Enable 2nd additive torque (load compensation). Source to enable torque additive 2. 0 = Disable torque additive 2. 1 = Enable torque additive 2. **Other [bit]**; source selection. 0: **Disable torque additive 2**; 0, normal operation. 1: **Enable torque additive 2**; 1. 3: **DI1**; 10.02.b00 DI delayed status.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Disable torque additive 2	-	1 = 1	n	y	Parameter
26.25	**Torque additive 2 source**						
	2nd additive torque reference (load compensation). Defines a torque reference to be added to 26.75 Torque reference 5. See 26.11 Torque reference 1 source. **Note**: Due to safety reasons, the additive torque reference is not applied during an emergency stop. **WARNING!** If the additive torque 2 exceeds the limits set by 30.13 Speed control min torque and 30.14 Speed control max torque, a ramp stop may be impossible. Make sure additive torque 2 is reduced or removed when a ramp stop is required. See 26.24 Torque additive 2 enable.						
	0 … 18	Zero	-	1 = 1	n	y	Parameter
26.30	**Torque step enable**						
	Enable a torque step. Enables/disables a torque step. 0: **Disable**; disable torque step. 1: **Enable**; enable torque step.						
	0 … 1	Disable	-	1 = 1	n	y	Parameter
26.31	**Torque step**						
	Torque step value. Adds an additional torque step in percent of 99.02 M1 nominal torque to 26.76 Torque reference 6. **Note**: Due to safety reasons, the torque step is not applied during an emergency stop. **WARNING!** If the torque step exceeds the limits set by 30.13 Speed control min torque and 30.14 Speed control max torque, a ramp stop may be impossible. Make sure the torque step is reduced or removed when a ramp stop is required. See 26.30 Torque step enable.						
	-325.00 … 325.00	0.00	%	See 46.04	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Gear backlash compensation: Gear backlash compensation is used to reduce the gear backlash. Thus, it is possible to make torque reference direction changes faster without damaging the gearbox. When the torque reference is changing its direction, the torque limit is reduced to 26.36 Gear start torque for the time defined by 26.37 Gear torque time. After the time has elapsed, the torque limit is increased to its normal value according to the ramp time defined by 26.38 Gear torque ramp.  						
26.36	**Gear start torque**						
	Torque limit for the gear backlash compensation. Defines the reduced torque limit in percent of 99.02 M1 nominal torque after a direction change of the torque reference.						
	0.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
26.37	**Gear torque time**						
	Torque limit time for the gear backlash compensation. When the torque reference is changing its direction, the torque limit is reduced for the time defined by 26.37 Gear torque time.						
	0 … 32500	100	ms	1 = 1 ms	n	y	Parameter
26.38	**Gear torque ramp**						
	Torque reference ramp-up time for the gear backlash compensation. The time within the torque reference will increase from zero to 99.02 M1 nominal torque.						
	0 … 32500	100	ms	1 = 1 ms	n	y	Parameter
26.43	**Torque correction enable**						
	Enable torque correction. Source to enable torque correction. 0 = Disable torque correction. 1 = Enable torque correction. **Other [bit]**; source selection. 0: **Disable torque correction**; 0, normal operation. 1: **Enable torque correction**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Disable torque correction	-	1 = 1	n	y	Parameter
26.44	**Torque correction source**						
	Torque correction. Defines a torque correction to be added to the torque reference after the limitation. See 26.11 Torque reference 1 source. **Note**: Due to safety reasons, the additive torque reference is not applied during an emergency stop. **WARNING!** If the torque correction exceeds the limits set by 30.03 Minimum torque all limits and 30.04 Maximum torque all limits, a ramp stop may be impossible. Make sure torque correction is reduced or removed when a ramp stop is required. See 26.43 Torque correction enable.						
	0 … 18	Zero	-	1 = 1	n	y	Parameter
26.70	**Torque reference 1**						
	Value of torque reference 1 source. Displays the torque reference in percent of 99.02 M1 nominal torque after torque reference 1 source. See 26.11 Torque reference 1 source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.71	**Torque reference 2**						
	Value of torque reference 2 source. Displays the torque reference in percent of 99.02 M1 nominal torque after torque reference 2 source. See 26.12 Torque reference 2 source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.72	**Torque reference 3**						
	Torque reference after source selection. Displays the torque reference in percent of 99.02 M1 nominal torque after the mathematical function and torque reference 1/2 selection. See 26.13 Torque reference function and 26.14 Torque reference 1/2 selection.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.73	**Torque reference 4**						
	Torque reference after additive 1. Displays the torque reference in percent of 99.02 M1 nominal torque after 1st additive torque and after torque reference from control panel. See 26.16 Torque additive 1 source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.74	**Torque reference ramp output**						
	Torque reference at the ramp output. Displays the limited, filtered and ramped torque reference in percent of 99.02 M1 nominal torque. See 30.03 Minimum torque all limits and 30.04 Maximum torque all limits.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.75	**Torque reference 5**						
	Torque reference after torque selector. Displays the torque reference in percent of 99.02 M1 nominal torque after control mode selection. See 19.01 Present operation mode.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.76	**Torque reference 6**						
	Torque reference after additive 2 (load compensation). Displays the torque reference in percent of 99.02 M1 nominal torque after 2nd additive torque. See 26.24 Torque additive 2 enable and 26.25 Torque additive 2 source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
26.77	**Torque reference additive A**						
	Torque reference after additive 2 (load compensation) source selection. Displays the torque reference in percent of 99.02 M1 nominal torque after additive 2 selection. See 26.25 Torque additive 2 source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.78	**Torque reference additive B**						
	Torque reference after additive 2 (load compensation) enable. Displays the torque reference in percent of 99.02 M1 nominal torque after additive 2 enable. See 26.24 Torque additive 2 enable.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
26.79	**Torque correction reference**						
	Torque correction reference after source selection and enable. Displays the torque correction reference in percent of 99.02 M1 nominal torque after source selection and enable. See 26.43 Torque correction enable and 26.44 Torque correction source.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

27 Armature current control

Settings for the armature current control chain.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
27.01	**Current reference**						
	Armature current reference after flux adaption. Displays the armature current reference in percent of 99.11 M1 nominal current after flux adaption.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
27.02	**Used current reference**						
	Armature current reference after limitation. Displays the armature current reference in percent of 99.11 M1 nominal current after current limitation. See 30.34 M1 current limit bridge 2, 30.35 M1 current limit bridge 1 and 30.37 … 30.41 Current limit at speed 1 … 5.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
27.05	**Motor current**						
	Motor current. Measured motor current in percent of 99.11 M1 nominal current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
27.06	**Motor peak current**						
	Motor peak current. Measured motor peak current in percent of 99.11 M1 nominal current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
27.09	**Current controller i-part**						
	Integration time (T_I) part of the armature current controller. Displays the integration time (T_I) part of the armature current controller in percent of 99.11 M1 nominal current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
27.18	**Firing angle**						
	Firing angle. Displays the firing angel in degrees.						
	0.00 … 180.00	-	°	100 = 1°	y	n	Signal

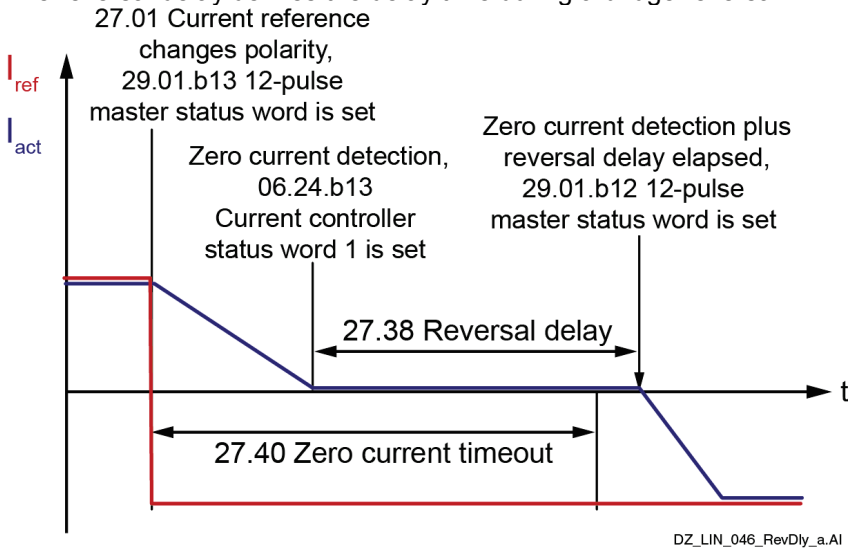
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
27.19	**Selected bridge**						
	Selected (current-conducting) bridge: 0: No bridge; no bridge selected. 1: Bridge 1; bridge 1 selected. 2: Bridge 2; bridge 2 selected.						
	0 … 2	-	-	1 = 1	y	n	Signal
27.22	**Current reference source**						
	Selects the current reference source. Selects the source for the current reference either as armature drive or as field exciter. **Other**; source selection. 0: **Zero**; 0, forces single firing pulses to suppress the DC current and sets 27.01 Current reference to zero. 1: **27.01 Current reference**; 27.01 Current reference as armature current reference. 2: **27.23 Current reference external**; 27.23 Current reference external as armature current reference. 3: **26.02 Torque reference used**; 26.02 Torque reference used is directly used as armature current reference (torque = current). **Note**: The flux adaption in field weakening is inactive (means no flux dependent armature current reference). 4: **AI1 scaled**; 12.12 AI1 scaled value as armature current reference. 5: **AI2 scaled**; 12.22 AI2 scaled value as armature current reference. 6: **AI3 scaled**; 12.32 AI3 scaled value as armature current reference. 7: **FBA A reference 1**; 03.05 FBA A reference 1 as armature current reference. 8: **FBA A reference 2**; 03.06 FBA A reference 2 as armature current reference. 11: **EFB reference 1**; 03.09 EFB reference 1 as armature current reference. 12: **EFB reference 2**; 03.10 EFB reference 2 as armature current reference. 30: **M1 field current reference**; 28.14 M1 field current reference from the armature drive via DCSLink as field current reference. Only available if 99.06 Operation mode = Field exciter. 31: **M2 field current reference**; 42.45 M2 field current reference from the armature drive via DCSLink as field current reference. Only available if 99.06 Operation mode = Field exciter. 32: **M1 field current + Current external**; 28.14 M1 field current reference from the armature drive via DCSLink plus 27.23 Current reference external as field current reference. Only available if 99.06 Operation mode = Field exciter. 33: **M2 field current + Current external**; 42.45 M2 field current reference from the armature drive via DCSLink plus 27.23 Current reference external as field current reference. Only available if 99.06 Operation mode = Field exciter. 34: **Flux reference after EMF control**; 28.09 Flux reference after EMF control from the armature drive via DCSLink as field current reference. Only if available 99.06 Operation mode = Field exciter.						
	0 … 34	Current reference	-	1 = 1	n	y	Parameter
27.23	**Current reference external**						
	External armature current reference. External armature current reference in percent of 99.11 M1 nominal current. **Note**: 27.23 Current reference external is only valid, if 27.22 Current reference source = Current reference external.						
	-325.00 … 325.00	0.00	%	100 = 1 %	n	y	Parameter
27.24	**Current reference slope**						
	Armature current reference slope. Armature current reference slope in percent of 99.11 M1 nominal current per 1 ms. The di/dt limitation is located at the input of the armature current controller.						
	0.20 … 120.00	10.00	%/ms	100 = 1 %/ms	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
27.27	**Current control mode**						
	Armature current control mode. Armature current controller mode selection. 0: **Standard**; PI-controller with RL compensation from EMF calculation based on 27.05 Motor current and feed forward from 99.01 Mains voltage. 1: **Feed forward reference**; PI-controller with RL compensation from EMF calculation based on current reference, see 27.22 Current reference source, and feed forward from 99.01 Mains voltage. More stable since a current reference is used. 2: **No feed forward**; PI-controller without RL compensation from EMF calculation. No feed forward from 99.01 Mains voltage takes place. Do not use for motor applications.						
	0 … 2	Standard	-	1 = 1	n	y	Parameter
27.28	**Current control feedback mode**						
	Proportional gain (K_P) feedback mode. Chooses the armature current feedback type for the proportional gain of the armature current controller. 0: **Peak current**; peak current measurement is used. 1 = **Average current**; average current measurement is used.						
	0 … 1	Peak current	-	1 = 1	n	y	Parameter
27.29	**M1 current proportional gain**						
	Proportional gain (K_P) of the armature current controller. **Example**: The controller generates 15 % of motor nominal current with 27.29 M1 current proportional gain = 3, if the armature current error is 5 % of 99.11 M1 nominal current.						
	0.00 … 325.00	0.10	-	100 = 1	n	y	Parameter
27.30	**M1 current integration time**						
	Integration time (T_I) of the armature current controller. Setting the integration time to zero disables the integral part of the armature current controller and resets the integrator. The integration time defines the time within the integral part of the armature current controller achieves the same value as the proportional part, when the error value is constant. **Example**: The controller generates 15 % of motor nominal current with 27.29 M1 current proportional gain = 3, if the armature current error is 5 % of 99.11 M1 nominal current. On that condition and with 27.30 M1 current integration time = 50 ms follows: – The controller generates 30 % of motor nominal current, if the armature current error is constant, after 50 ms are elapsed. 15 % derive from the proportional part and 15 % derive from the integral part.						
	0 … 32500	50	ms	1 = 1 ms	n	y	Parameter
27.31	**M1 discontinuous current limit**						
	Motor 1 discontinuous current limit. Threshold continuous/discontinuous current in percent of 99.11 M1 nominal current. The measured continuous/discontinuous current state can be read from 06.24.b12 Current controller status word 1.						
	0.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
27.32	**M1 armature resistance**						
	Motor 1 armature resistance. Resistance of the armature circuit in mΩ. Used for the EMF calculation/compensation: $EMF = U_A - R_A \times I_A - L_A \times \frac{dI_A}{dt}$ **Note**: Do not change the default values of 27.32 M1 armature resistance and 27.33 M1 armature inductance! Changing them will falsify the results of the autotuning.						
	0 … 65500	0	mΩ	1 = 1 mΩ	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
27.33	**M1 armature inductance**						
	Motor 1 armature inductance. Resistance of the armature circuit in mH. Used for the EMF calculation/compensation: $EMF = U_A - R_A \times I_A - L_A \times \frac{dI_A}{dt}$ **Note**: Do not change the default values of 27.32 M1 armature resistance and 27.33 M1 armature inductance! Changing them will falsify the results of the autotuning.						
	0.0 … 3250.0	0.0	mH	10 = 1 mH	n	y	Parameter
27.34	**Mains compensation time**						
	Mains compensation filter time constant. Mains voltage compensation filter time constant. Is used for the mains voltage compensation at the current controller output. Setting the mains compensation filter time constant to 32500 ms disables the mains voltage compensation.						
	0 … 32500	10	ms	1 = 1 ms	n	y	Parameter
27.37	**Block bridge source**						
	Block bridge source. Binary signal to block a bridge. See 27.19 Selected bridge. The signal blocks the selected bridge. 0 = Block bridge 1. 1 = Block bridge 2. **Other [bit]**; source selection. 0: **Block bridge 1**; 0, block bridge 1. 1: **Block bridge 2**; 1, block bridge 2. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 20: **Block**; block both bridges. 21: **Release**; release both bridges. Normal operation.						
	0 … 31	Release	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
27.38	**Reversal delay**						

Reversal delay during a bridge reversal (bridge changeover/change armature current direction).
The reversal delay defines the delay time during a bridge reversal.



The reversal delay starts after a bridge reversal command has been given and zero current has been detected. See 27.01 Current reference, 29.01.b13 12-pulse master status word and 06.24.b13 Current controller status word 1.
After a bridge reversal command, zero current has to be reached before 27.40 Zero current timeout elapses otherwise the event generates fault F557 Reversal time. See 04.24.b08 Fault word 4.
The setting of the reversal delay depends on the discontinuous current limit:

27.31 M1 discontinuous current limit	27.38 Reversal delay	delta	27.40 Zero current timeout
50 %	5 ms	15 ms	20 ms
≤ 35 %	10 ms	25 ms	35 ms
≤ 20 %	15 ms	35 ms	50 ms
≤ 10 %	20 ms	50 ms	70 ms

Notes:
- 29.14 12-pulse reversal timeout must be longer than 27.40 Zero current timeout and 27.40 Zero current timeout must be longer than 27.38 Reversal delay.
- 27.38 Reversal delay must have the same setting in 12-pulse master and 12-pulse slave with one exception only:
  If there is no current measurement in the 12-pulse serial slave, set 27.38 Reversal delay in the 12-pulse serial slave to 0 ms. Now the 12-pulse serial slave uses the reversal command of the 12-pulse master for its own bridge reversal. See 29.01.b12 12-pulse master status word.

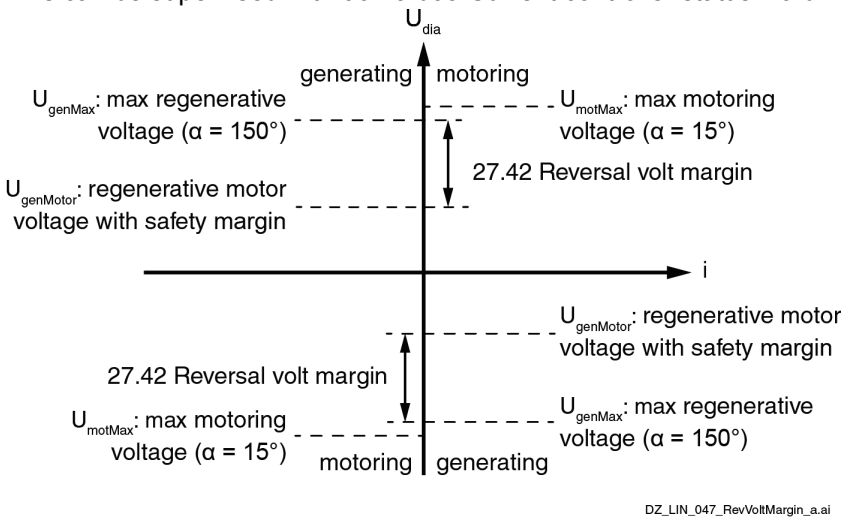
Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0 … 32500	5	ms	1 = 1 ms	n	y	Parameter

27.39	**Zero current detection**

Zero current detection method.
Selects the zero current detection method. Use a binary signal, if the zero current detection is done by another drive.
0 = Current not zero.
1 = Zero current detected.
Notes:
- If zero current is detected if the thyristor voltage is either ≤ 10 V or ≤ 10 % of 99.01 Mains voltage.
- With 27.39 Zero current detection = DIx the zero current detection flag is set, in case the mains contactor is switched off and the synchronization to the mains is interrupted.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Other [bit]; source selection. 0: **Current**; based on the drive's own zero current detection resistors. Normal operation. 1: **Voltage**; based on the drive's own thyristor voltages. Not valid when galvanic isolation is used. 2: **Current and voltage**; based on discontinuous current and thyristor voltages. Not valid when galvanic isolation is used. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Current	-	1 = 1	n	y	Parameter
27.40	**Zero current timeout**						
	Zero current timeout during a bridge reversal (bridge changeover/change armature current direction). The zero current timeout defines the time during a bridge reversal, while zero current has to be reached. Otherwise, the event generates fault F557 Reversal time. See 04.24.b08 Fault word 4. See 27.38 Reversal delay. **Notes**: – 29.14 12-pulse reversal timeout must be longer than 27.40 Zero current timeout and 27.40 Zero current timeout must be longer than 27.38 Reversal delay. – 27.40 Zero current timeout must have the same setting in 12-pulse master and 12-pulse slave with one exception only: If there is no current measurement in the 12-pulse serial slave, set 27.40 Zero current timeout in the 12-pulse serial slave to 32500 ms.						
	0 … 32500	20	ms	1 = 1 ms	n	y	Parameter
27.41	**Reversal mode**						
	Reversal mode for a bridge reversal (bridge changeover/change armature current direction). Reversal mode defines the behavior of the speed ramp and speed controller during a bridge reversal or a field reversal (torque reversal). **Note**: 27.41 Reversal mode is automatically set to Hard when 27.38 Reversal delay ≤ 25 ms. 0: **Soft**; the speed ramp and speed controller are frozen during reversal. Leading to a bumpless reversal (no speed steps). **Attention**: Do not use for hanging loads (e.g. cranes). 1: **Hard**; the speed ramp and speed controller are released during reversal. Thus, the drive follows the ramp.						
	0 … 1	Hard	-	1 = 1	n	y	Parameter
27.42	**Reversal volt margin**						
	Reversal volt safety margin. The reversal volt margin in percent of 99.10 Nominal mains voltage is a safety margin for the motor voltage during regenerative mode. Setting the reversal volt margin to zero removes the protection against commutation faults (shooting through). The function of the reversal volt margin is the following: To prevent the drive from blowing fuses when going from motoring to generating the armature voltage has to be lower than the corresponding mains voltage, because thyristors are line commutated. This is automatically checked by the drive and the reverse bridge is blocked as long as the armature voltage is too high. To lower the armature voltage two ways are possible: – Lowering the motor speed by idling. – Adapting the flux by lowering the field current. For this option set 28.41 M1 EMF/field control = EMF.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Both options take time and thus delaying the current/torque reversal. For faster adapting of the armature voltage, activate the field weakening function. This can be supervised with 06.25.b03 Current controller status word 2.						



For regenerative mode is valid:

$$U_{genMotor} = |U_{genMax}| - U_{Safety}$$

$$with \quad U_{genMax} = 1.35 \times \cos \alpha_{\max} \times (01.20)$$

$$U_{genMax} = 1.35 \times \cos (30.45) \times (01.20)$$

$$and \quad U_{Safety} = (27.42)$$

$$follows:$$

$$U_{genMotor} = |1.35 \times \cos (30.45) \times (01.20)| - (27.42) \times (01.20)$$

Example: With 30.45 Maximum firing angle = 150° and 27.42 Reversal volt margin = 10 % follows:

$$U_{genMotor} = |1.35 \times \cos 150° \times (01.20)| - 0.1 \times (01.20)$$

$$U_{genMotor} = |-1.16 \times (01.20)| - 0.1 \times (01.20)$$

$$follows:$$

$$U_{genMotor} = 1.06 \times (01.20)$$

Thus, the bridge reversal is only possible if 1.21 Armature voltage in V < 1.06 x 01.20 Mains voltage in V.

0 … 20	6	%	1 = 1 %	n	y	Parameter

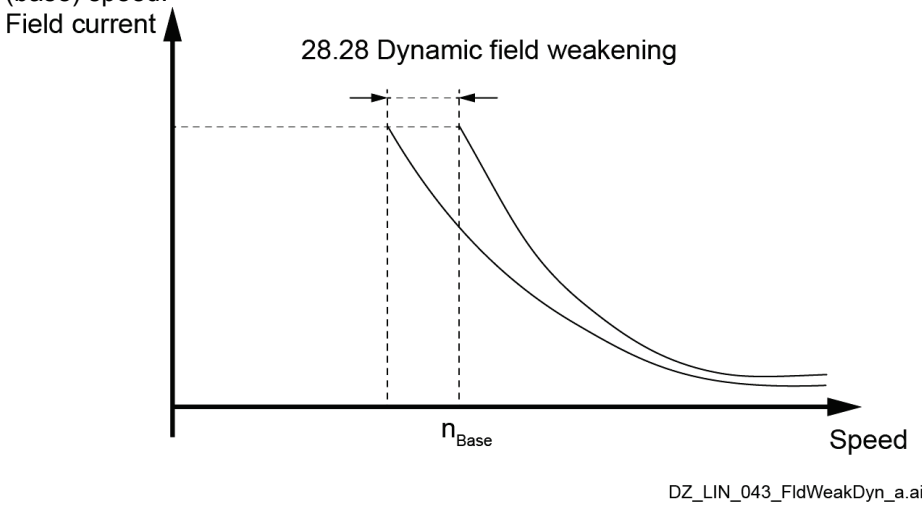
28 EMF and field current control

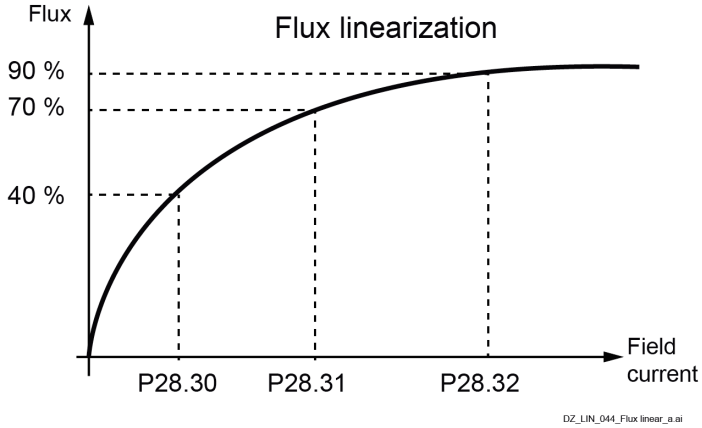
Settings for the EMF and field current control chain.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.01	**EMF voltage reference 1**						
	EMF voltage reference after source selection. Displays the EMF voltage reference in percent of 99.12 M1 nominal voltage after EMF reference source. See 28.18 EMF reference source.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.02	**EMF voltage reference 2**						
	EMF voltage reference after source selection. Displays the EMF voltage reference in percent of 99.12 M1 nominal voltage after voltage correction and ramp (slope). This is an input for the EMF controller. See 28.20 EMF voltage correction and 28.21 EMF voltage reference slope.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.05	**Armature voltage**						
	Armature voltage. Measured armature voltage in in percent of 99.12 M1 nominal voltage. This value is also influenced by 95.34 DC voltage measurement adjust and 95.35 DC voltage measurement offset.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.06	**EMF voltage**						
	EMF voltage. Displays the EMF voltage in percent of 99.12 M1 nominal voltage after the EMF calculation. A filter time constant is defined by 28.23 EMF voltage filter time. This is an input for the EMF controller.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.09	**Flux reference after EMF control**						
	Flux reference after the EMF controller. Displays the EMF part of the flux reference in percent of nominal flux. Nominal flux is generated with 100 % field current. **Note**: 28.09 Flux reference after EMF control is set to zero, if 28.41 M1 EMF/field control = Fix.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.10	**Flux reference field weakening**						
	Flux reference from field weakening. Displays the field weakening part of the flux reference in percent of nominal flux. Nominal flux is generated with 100 % field current. **Note**: 28.10 Flux reference field weakening is set to 100 %, if 28.41 M1 EMF/field control = Fix.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.11	**Flux reference sum**						
	Flux reference sum. Displays the sum of the flux reference in percent of nominal flux. Nominal flux is generated with 100 % field current. 28.11 Flux reference sum = 28.09 Flux reference after EMF control + 28.10 Flux reference field weakening.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.14	**M1 field current reference**						
	Motor 1 field current reference. Displays motor 1 field current reference in percent of 99.13 M1 nominal field current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal
28.15	**M1 field current**						
	Motor 1 field current. Motor 1 measured field current in percent of 99.13 M1 nominal field current.						
	-325.00 … 325.00	-	%	100 = 1 %	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.17	**M1 EMF/field control mode**						
	Motor 1 EMF/field control mode Motor 1 EMF/field control mode selection. **Note**: It is not possible to go into field weakening range when 90.41 M1 feedback selection = EMF. 0: **Fix**; constant field (no field weakening), EMF controller blocked, field reversal blocked, optitorque blocked. 1: **EMF**; field weakening active, EMF controller released, field reversal blocked, optitorque blocked. 2: **Fix/reversal**; constant field (no field weakening), EMF controller blocked, field reversal active, optitorque blocked. 3: **EMF/reversal**; field weakening active, EMF controller released, field reversal active, optitorque blocked. 4: **Fix/optitorque**; constant field (no field weakening), EMF controller blocked, field reversal blocked, optitorque active. 5: **EMF/optitorque**; field weakening active, EMF controller released, field reversal blocked, optitorque active. 6: **Fix/reversal/optitorque**; constant field (no field weakening), EMF controller blocked, field reversal active, optitorque active. 7 = **EMF/reversal/optitorque**; field weakening active, EMF controller released, field reversal active, optitorque active.						
	0 … 7	Fix	-	1 = 1	n	y	Parameter
28.18	**EMF reference source**						
	Selects the EMF voltage reference source. Selects the source for the EMF voltage reference. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **Internal**; internally calculated EMF voltage reference. 2: **EMF voltage external reference**; 28.19 EMF voltage external reference. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 7: **FBA A reference 1**; 03.05 FBA A reference 1. 8: **FBA A reference 2**; 03.06 FBA A reference 2. 11: **EFB reference 1**; 03.09 EFB reference 1. 12: **EFB reference 2**; 03.10 EFB reference 2.						
	0 … 12	Internal	-	1 = 1	n	y	Parameter
28.19	**EMF voltage external reference**						
	External EMF voltage reference input. External EMF voltage reference input of the drive in percent of 99.12 M1 nominal voltage. Can be connected via 28.18 EMF reference source.						
	-325.00 … 325.00	0.00	%	100 = 1 %	n	y	Parameter
28.20	**EMF voltage correction source**						
	Selects the EMF voltage correction source. Selects the source for the EMF voltage correction. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **EMF voltage correction**; 28.21 EMF voltage correction. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 7: **FBA A reference 1**; 03.05 FBA A reference 1. 8: **FBA A reference 2**; 03.06 FBA A reference 2. 11: **EFB reference 1**; 03.09 EFB reference 1.						

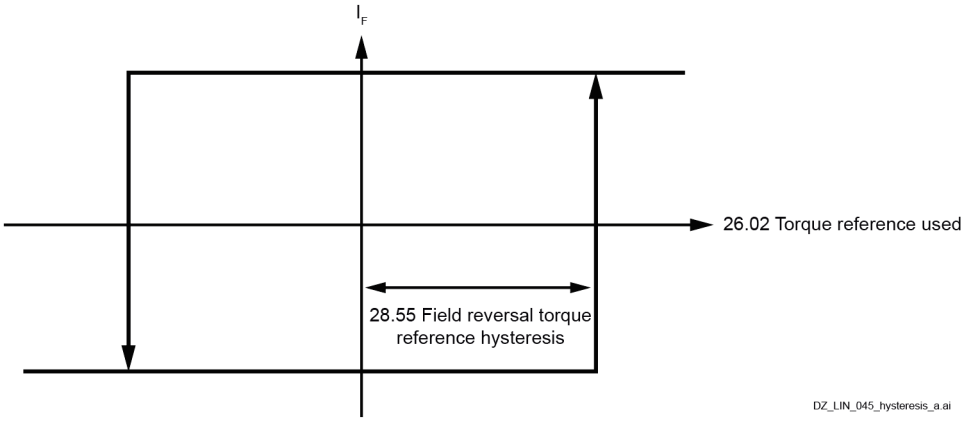
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	12: **EFB reference 2**; 03.10 EFB reference 2.						
	0 … 12	Zero	-	1 = 1	n	y	Parameter
28.21	**EMF voltage correction**						
	EMF voltage correction input. EMF voltage correction input of the drive in percent of 99.12 M1 nominal voltage. Can be connected via 28.20 EMF voltage correction source.						
	-325.00 … 325.00	0.00	%	100 = 1 %	n	y	Parameter
28.22	**EMF voltage reference slope**						
	EMF voltage reference slope. EMF voltage reference slope in percent of 99.12 M1 nominal voltage per 1 ms. The dv/dt limitation is located at the input of the EMF controller.						
	0.01 … 100.00	30.00	%/ms	100 = 1 %/ms	n	y	Parameter
28.23	**EMF voltage filter time**						
	EMF voltage filter time constant. EMF voltage filter time constant for 28.06 EMF voltage.						
	0 … 32500	10	ms	1 = 1 ms	n	y	Parameter
28.24	**EMF proportional gain**						
	Proportional gain (KP) of the EMF controller. **Example**: The controller generates 15 % of motor nominal EMF with 28.24 EMF proportional gain = 3, if the EMF error is 5 % of 99.12 M1 nominal voltage.						
	0.00 … 325.00	0.50		100 = 1	n	y	Parameter
28.25	**EMF integration time**						
	Integration time (T_I) of the EMF controller. Setting the integration time to zero disables the integral part of the EMF controller and resets the integrator. The integration time defines the time within the integral part of the EMF controller achieves the same value as the proportional part, when the error value is constant. **Example**: The controller generates 15 % of motor nominal EMF with 28.24 EMF proportional gain = 3, if the EMF error is 5 % of 99.12 M1 nominal voltage. On that condition and with 28.25 EMF integration time = 50 ms follows: – The controller generates 30 % of motor nominal EMF, if the EMF error is constant, after 50 ms are elapsed. 15 % derive from the proportional part and 15 % derive from the integral part.						
	0 … 32500	50	ms	1 = 1 ms	n	y	Parameter

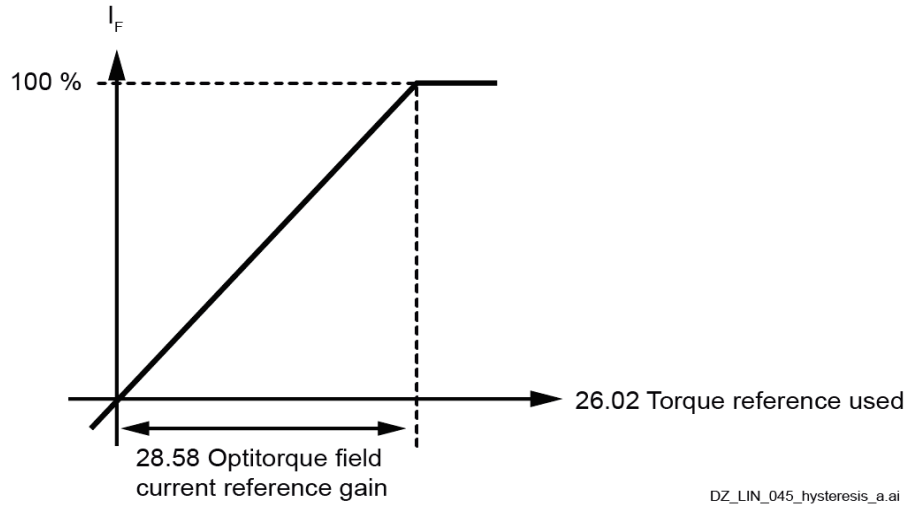
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.28	**Dynamic field weakening**						
	Dynamic field weakening. If the motor speed passes the base speed (field weakening point) quickly, armature voltage overshoot may occur. To solve this problem the field weakening point can be lowered by means of dynamic field weakening. 28.28 Dynamic field weakening is set in percent of 99.14 M1 nominal (base) speed.  **Note**: The lowered field weakening point is compensated by the EMF controller in case of constant speed or slow speed change. 30.50 Maximum EMF limit has to be set high enough to allow the EMF controller to compensate.						
	80.00 … 100.00	100.00	%	100 = 1 %	n	y	Parameter
28.29	**Flux correction source**						
	Selects the flux correction source. Selects the source for the flux correction. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **Flux correction**; 28.29 Flux correction. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 7: **FBA A reference 1**; 03.05 FBA A reference 1. 8: **FBA A reference 2**; 03.06 FBA A reference 2. 11: **EFB reference 1**; 03.09 EFB reference 1. 12: **EFB reference 2**; 03.10 EFB reference 2.						
	0 … 12	Zero	-	1 = 1	n	y	Parameter
28.30	**Flux correction**						
	Flux correction input. Flux correction input of the drive in percent of nominal flux. Nominal flux is generated with 100 % field current. Can be connected via 28.28 Flux correction source.						
	-100.00 … 100.00	0.00	%	100 = 1 %	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.31	**Field current at 40 % flux**						
	Field current at 40 % flux. Field current in percent of 99.13 M1 nominal field current needed to generate 40 % of nominal flux. It is used to compensate the non-linearity between flux and field current.  						
	0.00 … 100.00	40.00	%	100 = 1 %	n	y	Parameter
28.32	**Field current at 70 % flux**						
	Field current at 70 % flux. Field current in percent of 99.13 M1 nominal field current needed to generate 70 % of nominal flux. It is used to compensate the non-linearity between flux and field current.						
	0.00 … 100.00	70.00	%	100 = 1 %	n	y	Parameter
28.33	**Field current at 90 % flux**						
	Field current at 90 % flux. Field current in percent of 99.13 M1 nominal field current needed to generate 90 % of nominal flux. It is used to compensate the non-linearity between flux and field current.						
	0.00 … 100.00	90.00	%	100 = 1 %	n	y	Parameter
28.36	**M1 field heating source**						
	Motor 1 field heating source. Selects the source of motor 1 field heating On/Off command. 0 = Disable field heating. 1 = Enable with On. **Notes**: – Field heating is disabled if: – Safe torque off (STO) is active. – Switch-on inhibited is active. – A fault is active. – Off2 (emergency off/fast current off) is active. – Off3 (emergency stop) is active. – When the drive is in state Ready reference (Run command). – Motor 1 field heating reference is set with 28.37 M1 field heating reference. Motor 1 field heating can be disabled, when the reference is set to zero. Motor 1 field nominal current is set with 99.13 M1 nominal field current. – In case motor 1 field exciter is not connected via a separate field contactor following settings apply for motor 1 field heating: – 20.33 Mains contactor control mode = On. – 28.36 M1 field heating source = Enable with On. – When two motors in shared motion are used and field economy is needed for motor 1, set 28.36 M1 field heating source = Disable field heating.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	When 28.36 M1 field heating source = Enable with On, 100 % field current for motor 1 is kept, while the procedure to close the brake is active. **Other [bit]**; source selection. 0: **Disable field heating**; 0, motor 1 field heating is off. Normal operation. 1: **Enable with On**; 1, enable motor 1 field heating with Off1 control = 1 and Run = 0. 2. **Enable field heating**; enable motor 1 field heating as long as Off1 control = 0. 3: **DI1**; 10.02.b00 DI delayed status. Enable motor 1 field heating with DI1 = 1 and Run = 0. 4: **DI2**; 10.02.b01 DI delayed status. Enable motor 1 field heating with DI2 = 1 and Run = 0. 5: **DI3**; 10.02.b02 DI delayed status. Enable motor 1 field heating with DI3 = 1 and Run = 0. 6: **DI4**; 10.02.b03 DI delayed status. Enable motor 1 field heating with DI4 = 1 and Run = 0. 7: **DI5**; 10.02.b04 DI delayed status. Enable motor 1 field heating with DI5 = 1 and Run = 0. 8: **DI6**; 10.02.b05 DI delayed status. Enable motor 1 field heating with DI6 = 1 and Run = 0. 11: **DIO1**; 11.02.b00 DIO delayed status. Enable motor 1 field heating with DIO1 = 1 and Run = 0. 12: **DIO2**; 11.02.b01 DIO delayed status. Enable motor 1 field heating with DO2 = 1 and Run = 0. 19: **DIL**; 10.02.b15 DI delayed status. Enable field motor 1 heating with DIL = 1 and Run = 0.						
	0 … 19	Enable field heating	-	1 = 1	n	y	Parameter
28.37	**M1 field heating reference**						
	Motor 1 field heating current reference. Field current reference in percent of 99.13 M1 nominal field current for field heating and field economy. Field heating: – Field heating is enabled according to 28.36 M1 field heating source. – Field heating is disabled when 28.37 M1 field heating reference = 0. Field economy: – Field economy is only available when 2 motors with 2 independent field exciters are connected to the drive. – Field economy for motor 1 is enabled when 28.37 M1 field heating reference < 100 %. – Field economy for motor 1 is activated, if: – The On command is given for longer than 10 s. – Motor 2 is selected via 42.01 Motor 1/2 selection. – Motor 2 is active. See 06.18.b05 Drive status word 3. – 28.38 M1 field current reference source = 42.53 M2 field current reference source = Internal.						
	0.00 … 100.00	0.00	%	100 = 1 %	n	y	Parameter
28.38	**M1 field current reference source**						
	Motor 1 field current reference source. Selector for motor 1 field current reference. 0: Internal; motor 1 field current reference according to field heating or shared motion. See 28.36 Field heating source and 42.01 Motor 1/2 selection. 1: **Motor 2 reference**; motor 2 field current reference is taken. 2: **Motor 1 external**; 28.39 M1 field current external reference.						
	0 … 2	Internal	-	1 = 1	n	y	Parameter
28.39	**M1 field current external reference**						
	Motor1 external field current reference. External field current reference input of the drive in percent of 99.13 M1 nominal field current. Can be connected via 28.38 M1 field current reference source.						
	-100.00 … 100.00	0.00	%	100 = 1 %	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.40	**Field current reference trimming**						
	Field current reference trimming. The field current of motor 1 and motor 2 can be corrected by means of 28.40 Field current reference trimming in percent of 99.13 M1 nominal field current or 42.10 M2 nominal field current respectively. See drawing in 28.38 M1 field current reference source.						
	-100.00 … 100.00	0.00	%	100 = 1 %	n	y	Parameter
28.44	**M1 field control voltage limit**						
	Motor 1 voltage limit for the field exciter. Positive voltage limit for motor 1 field exciter in percent of the maximum possible field exciter output voltage. **Example**: With a 3-phase supply voltage of 400 V_{AC} the field current controller can generate a maximum average output voltage of 521 V_{DC}. In case the rated field supply voltage is 200 V_{DC} it is possible to limit the field exciter output voltage. E.g. to get a maximum average output voltage of 240V_{DC} set the limit to 46 %. This is archived by limiting the firing angle of the field current controller. **Note**: 4-Q field exciters that can reverse the field current will use the setting for positive and negative voltage limit.						
	0.00 … 100.00	100.00	%	100 = 1 %	n	y	Parameter
28.45	**M1 field current proportional gain**						
	Proportional gain (K_P) of the field current controller. **Example**: The controller generates 15 % of motor nominal field voltage (see motor nameplate) with 28.45 M1 field current proportional gain = 3, if the field current error is 5 % of 99.13 M1 nominal field current.						
	0.00 … 325.00	0.20	-	100 = 1	n	y	Parameter
28.46	**M1 field current integration time**						
	Integration time (T_I) of the field current controller. Setting the integration time to zero disables the integral part of the filed current controller and resets the integrator. The integration time defines the time within the integral part of the field current controller achieves the same value as the proportional part, when the error value is constant. **Example**: The controller generates 15 % of motor nominal field voltage (see motor nameplate) with 28.45 M1 field current proportional gain = 3, if the field current error is 5 % of 99.13 M1 nominal field current. On that condition and with 28.46 M1 field current integration time = 200 ms follows: – The controller generates 30 % of motor nominal field voltage, if the field current error is constant, after 200 ms are elapsed. 15 % derive from the proportional part and 15 % derive from the integral part.						
	0 … 32500	200	ms	1 = 1 ms	n	y	Parameter
28.54	**Field current force direction**						
	Force field current direction. Selects the source for the field current direction. 0 = Forward. 1 = Reverse. **Other [bit]**; source selection. 0: **Forward**; field current direction is forced to forward direction. Normal operation. 1: **Reverse**; field current direction is forced to reverse direction. 2: **None**; inactive. Field current force direction is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 20: **External reverse**; In case an external contactor in the field current loop is used to change the field direction, 28.54 Field current force direction has to be switched between Forward and External reverse. External reverse adapts the armature voltage and speed supervision. The external contactor interlocking and the control of 28.54 Field current force direction has to be done by means of Adaptive Program, application program or overriding control.						
	0 … 20	None	-	1 = 1	n	y	Parameter
28.55	**Field reversal torque reference hysteresis**						
	Torque reference hysteresis for field reversal. To prevent the field reversal from continuous toggling at a small 26.02 Torque reference used, a hysteresis in percent of 99.02 M1 nominal torque is available. The hysteresis is symmetrical and is set by 28.55 Field reversal torque reference hysteresis. The field reversal itself is controlled by the sign of 26.02 Torque reference used.  **Note**: The hysteresis is only effective for 28.43 M1 EMF/field control mode = Fix/reversal or EMF/reversal.						
	0.00 … 325.00	2.00	%	See 46.04	n	y	Parameter
28.56	**Field reversal field current hysteresis**						
	Field current hysteresis for field reversal. The sign of 28.15 M1 field current is used to generate the acknowledge signal for the field reversal. To avoid signal noise problems a small hysteresis in percent of 99.13 M1 nominal field current is needed. **Note**: The hysteresis is only effective for 28.43 M1 EMF/field control mode = Fix/reversal, EMF/reversal, Fix/reversal/optitorque or EMF/reversal/optitorque.						
	0.00 … 100.00	2.00	%	100 = 1 %	n	y	Parameter
28.57	**Field reversal flux monitoring delay**						
	Flux monitoring delay for field reversal. Maximum allowed time within the sign of 28.15 M1 field current and the internal motor flux do not correspond to each other during field reversal. During this time, 7301 Motor speed feedback and 73A1 Load speed feedback are disabled. See 4.22.b05 Fault word 2. **Note**: The delay is only effective for 28.43 M1 EMF/field control mode = Fix/reversal, EMF/reversal, Fix/reversal/optitorque or EMF/reversal/optitorque.						
	0 … 32500	0	ms	1 = 1 ms	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
28.58	**Optitorque field current reference gain**						
	Field current reference gain for optitorque. Optitorque calculates the field current reference depending on the torque reference. See 26.02 Torque reference used. The field current is reduced to a smaller value in case of low torque references. Thus, for low torque references the field reversal is faster. Optitorque is activated by means of 28.43 M1 EMF/field control mode. The relation between 26.02 Torque reference used and 28.14 M1 field current reference is linear and without offset. The gradient is defined by means of 28.58 Optitorque field current reference gain.  **Example**: With 28.58 Optitorque field current reference gain = 20 %, 100 % field current is generated at 26.02 Torque reference used = 20 %. **Note**: The gain is only effective for 28.43 M1 EMF/field control mode = Fix/optitorque, EMF/optitorque, Fix/reversal/optitorque or EMF/reversal/optitorque.						
	.00 … 100.00	50.00	%	100 = 1 %	n	y	Parameter
28.61	**Set: M1 field exciter current scaling**						
	Set: Motor 1 field exciter scaling factor. 28.61 Set: M1 field exciter current scaling is write protected, unless 95.24 Service mode = Set: Type code. If the scaling is changed, the new value is taken over immediately. To use 28.61 Set: M1 field exciter current scaling following inequation has to be valid: – 99.13 M1 nominal field current ≤ 28.61 Set: M1 field exciter current scaling ≤ maximum field current of the used field exciter. **Notes**: – For 28.61 Set: M1 field exciter current scaling > maximum field current of the used field exciter A132 Parameter setting conflict is generated. See 4.32.b15 Warning word 2. – For 99.13 M1 nominal field current > 28.61 Set: M1 field exciter current scaling the scaling is set automatically. – The scaling factor is released when 99.13 M1 nominal field current < 28.61 Set: M1 field exciter current scaling and 99.07 M1 used field exciter type = OnBoard … DCF804-0060.						
	0.00 … 60.00	0.00	A	100 = 1 A	n	y	Parameter
28.62	**M1 field exciter freewheeling level**						
	Motor 1 field exciter freewheeling level. The freewheeling level is shown in percent per 1 ms of the measured field exciter supply voltage. If 2 successive AC-voltage measurements differ more than 28.62 M1 field exciter freewheeling level, the freewheeling function is activated. **Note**: The freewheeling level is only valid, for 99.07 M1 used field exciter type = DCF804-0050 … DCF804-0060.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0.00 … 100.00	20.00	%/ms	100 = 1 %/ms	n	y	Parameter
28.63	M1 field exciter operation mode						
	Motor 1 operation mode for certain field exciters. The field exciters DCF803-0016, DCF803-0025 and DCF803-0035 can be connected to either a 3-phase supply or a single-phase supply. 0: **1-phase**; single-phase supply for the field exciter. 1: **3-phase**; 3-phase supply for the field supply.						
	0 … 1	3-phase	-	1 = 1	n	y	Parameter

29 12-pulse/Hardparallel

Settings for 12-pulse and hardparallel.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
29.01	**12-pulse master status word**						

12-pulse master status word.
Displays the 12-pulse master status word send from the 12-pulse master to the 12-pulse slave, when 20.01 Command location = 12-pulse link.
Note: The status word is valid in 12-pulse master and slave.
Bit assignment:

Bit	Name	Value	Remarks
0	Off1 control	1	On command for the 12-pulse slave.
		0	Off1 command for the 12-pulse slave.
1	Off2 control	1	Normal operation (Off2 inactive) for the 12-pulse slave.
		0	Off2 (emergency off/fast current off) command for the 12-pulse slave.
2	Motor heating	1	Motor heating active.
		0	Motor heating inactive.
3	Run	1	Run command for the 12-pulse slave.
		0	Stop command for the 12-pulse slave.
4	Field exciter	1	Field exciter On command for the 12-pulse slave.
		0	Field exciter Off command for the 12-pulse slave.
5	Dynamic braking	1	Dynamic braking active/started.
		0	Dynamic braking inactive.
6	12-pulse type	1	12-pulse serial operation in the 12-pulse master. See 99.06 Operation mode.
		0	12-pulse parallel operation in the 12-pulse master. See 99.06 Operation mode.
7	Reset	0 → 1	Acknowledge fault indications in the 12-pulse slave with the positive edge.
8	reserved		
9	reserved		
10	Waiting for EMF reduction	1	Waiting for reduction of EMF to match the mains voltage. See 27.42 Reversal volt margin.
11	Autotuning current controller	1	Autotuning armature current controller active.
12	Zero current + reversal delay	1	Zero current detection plus reversal delay elapsed. See 06.24.b13 Current controller status word 1 and 27.38 Reversal delay.
13	Change current direction	1	Command to change the direction of the armature current. Bridge changeover is active.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	14 Blocked current controller	1	6.25 Current controller status word 2 > 0. Thus, the armature current controller is blocked.				
	15 Current direction	1	27.02 Used current reference is negative.				
		0	27.02 Used current reference is positive.				
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

30 Control limits

Drive operation limits.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.01	**Limit word 1**						

Drive limit word 1.
Displays the limit word 1 of the drive.
Bit assignment:

Bit	Name	Value	Remarks
0	Negative speed	1	Speed reference is limited by 20.24 Negative speed enable.
1	Positive speed	1	Speed reference is limited by 20.23 Positive speed enable.
2	Min speed	1	Speed reference is limited by 30.11 Minimum speed.
3	Max speed	1	Speed reference is limited by 30.12 Maximum speed.
4	Bridge 2 current	1	Armature current reference is limited by 30.34 M1 current limit bridge 2.
5	Bridge 1 current	1	Armature current reference is limited by 30.35 M1 current limit bridge 1.
6	Speed 1 current	1	Armature current reference is limited by 30.37 Current limit at speed 1.
7	Speed 2 current	1	Armature current reference is limited by 30.38 Current limit at speed 2.
8	Speed 3 current	1	Armature current reference is limited by 30.39 Current limit at speed 3.
9	Speed 4 current	1	Armature current reference is limited by 30.40 Current limit at speed 4.
10	Speed 5 current	1	Armature current reference is limited by 30.41 Current limit at speed 5.
11	Min firing angle	1	Firing angle is limited by 30.44 Minimum firing angle.
12	Max firing angle	1	Firing angle is limited by 30.45 Maximum firing angle.
13	Min EMF controller	1	EMF controller output is limited by 30.49 Minimum EMF limit.
14	Max EMF controller	1	EMF controller output is limited by 30.50 Maximum EMF limit.
15	reserved		

0000h … FFFFh	-	-	1 = 1	y	n	Signal

30.02	**Torque limit status**

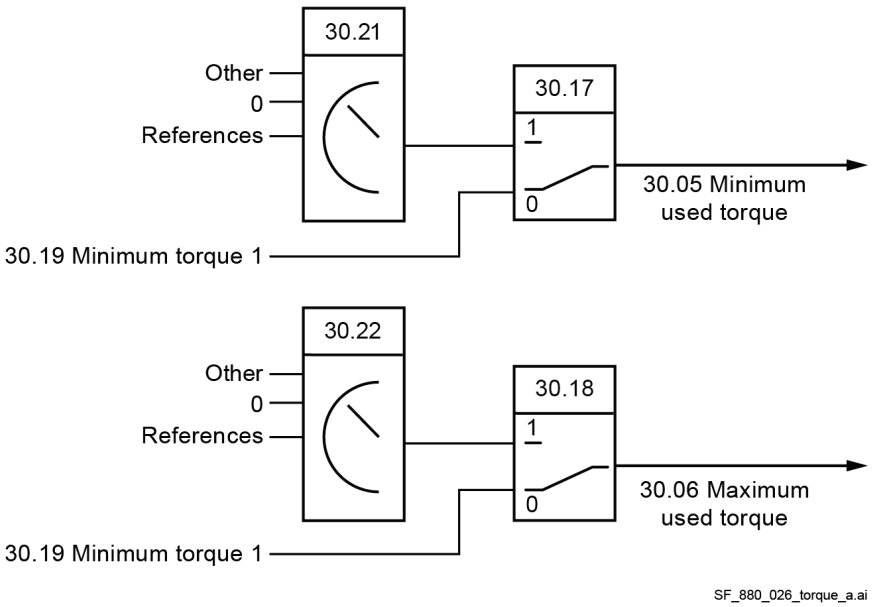
Torque limit word.
Displays the torque word of the drive.
Bit assignment:

Bit	Name	Value	Remarks

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0 Min 2-Q operation	1	Torque/current reference is limited by 2-Q operation. See 07.34 Drive block bridge 2 set = Block bridge 2.				
	1 Min speed controller	1	Speed controller output is limited by 30.13 Speed control min torque.				
	2 Max speed controller	1	Speed controller output is limited by 30.14 Speed control max torque.				
	3 Min external	1	External torque reference is limited by 30.15 Minimum torque reference from 26.08.				
	4 Max external	1	External torque reference is limited by 30.16 Maximum torque reference from 26.09.				
	5 Min 1	1	Torque reference is limited by 30.19 Minimum torque 1.				
	6 Max 1	1	Torque reference is limited by 30.20 Maximum torque 1.				
	7 Min 2	1	Torque reference is limited by 30.23 Minimum torque 2.				
	8 Max 2	1	Torque reference is limited by 30.24 Maximum torque 2.				
	9 Max regenerating	1	Torque reference is limited by 30.27 Max torque during regenerating.				
	10 Min emergency stop	1	Speed controller output is limited by 30.30 Minimum torque emergency stop from 25.13.				
	11 Max emergency stop	1	Speed controller output is limited by 30.31 Maximum torque emergency stop from 25.14.				
	12 reserved						
	13 reserved						
	14 reserved						
	15 reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
30.03	**Minimum torque all limits**						
	Combination of all minimum torque/current limits. Largest of all minimum torque/current limits in percent of 99.02 M1 nominal torque. Evaluated from 07.34 Drive block bridge 2 set, 30.06 Maximum used torque and 30.34 M1 current limit bridge 2.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
30.04	**Maximum torque all limits**						
	Combination of all maximum torque/current limits. Smallest of all maximum torque/current limits in percent of 99.02 M1 nominal torque. Evaluated from 30.06 Maximum used torque and 30.35 M1 current limit bridge 1.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
30.05	**Minimum used torque**						
	Minimum used torque reference limit. Minimum torque limit in percent of 99.02 M1 nominal torque. The source is selected with 30.17 Minimum torque sel. Connected to the torque limiter after 26.01 Torque reference to limitation.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal
30.06	**Maximum used torque**						
	Maximum used torque reference limit. Maximum torque limit in percent of 99.02 M1 nominal torque. The source is selected with 30.18 Maximum torque sel. Connected to the torque limiter after 26.01 Torque reference to limitation.						
	-325.00 … 325.00	-	%	See 46.04	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.11	**M1 minimum speed**						
	Motor 1 minimum speed limit. Motor 1 minimum speed reference limit in rpm for 23.01 Speed reference ramp input and 24.01 Used speed reference. **Notes**: – 30.11 M1 minimum speed is applied to 24.01 Used speed reference to avoid exceeding the speed limits by means of 24.11 Speed correction. – To be able to overspeed the drive (e.g. for winders) it is possible to switch off the speed limit for 24.01 Used speed reference by means of 6.10.b02 Auxiliary control word 1.						
	-30000.00 … 30000.00	-1500.00	rpm	See 46.02	n	y	Parameter
30.12	**M1 maximum speed**						
	Motor 1 maximum speed limit. Motor 1 maximum speed reference limit in rpm for 23.01 Speed reference ramp input and 24.01 Used speed reference. **Notes**: – 30.12 M1 maximum speed is applied to 24.01 Used speed reference to avoid exceeding the speed limits by means of 24.11 Speed correction. – To be able to overspeed the drive (e.g. for winders) it is possible to switch off the speed limit for 24.01 Used speed reference by means of 6.10.b02 Auxiliary control word 1.						
	-30000.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter
30.13	**Speed control min torque**						
	Minimum speed controller output torque limit. Minimum speed controller output torque limit in percent of 99.02 M1 nominal torque. See 25.01 Torque reference speed control. **Notes**: – The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the largest value is valid. – No need to change the default setting of 30.13 Speed control min torque for 2-Q operation, because the minimum torque limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter
30.14	**Speed control max torque**						
	Maximum speed controller output torque limit. Maximum speed controller output torque limit in percent of 99.02 M1 nominal torque. See 25.01 Torque reference speed control. **Note**: The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	-325.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
30.15	**Minimum torque reference**						
	Minimum external torque reference limit. Minimum external torque reference limit in percent of 99.02 M1 nominal torque for external references. See 26.11 Torque reference 1 source and 26.12 Torque reference 2 source. **Notes**: – The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the largest value is valid. – No need to change the default setting of 30.13 Speed control min torque for 2-Q operation, because the minimum torque limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter

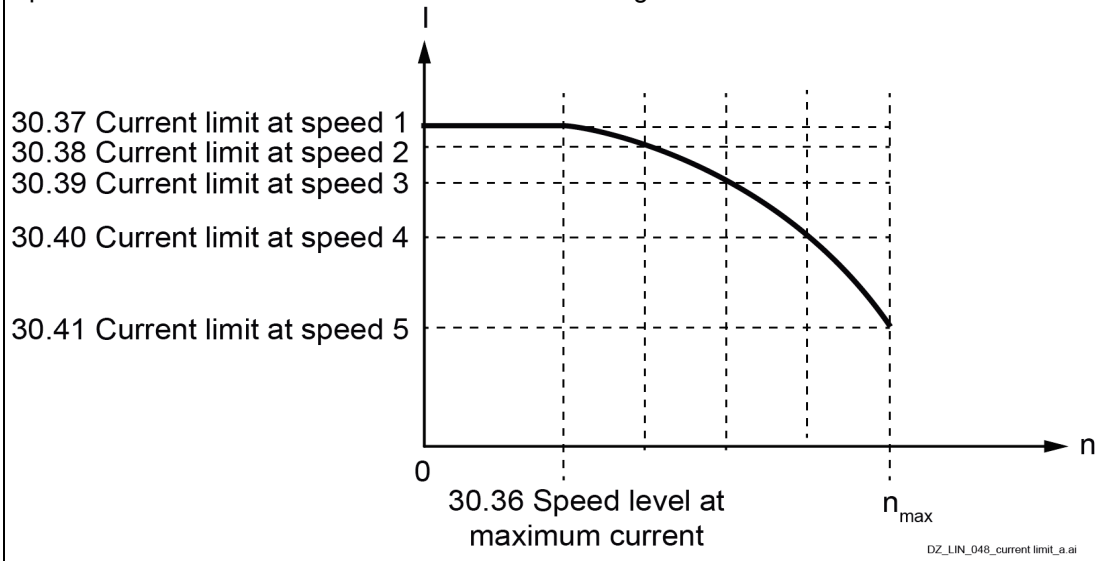
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.16	**Maximum torque reference**						
	Maximum external torque reference limit. Maximum external torque reference limit in percent of 99.02 M1 nominal torque for external references. See 26.11 Torque reference 1 source and 26.12 Torque reference 2 source. **Note**: The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	-325.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
30.17	**Minimum torque sel**						
	Minimum torque reference limit selector. Selects a source that switches between two different predefined minimum torque limits. The user can define two sets of torque limits and switch between the sets using a binary source such as a digital input. 30.17 Minimum torque sel is independent of 30.18 Maximum torque sel. The first set of limits is defined by 30.19 Minimum torque 1 and 30.20 Maximum torque 1. The second set has selector parameters for both minimum and maximum limit. See 30.21 Minimum torque 2 source and 30.22 Maximum torque 2 source. Thus, it is possible to select e.g. analog inputs. 0 = Minimum torque 1. 1 = Minimum torque 2.						
	0 … 19	Minimum torque 1	-	1 = 1	n	y	Parameter



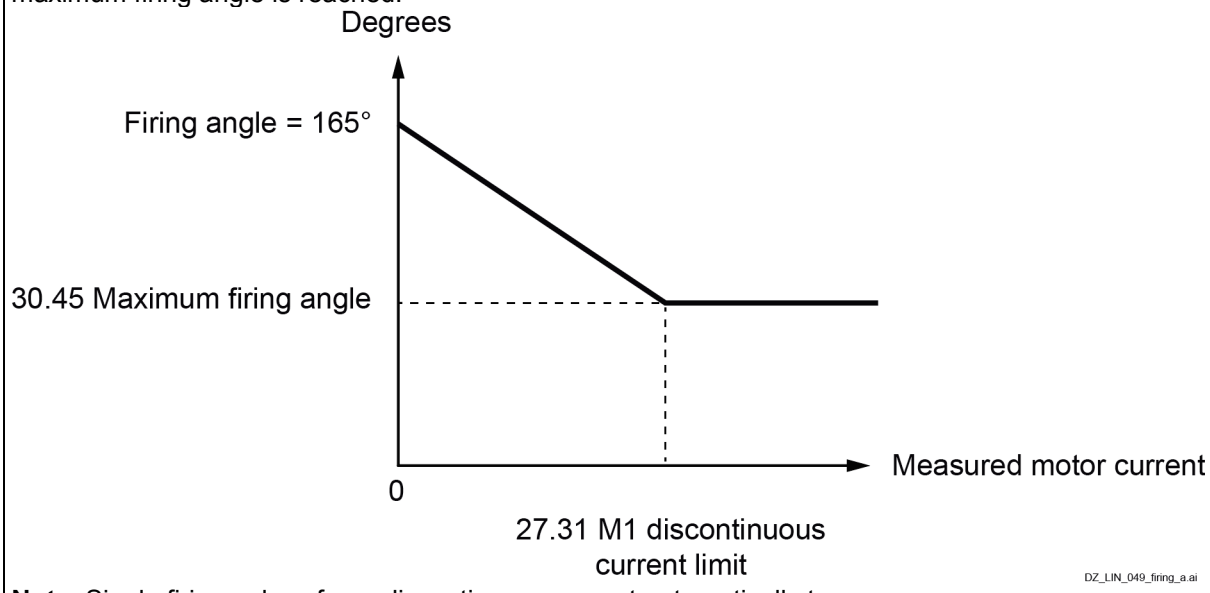
Other [bit]; source selection.
0: **Minimum torque 1**; 30.19 Minimum torque 1 is active. Normal operation.
1: **Minimum torque 2**; the source selected by 30.21 Minimum torque 2 source is active.
3: **DI1**; 10.02.b00 DI delayed status.
4: **DI2**; 10.02.b01 DI delayed status.
5: **DI3**; 10.02.b02 DI delayed status.
6: **DI4**; 10.02.b03 DI delayed status.
7: **DI5**; 10.02.b04 DI delayed status.
8: **DI6**; 10.02.b05 DI delayed status.
11: **DIO1**; 11.02.b00 DIO delayed status.
12: **DIO2**; 11.02.b01 DIO delayed status.
19: **DIL**; 10.02.b15 DI delayed status.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.18	**Maximum torque sel**						
	Maximum torque reference limit selector. Selects a source that switches between two different predefined minimum torque limits. See 30.17 Minimum torque sel. 0 = Maximum torque 1. 1 = Maximum torque 2. **Other [bit]**; source selection. 0: **Maximum torque 1**; 30.20 Maximum torque 1 is active. Normal operation. 1: **Maximum torque 2**; the source selected by 30.22 Maximum torque 2 source is active. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Maximum torque 1	-	1 = 1	n	y	Parameter
30.19	**Minimum torque 1**						
	Minimum torque reference limit 1. Minimum torque reference limit 1 in percent of 99.02 M1 nominal torque for the torque limiter. See 30.17 Minimum torque sel. **Notes**: – The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the largest value is valid. – No need to change the default setting of 30.19 Minimum torque 1 for 2-Q operation, because the minimum torque limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter
30.20	**Maximum torque 1**						
	Maximum torque reference limit 1. Maximum torque reference limit 1 in percent of 99.02 M1 nominal torque for the torque limiter. See 30.17 Minimum torque sel. **Note**: The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	-325.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
30.21	**Minimum torque 2 source**						
	Minimum torque reference limit 2 source. Selects the source for the minimum torque reference limit 2 in percent 99.02 M1 nominal torque. See 30.17 Minimum torque sel. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **Minimum torque 2**; 30.23 Minimum torque 2. 2: **Negate maximum torque 2**; 30.24 Maximum torque 2 multiplied with -1. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 18: **Process PID output actual**; 40.01 Process PID output actual.						
	0 … 18	Minimum torque 2	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.22	**Maximum torque 2 source**						
	Maximum torque reference limit 2 source. Selects the source for the Maximum torque reference limit 2 in percent 99.02 M1 nominal torque. See 30.17 Minimum torque sel. **Other**; source selection. 0: **Zero**; 0, not in use. 1: **Maximum torque 2**; 30.24 Maximum torque 2. 2: **Negate minimum torque 2**; 30.23 Minimum torque 2 multiplied with -1. 4: **AI1 scaled**; 12.12 AI1 scaled value. 5: **AI2 scaled**; 12.22 AI2 scaled value. 6: **AI3 scaled**; 12.32 AI3 scaled value. 18: **Process PID output actual**; 40.01 Process PID output actual.						
	0 … 18	Maximum torque 2	-	1 = 1	n	y	Parameter
30.23	**Minimum torque 2**						
	Minimum torque reference limit 2. Minimum torque reference limit 2 in percent of 99.02 M1 nominal torque for the torque limiter. See 30.17 Minimum torque sel. **Notes**: – The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the largest value is valid. – No need to change the default setting of 30.23 Minimum torque 2 for 2-Q operation, because the minimum torque limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter
30.24	**Maximum torque 2**						
	Maximum torque reference limit 2. Maximum torque reference limit 2 in percent of 99.02 M1 nominal torque for the torque limiter. See 30.17 Minimum torque sel. **Note**: The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	-325.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
30.27	**Max torque during regenerating**						
	Maximum torque limit during regeneration. Maximum and torque limit in percent of 99.02 M1 nominal torque only during regenerating. **Note**: The used torque limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening).						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter
30.30	**Minimum torque emergency stop**						
	Minimum speed controller output torque limit for a ramped Off3 (emergency stop) command. Minimum speed controller output torque limit during a ramped Off3 (emergency stop) command. See 21.03 Emergency stop mode, 06.20.b11 Run inhibit status word and 06.20.b13 Run inhibit status word. **Notes**: – The emergency stop torque limit overrides all other minimum torque limits. Minimum current limits remain valid. – No need to change the default setting of 30.30 Minimum torque emergency stop for 2-Q operation, because the minimum torque limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-325.00	%	See 46.04	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.31	**Maximum torque emergency stop from 25.14**						
	Maximum speed controller output torque limit for a ramped Off3 (emergency stop) command. Maximum speed controller output torque limit during a ramped Off3 (emergency stop) command. See 21.03 Emergency stop mode, 06.20.b11 Run inhibit status word and 06.20.b13 Run inhibit status word. **Note**: The emergency stop torque limit overrides all other Maximum torque limits. Maximum current limits remain valid.						
	-325.00 … 325.00	325.00	%	See 46.04	n	y	Parameter
30.34	**M1 current limit bridge 2**						
	Motor 1 armature current limit for bridge 2. Current limit bridge 2 in percent of 99.11 M1 nominal current. Setting 30.34 M1 current limit bridge 2 = 0 % disables bridge 2. **Notes**: – The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the largest value is valid. – No need to change the default setting of 30.34 M1 current limit bridge 2for 2-Q operation, because the minimum current limit is internally set to -1 %. See 07.34 Drive block bridge 2 set = Block bridge 2.						
	-325.00 … 325.00	-100.00	%	100 = 1 %	n	y	Parameter
30.35	**M1 current limit bridge 1**						
	Motor 1 armature current limit for bridge 1. Current limit bridge 1 in percent of 99.11 M1 nominal current. Setting 30.35 M1 current limit bridge 1 = 0 % disables bridge 1. **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	-325.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
30.36	**Speed level at maximum current**						
	Speed level for the speed depending current limit. Speed level where the armature current reduction begins.  n_{max} = maximum absolute value of 30.11 M1 minimum speed and 30.12 M1 maximum speed						
	0.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.37	**Current limit at speed 1**						
	Speed depending current limit at speed 1. Armature current limit in percent of 99.11 M1 nominal current at 30.36 Speed level at maximum current. Should be set to the maximum absolute value of 30.34 M1 current limit bridge 2 and 30.35 M1 current limit bridge. **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	0.00 … 325.00	325.00	%	100 = 1 %	n	y	Parameter
30.38	**Current limit at speed 2**						
	Speed depending current limit at speed 2. Armature current limit in percent of 99.11 M1 nominal current at speed: $(30.36) + \frac{1}{4} \times [n_{max} - (30.36)]$ $With: n_{max} = Max[\lvert(30.11)\rvert, \lvert(30.12)\rvert]$ **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	0.00 … 325.00	325.00	%	100 = 1 %	n	y	Parameter
30.39	**Current limit at speed 3**						
	Speed depending current limit at speed 3. Armature current limit in percent of 99.11 M1 nominal current at speed: $(30.36) + \frac{1}{2} \times [n_{max} - (30.36)]$ $With: n_{max} = Max[\lvert(30.11)\rvert, \lvert(30.12)\rvert]$ **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	0.00 … 325.00	325.00	%	100 = 1 %	n	y	Parameter
30.40	**Current limit at speed 4**						
	Speed depending current limit at speed 4. Armature current limit in percent of 99.11 M1 nominal current at speed: $(30.36) + \frac{3}{4} \times [n_{max} - (30.36)]$ $With: n_{max} = Max[\lvert(30.11)\rvert, \lvert(30.12)\rvert]$ **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	0.00 … 325.00	325.00	%	100 = 1 %	n	y	Parameter
30.41	**Current limit at speed 5**						
	Speed depending current limit at speed 5. Armature current limit in percent of 99.11 M1 nominal current at n_{max}. $With: n_{max} = Max[\lvert(30.11)\rvert, \lvert(30.12)\rvert]$ **Note**: The used current limit depends also on the drives actual limitation situation (other torque limits, current limits and field weakening). The limit with the smallest value is valid.						
	0.00 … 325.00	325.00	%	100 = 1 %	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
30.44	**Minimum firing angle**						
	Minimum firing angle. Minimum firing angle in degrees.						
	0.00 … 165.00	15.00	°	100 = 1°	n	y	Parameter
30.45	**Maximum firing angle**						
	Maximum firing angle. Maximum firing angle in degrees. The maximum firing angel can be forced using 06.10.b10 Auxiliary control word 1.						
	0.00 … 165.00	150.00	°	100 = 1°	n	y	Parameter
30.46	**Maximum firing angle mode**						
	Maximum firing angle mode. Selects the strategy for the maximum firing angle. 0: **Fix**; the maximum firing angle limit is defined by 30.45 Maximum firing angle. 1: **Fix + single**; the maximum firing angle limit is defined by 30.45 Maximum firing angle. When the maximum firing angle is reached, single firing pulses to suppress the DC current are fired. 2: **Calculated**; the maximum firing limit is automatically reduced from 165° to 30.45 Maximum firing angle depending on the measured motor current and 27.31 M1 discontinuous current limit. 3: **Calculated + single**; same function as Calculated, but single pulses fired are given, when the maximum firing angle is reached.  **Note**: Single firing pulses force discontinuous current automatically to zero.						
	0 … 3	Fix + single	-	1 = 1	n	y	Parameter
30.49	**Minimum EMF limit**						
	Minimum EMF limit. Negative limit for EMF controller in percent of nominal flux.						
	-100.00 … 0.00	-100.00	%	100 = 1 %	n	y	Parameter
30.50	**Maximum EMF limit**						
	Maximum EMF limit. Positive limit for EMF controller in percent of nominal flux.						
	0.00 … 100.00	10.00	%	100 = 1 %	n	y	Parameter

31 Fault functions and fault levels

Configuration of external events. Selection of the drive behavior in fault situations.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.01	**External event 1 source** Source of external event 1. Defines the source of external event 1. See 31.02 External event 1 type. 0 = Active. 1 = Inactive. **Other [bit]**; source selection. 0: **Active (false)**; trigger event. 1: **Inactive (true)**; no trigger event. Normal operation. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Inactive (true)	-	1 = 1	n	y	Parameter
31.02	**External event 1 type** Type of external event 1. Selects the type of external event 1. 0: **No action**; none, disable external event 1. 1: **Fault**; the event generates fault 9081 External fault 1. 2: **Warning**; the event generates warning A981 External warning 1. 3: **Warning or fault**; if the drive is in state Ready reference, the event generates fault 9081 External fault 1. Otherwise, the event generates warning A981 External warning 1. 4: **No action or fault**; if the drive is in state Ready reference, the event generates fault 9081 External fault 1. Otherwise, the event is inactive. 5: **Inactive or warning**; if the drive is in state Ready reference, the event generates warning A981 External warning 1. Otherwise, the event is inactive.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
31.03	**External event 2 source** Source of external event 2. Defines the source of external event 2. See 31.04 External event 2 type and 31.01 External event 1 source.						
	0 … 19	Inactive (true)	-	1 = 1	n	y	Parameter
31.04	**External event 2 type** Type of external event 2. Selects the type of external event 2. See 31.02 External event 1 type.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
31.05	**External event 3 source** Source of external event 3. Defines the source of external event 3. See 31.06 External event 3 type and 31.01 External event 1 source.						
	0 … 19	Inactive (true)	-	1 = 1	n	y	Parameter
31.06	**External event 3 type** Type of external event 3. Selects the type of external event 3. See 31.02 External event 1 type.						
	0 … 5	No action	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.07	**External event 4 source**						
	Source of external event 4. Defines the source of external event 4. See 31.08 External event 4 type and 31.01 External event 1 source.						
	0 … 19	Inactive (true)	-	1 = 1	n	y	Parameter
31.08	**External event 4 type**						
	Type of external event 4. Selects the type of external event 4. See 31.02 External event 1 type.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
31.09	**External event 5 source**						
	Source of external event 5. Defines the source of external event 5. See 31.10 External event 5 type and 31.01 External event 1 source.						
	0 … 19	Inactive (true)	-	1 = 1	n	y	Parameter
31.10	**External event 5 type**						
	Type of external event 4. Selects the type of external event 4. See 31.02 External event 1 type.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
31.13	**Fault stop mode communication**						
	Stop mode for communication losses. Selects the way the motor is stopped for all communication losses (local, fieldbus communication, master-follower, DDCS and DCSLink). 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. 1: **Ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the emergency stop ramp. See 23.23 Emergency stop time. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 3: **Torque limit**; the output of the drive ramp is set to zero. Thus, the motor stops at the active torque limit. When reaching 21.08 M1 zero speed level the firing pulses are set to 150 ° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 4: **Dynamic braking**; the motor stops by means of dynamic braking.						
	0 … 4	Ramp stop	-	1 = 1	n	y	Parameter
31.14	**Fault stop mode fault level 3**						
	Stop mode for faults with fault level 3. Selects the way the motor is stopped for all faults with fault level 3. **Note**: 31.14 Fault stop mode fault level 3 does not apply to communication faults. 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. 4: **Dynamic braking**; the motor stops by means of dynamic braking.						
	0 … 4	Coast stop	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.15	**Fault stop mode fault level 4**						
	Stop mode for faults with fault level 4. Selects the way the motor is stopped for all faults with fault level 4. **Note**: 31.15 Fault stop mode fault level 4 does not apply to communication faults. See 31.13 Fault stop mode communication. 0: **Coast stop**; the motor coasts to a stop. The firing pulses are immediately set to 150° to decrease the armature current as fast as possible. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. 1: **Ramp stop**; the input of the drive ramp is set to zero. Thus, the motor stops along the emergency stop ramp. See 23.23 Emergency stop time. When reaching 21.08 M1 zero speed level the firing pulses are set to 150° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 3: **Torque limit**; the output of the drive ramp is set to zero. Thus, the motor stops at the active torque limit. When reaching 21.08 M1 zero speed level the firing pulses are set to 150 ° to decrease the armature current. When the armature current is zero the firing pulses are blocked. The breakers are opened. Field exciter and fans are stopped. In case 19.20 Follower force ramp stop = Force speed control the torque selector is bypassed and the drive is forced to speed control. 4: **Dynamic braking**; the motor stops by means of dynamic braking.						
	0 … 4	Ramp stop	-	1 = 1	n	y	Parameter
31.17	**Residual current detection source**						
	Source of the residual current detection. Defines the source of the residual current detection. The drive reacts according to 31.18 Residual current detection type if the earth current exceeds 31.19 Residual current detection level for 31.20 Residual current detection delay. 0 = No current. 1 = Current detected. **Note**: If the residual current detection source is connected to a digital input only 31.20 Residual current detection delay remains valid. The residual current detection level is adjusted at the external device. **Other [bit]**; source selection. 0: **No current**; no residual current detected. Normal operation. 1: **Current detected**; residual current detected. 2: **Aix**; the residual current is measured by means of a current difference sensor in combination with AI4 (X3:11 and X3:12) on the SDCS-IOB-3. 3: **DI1**; 10.02.b00 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 4: **DI2**; 10.02.b01 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 5: **DI3**; 10.02.b02 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 6: **DI4**; 10.02.b03 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 7: **DI5**; 10.02.b04 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 8: **DI6**; 10.02.b05 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 11: **DIO1**; 11.02.b00 DIO delayed status. The residual current is measured by means of an external device (e.g. Bender relays). 12: **DIO2**; 11.02.b01 DIO delayed status. The residual current is measured by means of an external device (e.g. Bender relays).						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	19: **DIL**; 10.02.b15 DI delayed status. The residual current is measured by means of an external device (e.g. Bender relays).						
	0 … 19	No current	-	1 = 1	n	y	Parameter
31.18	**Residual current detection type**						
	Type of event residual current detection. Selects the type of event residual current detection. 0: **No action**; none, disable residual current detection. 1: **Fault**; the event generates fault 2330 Residual current detected. 2: **Warning**; the event generates warning A2B3 Residual current detected.						
	0 … 2	No action	-	1 = 1	n	y	Parameter
31.19	**Residual current detection level**						
	Residual current detection level. Residual current detection tripping level in amperes. The value is calculated to the primary side of the current transformer. Thus, the current transformer ratio must be 400 to 1. **Note**: If the residual current detection source is connected to a digital input 31.19 Residual current detection level is deactivated. The residual current detection level is adjusted at the external device.						
	0.00 … 20.00	4.00	A	100 = 1 A	n	y	Parameter
31.20	**Residual current detection delay**						
	Delay of the residual current detection. Time delay for the residual current detection event.						
	0 … 32500	10	ms	1 = 1 ms	n	y	Parameter
31.21	**Mains phase loss**						
	Type of event mains phase loss. Selects the type of event mains phase loss. 0: **No action**; none, disable mains phase loss. 1: **Fault**; the event generates fault 3130 Mains phase loss. 2: **Warning**; the event generates warning A130 Mains phase loss.						
	0 … 2	Fault	-	1 = 1	n	y	Parameter
31.22	**STO indication run/stop**						

Type of event STO indication.
Selects which indications are given when one or both Safe torque off (STO) signals are switched off or are lost. The indications also depend on whether the drive is running or stopped, when this occurs. The tables at each selection below show the indications generated with that particular setting.
Notes:

- This parameter does not affect the operation of the STO function itself. The STO function will operate regardless of the setting of this parameter. A running drive will stop upon removal of one or both STO signals. It will not start until both STO signals are restored and all faults are reset. The loss of only one STO signal is interpreted as a malfunction. This event generates either fault FA81 Safe torque off 1 loss or FA82 Safe torque off 2 loss.
- For more information on the STO, see safety supplement for functional safety converter DCS880 (3ADW000452).

Setting of 31.22 STO indication run/stop		Fault / Fault	Fault / Warning		Fault / Event		Warning / Warning		Event / Event		No indication / No indication		Warning / Event	
IN1	IN2		running	stopped	running	stopped	running	stopped	running	stopped	running	stopped	running	stopped
0	0	5091	5091	A5A0	5091	B5A0	A5A0	A5A0	B5A0	B5A0	None	None	A5A0	B5A0
0	1	5091	5091	A5A0	5091	B5A0	A5A0	A5A0	B5A0	B5A0	None	None	A5A0	B5A0
1	0	5091	5091	A5A0	5091	B5A0	A5A0	A5A0	B5A0	B5A0	None	None	A5A0	B5A0
1	1	normal operation												

- The normal STO operation (IN1 = IN2 = 0) has different, selectable indications.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

0: **Fault/Fault**;

Inputs		Indication (running or stopped)
IN1	IN2	
0	0	Fault 5091 Safe torque off.
0	1	Faults 5091 Safe torque off and FA81 Safe torque off 1 loss fault.
1	0	Faults 5091 Safe torque off and FA82 Safe torque off 2 loss fault.
1	1	Normal operation.

1: **Fault/Warning**;

Inputs		Indication (running or stopped)	
IN1	IN2	Running	Stopped
0	0	Fault 5091 Safe torque off.	Warning A5A0 Safe torque off.
0	1	Faults 5091 Safe torque off and FA81 Safe torque off 1 loss fault.	Warning A5A0 Safe torque off and FA81 Safe torque off 1 loss fault.
1	0	Faults 5091 Safe torque off and FA82 Safe torque off 2 loss fault.	Warning A5A0 Safe torque off and FA82 Safe torque off 2 loss fault.
1	1	Normal operation.	

2: **Fault/Event**;

Inputs		Indication (running or stopped)	
IN1	IN2	Running	Stopped
0	0	Fault 5091 Safe torque off.	Event B5A0 Safe torque off.
0	1	Faults 5091 Safe torque off and FA81 Safe torque off 1 loss fault.	Event B5A0 Safe torque off and FA81 Safe torque off 1 loss fault.
1	0	Faults 5091 Safe torque off and FA82 Safe torque off 2 loss fault.	Event B5A0 Safe torque off and FA82 Safe torque off 2 loss fault.
1	1	Normal operation.	

3: **Warning/Warning**;

Inputs		Indication (running or stopped)
IN1	IN2	
0	0	Warning A5A0 Safe torque off.
0	1	Warning A5A0 Safe torque off and FA81 Safe torque off 1 loss fault.
1	0	Warning A5A0 Safe torque off and FA82 Safe torque off 2 loss fault.
1	1	Normal operation.

4: **Event/Event**;

Inputs		Indication (running or stopped)
IN1	IN2	
0	0	Event B5A0 Safe torque off.
0	1	Event B5A0 Safe torque off and FA81 Safe torque off 1 loss fault.
1	0	Event B5A0 Safe torque off and FA82 Safe torque off 2 loss fault.
1	1	Normal operation.

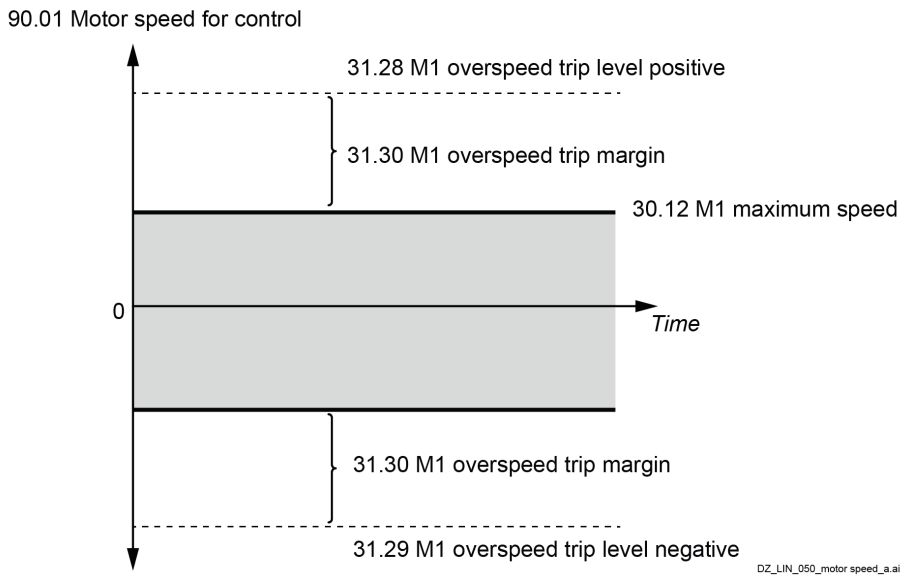
5: **No indication/No indication**;

Inputs		Indication (running or stopped)
IN1	IN2	
0	0	STO is performed, but not indicated.
0	1	FA81 Safe torque off 1 loss fault.
1	0	FA82 Safe torque off 2 loss fault.
1	1	Normal operation.

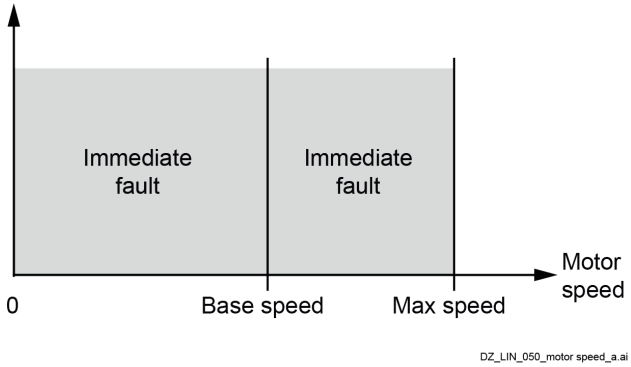
6: **Warning/Event**;

Inputs		Indication (running or stopped)	
IN1	IN2	Running	Stopped
0	0	Warning A5A0 Safe torque off.	Event B5A0 Safe torque off.
0	1	Warning A5A0 Safe torque off.	Event B5A0 Safe torque off and FA81 Safe torque off 1 loss fault.

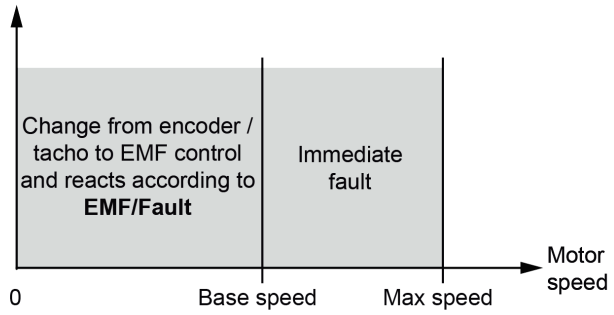
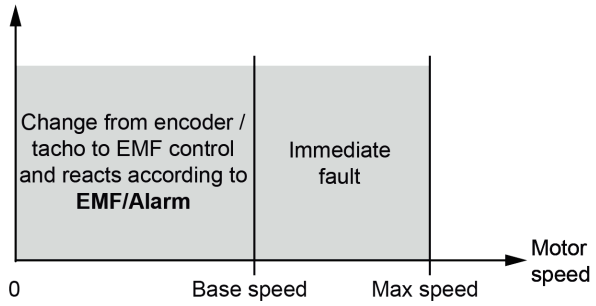
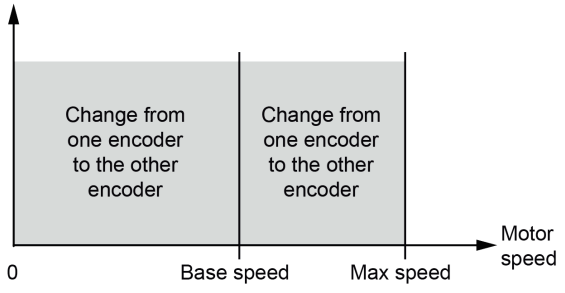
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	1 0 — Warning A5A0 Safe torque off. — Event B5A0 Safe torque off and FA82 Safe torque off 2 loss fault.						
	1 1 — Normal operation.						
	1 … 6	Fault/Fault	-	1 = 1	n	y	Parameter
31.24	**Stall function** Type of event stall. Selects the type of event stall. The drive reacts according to 31.24 Stall function if the torque exceeds 31.25 Stall torque level and undershoots 31.26 Stall speed level for 31.28 Stall time. 0: **No action**; none, disable stall supervision. 1: **Fault**; the event generates fault 7121 Motor stall. 2: **Warning**; the event generates warning A780 Motor stall.						
	0 … 2	No action	-	1 = 1	n	y	Parameter
31.25	**Stall torque level** Torque level for the stall function. Stall torque level in percent of 99.02 M1 nominal torque.						
	0.00 … 325.00	75.00	%	See 46.04	n	y	Parameter
31.26	**Stall speed level** Speed level for the stall function. Stall speed level.						
	0.00 … 30000.00	5.00	rpm	See 46.02	n	y	Parameter
31.27	**Stall time** Delay of the stall function. Time delay for the stall function event.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
31.28	**M1 overspeed trip level positive** Motor 1 overspeed trip level positive. If the positive (maximum) trip level for overspeed is exceeded, fault 7310 Overspeed is generated. **Example**: If the maximum speed is 1100 rpm and overspeed trip margin is 300 rpm, the drive trips at 1400 rpm. See 31.30 M1 overspeed trip margin.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
31.29	**M1 overspeed trip level negative** Motor 1 overspeed trip level negative. If the negative (minimum) trip level for overspeed is exceeded, fault 7310 Overspeed is generated. **Example**: If the minimum speed is -1420 rpm and overspeed trip margin is 300 rpm, the drive trips at -1720 rpm. See 31.30 M1 overspeed trip margin.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
31.30	**M1 overspeed trip margin** Motor 1 overspeed trip margin. Defines, together with 30.11 M1 minimum speed and 30.12 M1 maximum speed, the maximum allowed speed of the motor (overspeed protection). The event generates fault 7310 Overspeed, if the speed feedback, see 90.01 Motor speed for control, exceeds the speed limit defined by 30.11 M1 minimum speed or 30.12 M1 maximum speed by more than the overspeed trip margin. It is recommended to set 31.30 M1 overspeed trip margin at least 20 % higher than the maximum motor speed. **Examples**: – If the maximum speed is 1100 rpm and overspeed trip margin is 300 rpm, the drive trips at 1400 rpm. See 31.28 M1 overspeed trip level positive. – If the minimum speed is -1420 rpm and overspeed trip margin is 300 rpm, the drive trips at -1720 rpm. See 31.29 M1 overspeed trip level negative. **Note**: The overspeed fault for motor 1 is inactive, if 31.30 M1 overspeed trip margin = 0.						

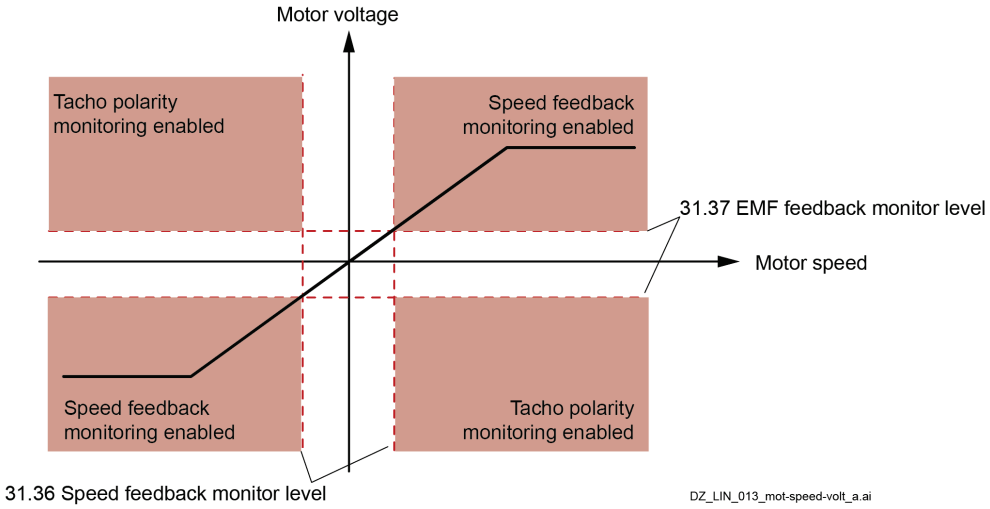
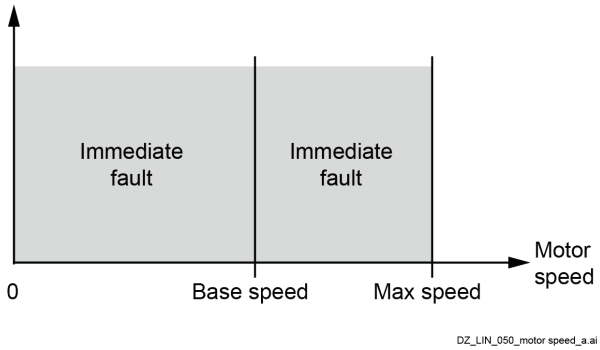
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
							
	0.00 … 30000.00	300.00	rpm	See 46.02	n	y	Parameter
31.31	**Emergency ramp supervision** Maximum deviation from the expected deceleration rate. 31.32 Emergency ramp supervision, 31.33 Emergency ramp supervision delay and 01.07 Speed change rate, provide a supervision function for a ramped Off3 (emergency stop) command. See 21.03 Emergency stop mode, 06.20.b11 Run inhibit status word and 06.20.b13 Run inhibit status word. The supervision is based on either observing the time within which the motor stops or comparing the actual and expected deceleration rates. **Maximum ramp-down time** If 31.31 Emergency ramp supervision = 0.00 %, the maximum stop time is directly set in 31.32 Emergency ramp supervision delay. **Comparing deceleration rates** Otherwise, 31.31 Emergency ramp supervision defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters 23.11 … 23.19 for Off3 stop mode 1 (21.03 Emergency stop mode = Ramp stop) or 23.23 Emergency stop time for Off3 stop mode 2 (21.03 Emergency stop mode = Emergency ramp stop). If 1.07 Speed change rate deviates too much from the expected rate, the event generates fault 73B0 Emergency ramp stop. Additionally 06.17.b08 Drive status word 2 is set and the motor coasts to a stop. The emergency stop ramp supervision is disabled, if 31.31 Emergency ramp supervision = 0.00 % and 31.32 Emergency ramp supervision delay = 0.0 s.						
	0.00 … 325.00	0.00	%	100 = 1 %	n	y	Parameter
31.32	**Emergency ramp supervision delay** Maximum ramp-down time or supervision activation delay. **Maximum ramp-down time** If 31.31 Emergency ramp supervision = 0.00 %, 31.32 Emergency ramp supervision delay defines the maximum time a ramped Off3 (emergency stop) command is allowed to take. If the motor has not stopped when the time elapses, the event generates fault 73B0 Emergency ramp stop, sets 06.17.b08 Drive status word 2 and the motor coasts to a stop. **Supervision activation delay** If 31.31 Emergency ramp supervision > 0.00 %, 31.32 Emergency ramp supervision delay defines a delay between the receipt of a ramped Off3 (emergency stop) command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter

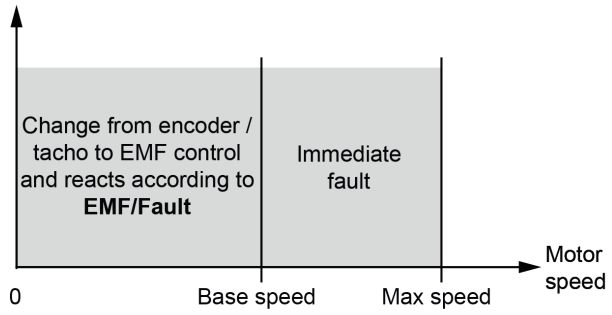
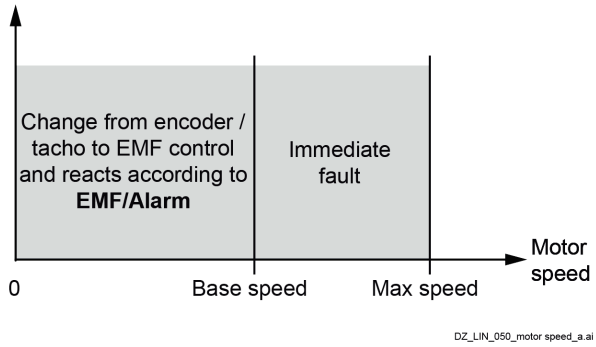
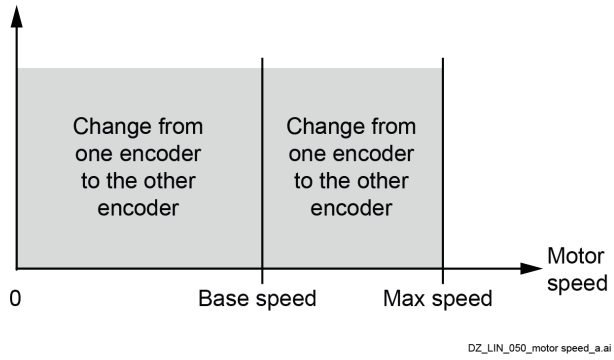
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.33	**Ramp stop supervision**						
	Maximum deviation the from expected deceleration rate. 31.33 Ramp stop supervision, 31.34 Ramp stop supervision delay and 01.07 Speed change rate, provide a supervision function for a normal (non-emergency) ramp stop. The supervision is based on either observing the time within which the motor stops, or comparing the actual and expected deceleration rates. **Maximum ramp-down time** If 31.33 Ramp stop supervision = 0.00 %, the maximum stop time is directly set in 31.34 Ramp stop supervision delay. **Comparing deceleration rates** Otherwise, 31.33 Ramp stop supervision defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters 23.11 … 23.19. If 1.07 Speed change rate deviates too much from the expected rate, the event generates fault 73B1 Normal ramp stop. Additionally 06.17.b14 Drive status word 2 is set and the motor coasts to a stop. The ramp stop supervision is disabled, if 31.33 Ramp stop supervision = 0.00 % and 31.34 Ramp stop supervision delay = 0.0 s.						
	0.00 … 325.00	0.00	%	100 = 1 %	n	y	Parameter
31.34	**Ramp stop supervision delay**						
	Maximum ramp-down time or supervision activation delay. **Maximum ramp-down time** If 31.33 Ramp stop supervision = 0.00 %, 31.34 Ramp stop supervision delay defines the maximum time a normal ramp stop is allowed to take. If the motor has not stopped when the time elapses, the event generates fault 73B1 Normal ramp stop, sets 06.17.b14 Drive status word 2 and the motor coasts to a stop. **Supervision activation delay** If 31.33 Ramp stop supervision > 0.00 %, 31.34 Ramp stop supervision delay defines a delay between the receipt of the stop command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize.						
	0.0 … 3250.0	0.0	s	10 = 1 s	n	y	Parameter
31.35	**Motor feedback fault**						
	Motor feedback fault. Selects how the drive reacts to a loss of a measured speed feedback. 0: **No action**; none, disable motor feedback fault. 1: **Fault**; the event generates fault 7301 Motor speed feedback or 7381 Speed feedback device and the motor stops according to 31.14 Fault stop mode fault level 3.						



2: **EMF/Fault**; the event changes the speed feedback to EMF and stops the motor at the emergency stop ramp. Then the event generates fault 7301 Motor speed feedback or 7381 Speed feedback device.
In case speed actual is greater than base speed the event generates fault 7301 Motor speed feedback or 7381 Speed feedback device and the motor stops according to 31.14 Fault stop mode fault level 3.

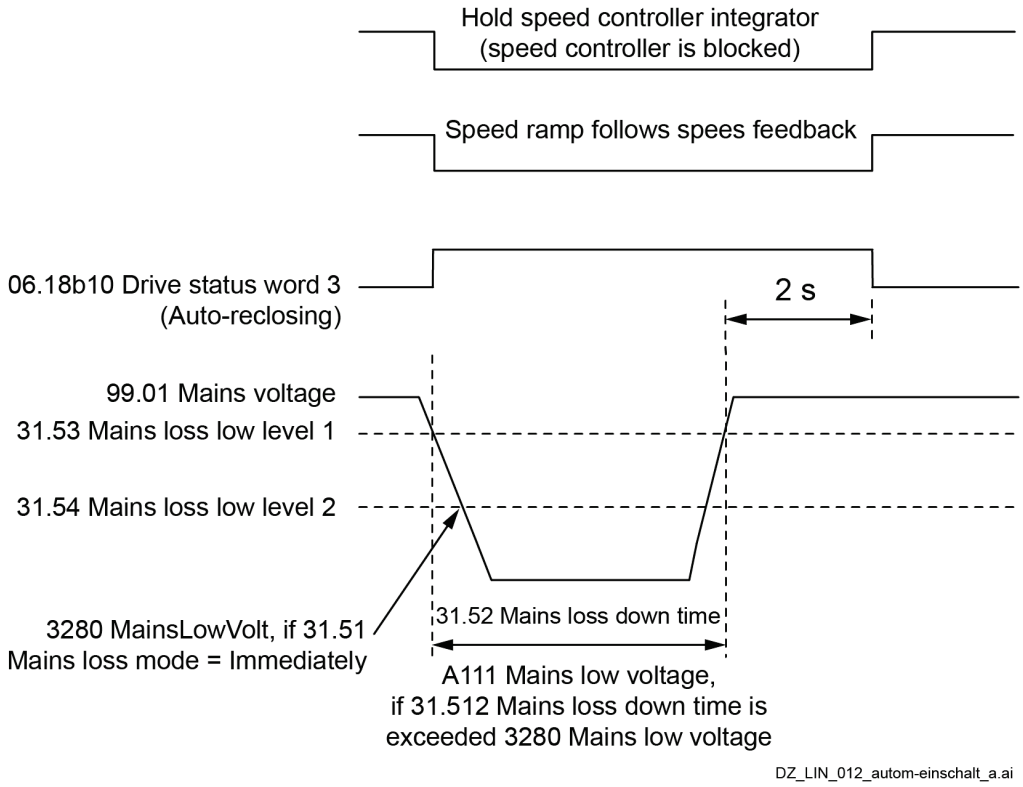
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	 DZ_LIN_050_motor speed_a.ai 3: **EMF/Warning**; the event changes the speed feedback to EMF and generates warning A798 Encoder interface communication, A7B0 Motor speed feedback or A7E1 Speed feedback device. In case speed actual is greater than base speed the event generates fault 7301 Motor speed feedback or 7381 Speed feedback device and the motor stops according to 31.14 Fault stop mode fault level 3.  DZ_LIN_050_motor speed_a.ai 4: **Encoder/Warning**; This selection is only valid if 2 pulse encoders are connected. Depending on the setting of 90.41 M1 feedback selection, the speed feedback is changed from one encoder to the other encoder, in case of a problem. Additionally the event generates warning A798 Encoder interface communication, A7B0 Motor speed feedback or A7E1 Speed feedback device.  DZ_LIN_050_motor speed_a.ai						
	1 … 4	Fault	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.36	**Speed feedback monitor level**						
	Speed feedback monitor level. The drive reacts according to 31.35 Motor feedback fault or generates fault 7381 Speed feedback device, if the measured speed feedback does not exceed 31.36 Speed feedback monitor level while the measured EMF exceeds 31.37 EMF feedback monitor level. See 90.01 Motor speed for control and 28.06 EMF voltage. **Example**: With 31.36 Speed feedback monitor level = 15 rpm and 31.37 EMF feedback monitor level = 50 V_{DC} the drive trips when the EMF is > 50 V_{DC}, while the speed feedback is ≤ 15 rpm.  						
	0.00 … 30000.00	15.00	rpm	See 46.02	n	y	Parameter
31.37	**EMF feedback monitor level**						
	EMF feedback monitor level. See 31.36 Speed feedback monitor level.						
	0.0 … 3250.0	50.0	V	10 = 1 V	n	y	Parameter
31.38	**Load feedback fault**						
	Load feedback fault. Selects how the drive reacts to a loss of a load feedback. 0: **No action**; none, disable load feedback fault. 1: **Fault**; the event generates fault 73A1 Load speed feedback and the motor stops according to 31.14 Fault stop mode fault level 3.  2: **EMF/Fault**; the event changes the speed feedback to EMF and stops the motor at the emergency stop ramp. Then the event generates fault 73A1 Load speed feedback. In case speed actual is greater than base speed the event generates fault 73A1 Load speed feedback and the motor stops according to 31.14 Fault stop mode fault level 3.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	 3: **EMF/Warning**; the event changes the speed feedback to EMF and generates warning A798 Encoder interface communication or A7B1 Load speed feedback. In case speed actual is greater than base speed the event generates fault 73A1 Load speed feedback and the motor stops according to 31.14 Fault stop mode fault level 3.  4: **Encoder/Warning**; This selection is only valid if 2 pulse encoders are connected. Depending on the setting of 90.41 M1 feedback selection, the speed feedback is changed from one encoder to the other encoder, in case of a problem. Additionally the event generates warning A798 Encoder interface communication or A7B1 Load speed feedback. 						
	1 … 4	Fault	-	1 = 1	n	y	Parameter
31.41	**Main fan fault function**						
	Type of event main cooling fan fault. Selects the type of event main cooling fan fault. See also 20.38 Drive fan acknowledge source. 0: **No action**; none, disable main cooling fan fault. 1: **Fault**; the event generates fault 5080 Drive fan acknowledge. 2: **Warning**; the event generates warning A581 Drive fan acknowledge.						
	0 … 2	Fault	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.44	**Armature overcurrent level**						
	Armature overcurrent level. The event generates fault 2310 Armature overcurrent, if 31.44 Overcurrent level in percent of 99.11 M1 nominal current is exceeded. It is recommended to set 31.44 Overcurrent level at least 25 % higher than 99.11 M1 nominal current. **Example**: With 99.11 M1 nominal current = 850 A_{DC} and 31.44 Overcurrent level = 250 % the drive trips with armature currents > 2125 A_{DC}.						
	0.00 … 400.00	250.00	%	100 = 1 %	n	y	Parameter
31.45	**Maximum current rise level**						
	Maximum armature current rise level. The event generates fault F539 Fast current rise, if 31.45 Maximum current rise level in percent of 99.11 M1 nominal current per 1 ms is exceeded. **Note**: This trip opens the mains contactor and the DC-breaker, if present.						
	0.00 … 325.00	325.00	%/ms	100 = 1 %/ms	n	y	Parameter
31.46	**Current ripple function**						
	Type of event armature current ripple. Selects the type of event armature current ripple, if 31.47 Current ripple level is reached. The current ripple function detects broken fuses, thyristors, current transformers (T51, T52) or a too high gain of the current controller. 0: **No action**; none, disable current ripple. 1: **Fault**; the event generates fault F517 Armature current ripple. 2: **Warning**; the event generates warning A117 Armature current ripple.						
	0 … 2	Fault	-	1 = 1	n	y	Parameter
31.47	**Current ripple level**						
	Level for armature current ripple level. Threshold for 31.46 Current ripple function in percent of 99.11 M1 nominal current. Typical values when a thyristor is missing. – About 300 % for an armature drive. – About 90 % for high inductive loads (e.g. field exciter).						
	0.0 … 1000.0	150.0	%	10 = 1 %	n	y	Parameter
31.50	**Armature overvoltage level**						
	Armature overvoltage level. The event generates fault F503 Armature overvoltage, if 31.50 Overvoltage level in percent of 99.12 M1 nominal voltage is exceeded. It is recommended to set 31.50 Overvoltage level at least 20 % higher than 99.12 M1 nominal voltage. **Example**: With 99.12 M1 nominal voltage = 525 V_{DC} and 31.50 Overvoltage level = 120 % the drive trips with armature voltages > 630 V_{DC}. The overvoltage supervision is inactive, if 31.50 Overvoltage level = 1000.0 %.						
	0.0 … 1000.0	120.0	%	10 = 1 %	n	y	Parameter
31.51	**Mains loss mode**						
	Type of event mains loss. Selects the type of event mains loss. 0: **Immediately**; the event generates warning A111 Mains low voltage, if 31.53 Mains loss low level 1 is undershoot. The event generates fault 3280 Mains low voltage, if 31.54 Mains loss low level 2 is undershoot. The warning is removed when the mains voltage recovers before 31.52 Mains loss down time elapses. 1: **Delayed**; the event generates warning A111 Mains low voltage, if 31.53 Mains loss low level 1 is undershoot or if 31.53 Mains loss low level 1 is undershoot for longer than 31.52 Mains loss down time. The warning is removed when the mains voltage recovers before 31.52 Mains loss down time elapses.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	The event generates fault 3280 Mains low voltage, if 31.53 Mains loss low level 1 is undershoot for longer than 31.52 Mains loss down time. Undershooting 31.54 Mains loss low level 2 generates no fault.						
	0 … 1	Immediately	-	1 = 1	n	y	Parameter
31.52	**Mains loss down time**						
	Down time of event mains loss. The mains voltage must recover over both levels within 31.52 Mains loss down time. Otherwise, the event generates fault 3280 Mains low voltage.						
	0 … 32500	500	ms	1 = 1 ms	n	y	Parameter
31.53	**Mains loss low level 1**						
	Low level 1 of event mains loss. 1st (upper) level for the mains undervoltage monitoring in percent of 99.10 Nominal mains voltage. If the mains voltage undershoots 31.53 Mains loss low level 1 following actions take place. – The firing angle is set to 30.45 Maximum firing angle. – Single firing pulses are applied in order to extinguish the DC current as fast as possible. – The controllers are frozen. – The speed ramp output is updated from the speed feedback. – A111 Mains low voltage is generated as long as the mains voltage recovers before 31.52 Mains loss down time elapses, otherwise the event generates fault 3280 Mains low voltage. **Notes**: – In case an On command is given and the measured mains voltage is too low for longer than 500 ms A111 Mains low voltage is generated. If the problem persist for longer than 10 s 3280 Mains low voltage is generated. – 31.54 Mains loss low level 2 is not monitored, unless the mains voltage drops below 31.53 Mains loss low level 1 first. Thus for a proper function of the mains undervoltage monitoring 31.53 Mains loss low level 1 has to be larger than 31.54 Mains loss low level 2.						
	0.00 … 150.00	80.00	%	100 = 1 %	n	y	Parameter



Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.54	**Mains loss low level 2**						
	Low level 2 of event mains loss. 2nd (lower) limit for the mains undervoltage monitoring in percent of 99.10 Nominal mains voltage. If the mains voltage undershoots 31.54 Mains loss low level 2 following actions take place: – If 31.51 Mains loss mode = Immediately: – The event generated fault 3280 Mains low voltage. – If 31.51 Mains loss mode = Delayed: – The field acknowledge signals are ignored. – The firing angle is set to 30.45 Maximum firing angle. – Single firing pulses are applied in order to extinguish the DC current as fast as possible. – The controllers are frozen. – The speed ramp output is from the speed feedback. – A111 Mains low voltage is generated as long as the mains voltage recovers before 31.52 Mains loss down time elapses, otherwise the event generates fault 3280 Mains low voltage. **Notes**: – In case an On command is given and the measured mains voltage is too low for longer than 500 ms A111 Mains low voltage is generated. If the problem persist for longer than 10 s 3280 Mains low voltage is generated. – 31.54 Mains loss low level 2 is not monitored, unless the mains voltage drops below 31.53 Mains loss low level 1 first. Thus for a proper function of the mains undervoltage monitoring 31.53 Mains loss low level 1 has to be larger than 31.54 Mains loss low level 2.						
	0.00 … 150.00	60.00	%	100 = 1 %	n	y	Parameter
31.57	**Minimum field current trip delay**						
	Delay time of event minimum field current. 31.57 Minimum field current trip delay delays F541 M1 field exciter low current. If the field current recovers before the delay elapses, F541 M1 field exciter low current will be disregarded. See 31.58 M1 field current low level. **Note**: 31.57 Minimum field current trip delay is blocked when 99.06 Operation mode = Field exciter.						
	0 … 32500	2000	ms	1 = 1 ms	n	y	Parameter
31.58	**M1 field current low level**						
	Motor 1 field current low level. The event generated fault F541 M1 field exciter low current, if 31.58 M1 field current low level in percent of 99.13 M1 nominal field current is still undershot when 31.57 Minimum field current trip delay elapses. **Notes**: – 31.58 M1 field current low level is not valid during field heating and field economy. In these cases, the fault level is automatically set to 50 % of 28.37 M1 field heating reference. The event generates fault F541 M1 field exciter low current, if 50 % of 28.37 M1 field heating reference is still undershot when 31.57 Minimum field current trip delay elapses. – 31.58 M1 field current low level is not valid for 28.43 M1 EMF/field control mode = Fix/optitorque, EMF/optitorque, Fix/reversal/optitorque and EMF/reversal/optitorque. In these cases, the fault level is automatically set to 50 % of 28.14 M1 field current reference. The event generates fault F541 M1 field exciter low current, if 50 % of 28.14 M1 field current reference is still undershot when 31.57 Minimum field current trip delay elapses.						
	0.00 … 325.00	50.00	%	100 = 1 %	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
31.59	**M1 field overcurrent level**						
	Motor 1 field overcurrent level. The event generates fault F515 M1 field exciter overcurrent, if 31.59 M1 field overcurrent level in percent of 99.13 M1 nominal field current is exceeded. It is recommended to set 31.59 M1 field overcurrent level at least 25 % higher than 99.13 M1 nominal field current. **Notes**: – The field overcurrent fault is inactive, if 31.59 M1 field overcurrent level = 325 %. – During field boost, the internal field overcurrent level is set to field overcurrent level plus field boost current.						
	0.00 … 325.00	125.00	%	100 = 1 %	n	y	Parameter
31.90	**XSMCSTO indication**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0 … 2	Fault	-	1 = 1	n	y	Parameter
31.91	**STO status word**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
31.94	**STO time 1**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0 … 65535	-	ms	1 = 1	y	n	Signal
31.95	**STO time 2**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0 … 65535	-	ms	1 = 1	y	n	Signal
31.98	**STO actual status**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
31.99	**STO fault diagnostic**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
31.100	**STO test mode**						
	See safety supplement for functional safety converter DCS880 (3ADW000452).						
	0 … 2	None	-	1 = 1	n	y	Parameter

32 Supervision

Configuration of signal supervision functions 1 … 3. Three values can be monitored. A warning or fault is generated whenever predefined limits are exceeded.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
32.01							
32.xx							

33 Generic timer & counter

Configuration of maintenance timers/counters.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
33.01							
33.xx							

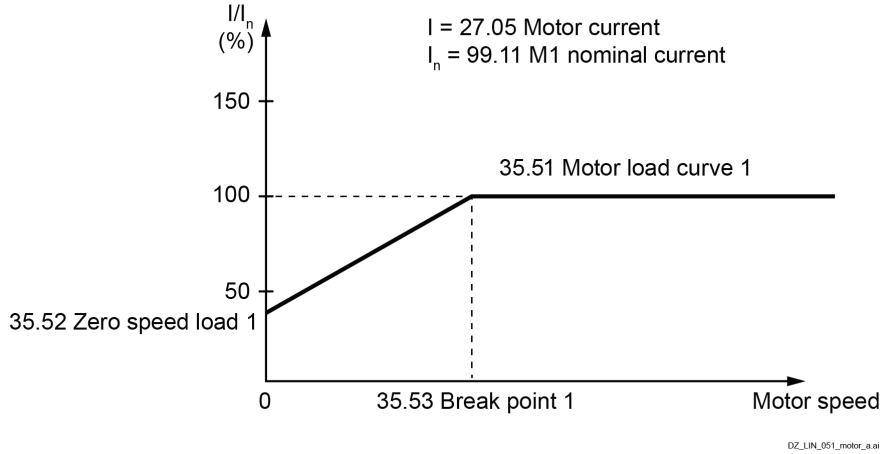
35 Motor thermal protection

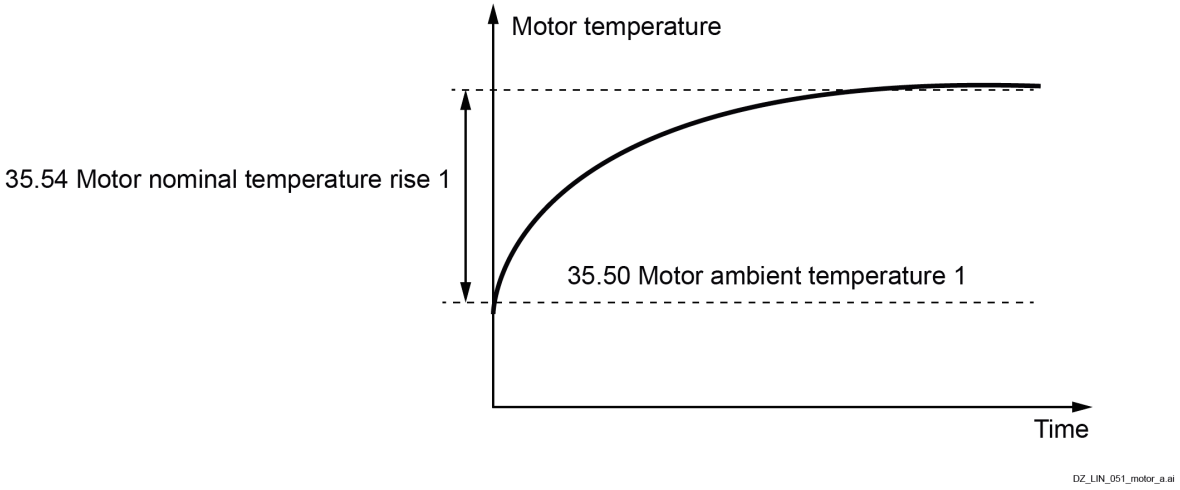
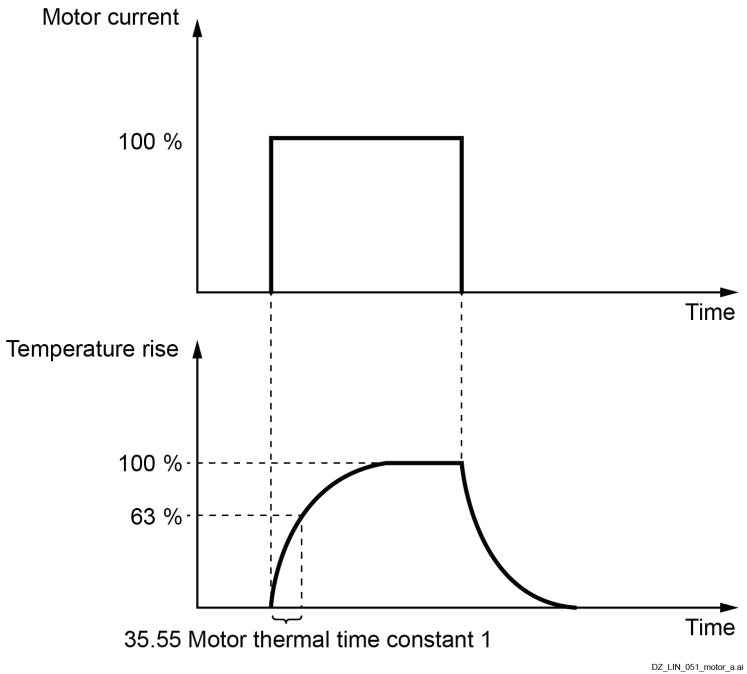
Motor thermal protection settings such as temperature measurement configuration and load curve definition.

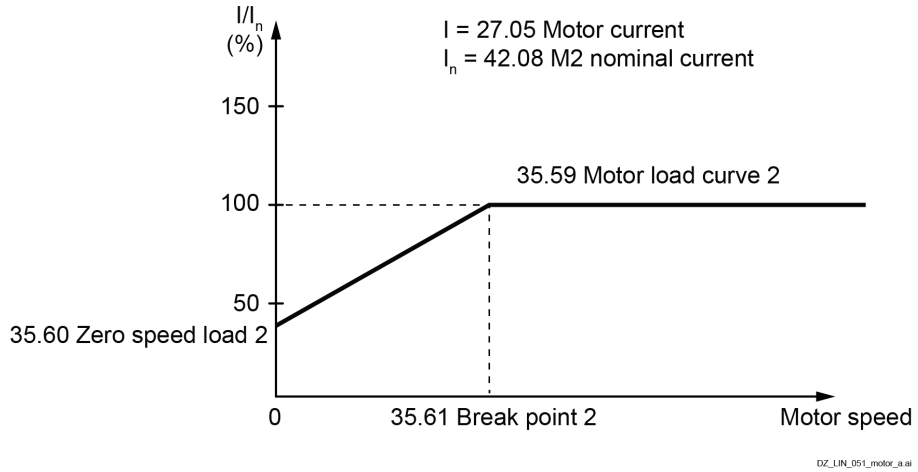
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.01	**Estimated temperature 1**						
	Estimated motor temperature 1. Displays the motor temperature as estimated by the internal motor thermal protection model. See parameters 35.50 … 35.55. The unit is selected by 96.02 Unit selection.						
	… 10000	-	°C or °F	1 = 1°C or °F	y	n	Signal
35.02	**Measured temperature 1**						
	Measured motor temperature 1. Displays the motor temperature received through the source defined by 35.11 Temperature 1 source. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	-	°C, °F or Ω	1 = 1°C, °F or Ω	y	n	Signal
35.03	**Estimated temperature 2**						
	Estimated motor temperature 2. Displays the motor temperature as estimated by the internal motor thermal protection model. See parameters 35.58 … 35.63. The unit is selected by 96.02 Unit selection.						
	-80 … 1000	-	°C or °F	1 = 1°C or °F	y	n	Signal
35.04	**Measured temperature 2**						
	Measured motor temperature 2. Displays the motor temperature received through the source defined by 35.21 Temperature 2 source. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	-	°C, °F or Ω	1 = 1°C, °F or Ω	y	n	Signal
35.12	**Temperature 1 fault level**						
	Fault level for motor temperature monitoring function 1. Defines the fault level for motor temperature monitoring function 1. When the measured motor temperature 1 exceeds the level, the event generates fault 4981 Motor temperature 1 measured/estimated. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	130 or 266	°C, °F or Ω	1 = 1°C, °F or Ω	n	y	Parameter

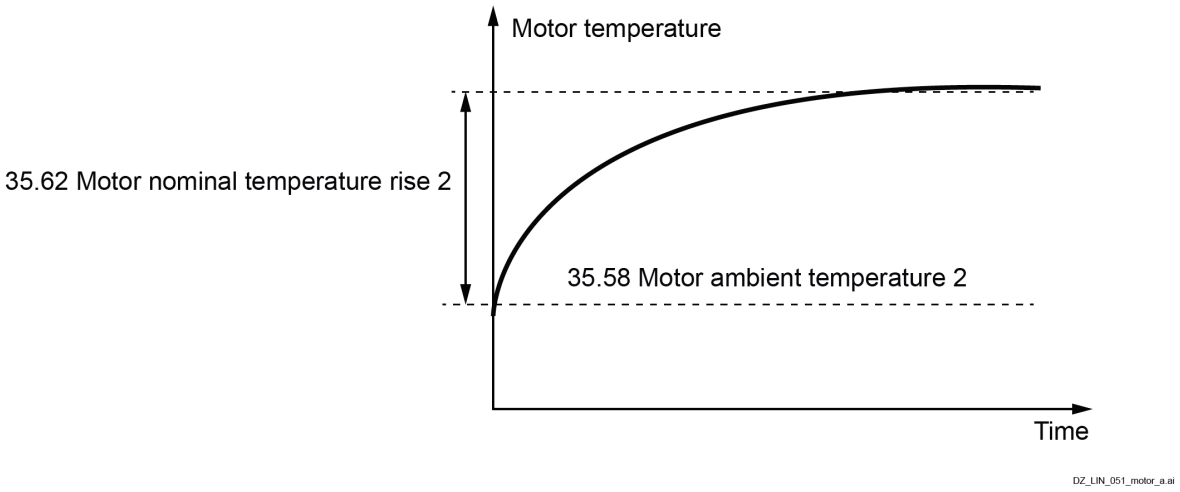
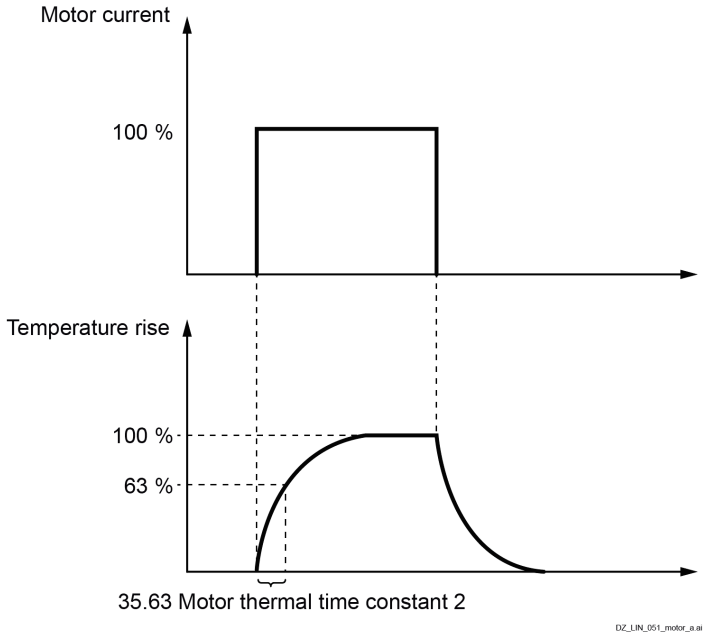
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.13	**Temperature 1 warning level**						
	Warning level for motor temperature monitoring function 1. Defines the warning level for motor temperature monitoring function 1. When the measured motor temperature 1 exceeds the level, the event generates warning A491 Motor temperature 1 measured/estimated. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	110 or 230	°C, °F or Ω	1 = 1°C, °F or Ω	n	y	Parameter
35.14	**Temperature 1 AI source**						
	Analog input source for motor temperature monitoring function 1. Specifies an analog input when required by 35.11 Temperature 1 source. In case the input is located on an I/O extension module, use Other to connect to e.g. 14.26 AI1 actual value. **Other**; source selection. 0: **Not selected**; not in use. 1: **AI1 actual value**; analog input AI1 on the control unit. 2: **AI2 actual value**; Analog input AI2 on the control unit.						
	0 … 2	Not selected	-	1 = 1	n	y	Parameter
35.15	**Supervision 1 klixon source**						
	Klixon source for motor temperature monitoring function 1. The event generates fault 4981 Motor temperature 1 measured/estimated if a digital input is selected and the klixon is open. 0 = Klixon open. 1 = Klixon closed. **Note**: It is possible to connect several klixons in series. 0: **Klixon open**; klixon is open. Generates fault 4981 Motor temperature 1 measured/estimated. 1: **Klixon closed**; klixon is closed. Normal operation. 2: **None**; inactive. Supervision 1 klixon is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	None	-	1 = 1	n	y	Parameter
35.22	**Temperature 2 fault level**						
	Fault level for motor temperature monitoring function 2. Defines the fault level for motor temperature monitoring function 2. When the measured motor temperature 2 exceeds the level, the event generates fault 4982 Motor temperature 2 measured/estimated. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	130 or 266	°C, °F or Ω	1 = 1°C, °F or Ω	n	y	Parameter
35.23	**Temperature 2 warning level**						
	Warning level for motor temperature monitoring function 2. Defines the warning level for motor temperature monitoring function 2. When the measured motor temperature 2 exceeds the level, the event generates warning A492 Motor temperature 2 measured/estimated. The unit is selected by 96.02 Unit selection. **Note**: With a PTC sensor, the unit is Ω.						
	-80 … 10000	110 or 230	°C, °F or Ω	1 = 1°C, °F or Ω	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.24	**Temperature 2 AI source**						
	Analog input source for motor temperature monitoring function 2. Specifies an analog input when required by 35.21 Temperature 2 source. In case the input is located on an I/O extension module, use Other to connect to e.g. 14.26 AI1 actual value. **Other**; source selection. 0: **Not selected**; not in use. 1: **AI1 actual value**; analog input AI1 on the control unit. 2: **AI2 actual value**; Analog input AI2 on the control unit.						
	0 … 2	Not selected	-	1 = 1	n	y	Parameter
35.25	**Supervision 2 klixon source**						
	Klixon source for motor temperature monitoring function 2. The event generates fault 4982 Motor temperature 2 measured/estimated if a digital input is selected and the klixon is open. 0 = Klixon open. 1 = Klixon closed. **Note**: It is possible to connect several klixons in series. 0: **Klixon open**; klixon is open. Generates fault 4982 Motor temperature 2 measured/estimated. 1: **Klixon closed**; klixon is closed. Normal operation. 2: **None**; inactive. Supervision 2 klixon is disabled. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	None	-	1 = 1	n	y	Parameter
35.50	**Motor ambient temperature 1**						
	Ambient temperature for motor thermal protection model 1. Defines the ambient temperature of the motor from the motor thermal protection model. The unit is selected by 96.02 Unit selection. The motor thermal protection model estimates the motor temperature based on parameters 35.50 … 35.55. The motor temperature increases if it operates in the region above the load curve, and decreases if it operates in the region below the load curve. **WARNING!** The model cannot protect the motor if the motor does not cool properly because of dust, dirt, etc.						
	-80 … 1000	20 or 68	°C or °F	1 = 1°C or °F	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.51	**Motor load curve 1**						
	Maximum load for motor thermal protection model 1. Defines the motor load curve in percent of 99.11 M1 nominal current together with 35.52 Zero speed load 1 and 35.53 Break point 1. The load curve is used by the motor thermal protection model to estimate the motor temperature. When the motor load curve = 100 %, the maximum load equals the value of 99.11 M1 nominal current. Higher loads will 'heat up' the motor. **Note**: The load curve level should be adjusted, if the ambient temperature differs from 35.50 Motor ambient temperature 1.  						
	0.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
35.52	**Zero speed load 1**						
	Zero speed load for motor thermal protection model 1. Defines the maximum motor load at zero speed in percent of 99.11 M1 nominal current for the motor load curve. See 35.51 Motor load curve 1 and 35.53 Break point 1. A higher value can be used if the motor has an external motor fan to boost the cooling. See the motor manufacturer's recommendations.						
	0.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
35.53	**Break point 1**						
	Break point for motor thermal protection model 1. Defines the break point speed in percent of 99.11 M1 nominal current for the load curve. This is the point at which the motor load curve begins to decrease from 35.51 Motor load curve 1 towards 35.52 Zero speed load 1.						
	0.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.54	**Motor nominal temperature rise 1**							
	Temperature rise for motor thermal protection model 1. Defines the temperature rise of the motor above 35.50 Motor ambient temperature 1, when the motor is loaded with 99.11 M1 nominal current. See the motor manufacturer's recommendations. The unit is selected by parameter 96.02 Unit selection. 	0 … 10000	80 or 176	°C or °F	1 = 1°C or °F	n	y	Parameter
35.55	**Motor thermal time constant 1**							
	Motor thermal time constant for motor thermal protection model 1. Defines the thermal time constant for the motor thermal protection model. It is the time to reach 63 % of nominal motor temperature. See the motor manufacturer's recommendations. 	0 … 32500	256	s	1 = 1 s	n	y	Parameter

Index	Name / Text						
	Range	**Default**	**Unit**	**Scale/ Fbeq16**	**Volatile**	**Change running**	**Type**
35.58	**Motor ambient temperature 2**						
	Ambient temperature for motor thermal protection model 2. Defines the ambient temperature of the motor from the motor thermal protection model. The unit is selected by 96.02 Unit selection. The motor thermal protection model estimates the motor temperature based on parameters 35.58 … 35.63. The motor temperature increases if it operates in the region above the load curve, and decreases if it operates in the region below the load curve. **WARNING!** The model cannot protect the motor if the motor does not cool properly because of dust, dirt, etc.						
	-80 … 1000	20 or 68	°C or °F	1 = 1°C or °F	n	y	Parameter
35.59	**Motor load curve 2**						
	Maximum load for motor thermal protection model 2. Defines the motor load curve in percent of 42.08 M2 nominal current together with 35.60 Zero speed load 2 and 35.61 Break point 2. The load curve is used by the motor thermal protection model to estimate the motor temperature. When the motor load curve = 100 %, the maximum load equals the value of 42.08 M2 nominal current. Higher loads will 'heat up' the motor. **Note**: The load curve level should be adjusted, if the ambient temperature differs from 35.58 Motor ambient temperature 2.  						
	0.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
35.60	**Zero speed load 2**						
	Zero speed load for motor thermal protection model 2. Defines the maximum motor load at zero speed in percent of 42.08 M2 nominal current for the motor load curve. See 35.59 Motor load curve 2 and 35.61 Break point 2. A higher value can be used if the motor has an external motor fan to boost the cooling. See the motor manufacturer's recommendations.						
	0.00 … 325.00	100.00	%	100 = 1 %	n	y	Parameter
35.61	**Break point 2**						
	Break point for motor thermal protection model 2. Defines the break point speed in percent of 42.08 M2 nominal current for the load curve. This is the point at which the motor load curve begins to decrease from 35.59 Motor load curve 2 towards 35.60 Zero speed load 2.						
	0.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
35.62	**Motor nominal temperature rise 2** Temperature rise for motor thermal protection model 2. Defines the temperature rise of the motor above 35.58 Motor ambient temperature 2, when the motor is loaded with 42.08 M2 nominal current. See the motor manufacturer's recommendations. The unit is selected by parameter 96.02 Unit selection.  	0 … 10000	80 or 176	°C or °F	1 = 1°C or °F	n	y	Parameter
35.63	**Motor thermal time constant 2** Motor thermal time constant for motor thermal protection model 2. Defines the thermal time constant for the motor thermal protection model. It is the time to reach 63 % of nominal motor temperature. See the motor manufacturer's recommendations.  	0 … 32500	256	s	1 = 1 s	n	y	Parameter

36 Load analyzer

Peak value and amplitude logger settings.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
36.01							
36.xx							

37 User load curve

Settings for user load curve.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
37.01							
37.xx							

40 Process PID

Parameter values for process PID controller.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
40.01							
40.xx							

42 Shared motion (2nd motor)

Configuration of 2nd motor.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
42.01							
42.xx							

44 Mechanical brake control

Configuration of mechanical brake.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
44.01							
44.xx							

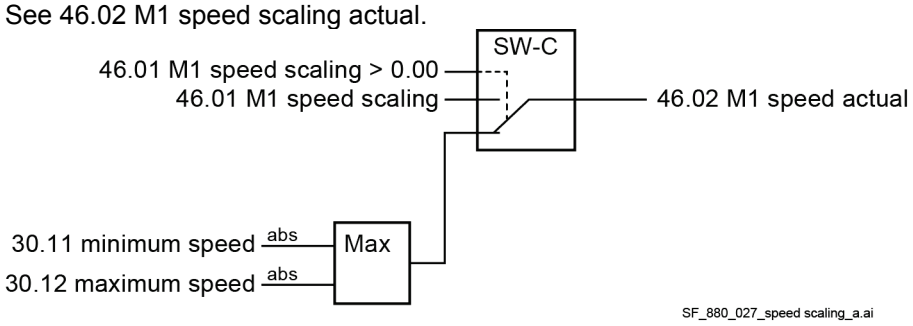
45 Energy efficiency

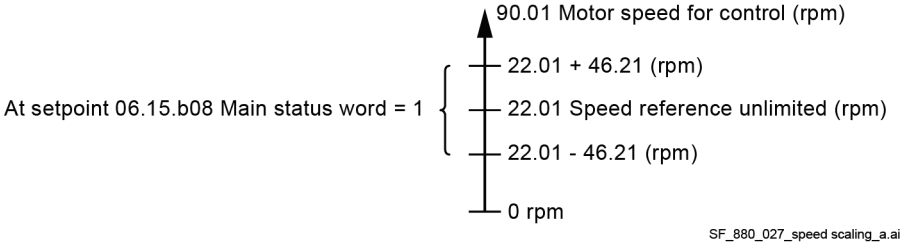
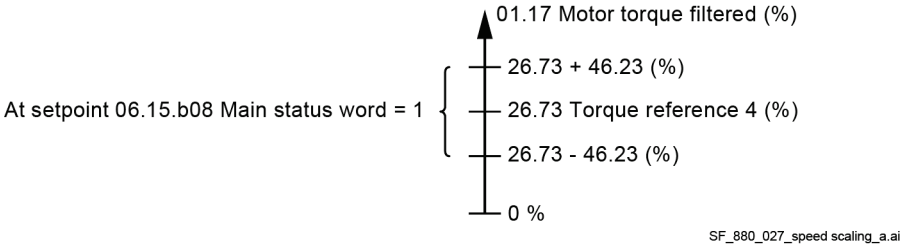
Settings for the energy saving calculators.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
45.01							
45.xx							

46 Monitoring/Scaling settings

Speed supervision settings, signal filtering and general scaling settings.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
46.01	**M1 speed scaling**						
	Motor 1 speed scaling. Sets the 16-bit scaling of all speed related parameters in rpm. The set scaling value corresponds to 20000 speed units in e.g. fieldbus or master-follower communication. 46.01 M1 speed scaling is valid for values > 0 rpm. For a value of 0 rpm, the maximum absolute value of 30.11 M1 minimum speed and 30.12 M1 maximum speed is taken. See 46.02 M1 speed scaling actual.  **Notes**: – 46.01 M1 speed scaling has to be set in case the speed is read or written by means of an overriding control (e.g. fieldbus). – The maximum amount of speed units is 32000. **Commissioning hints:** – Set 46.01 M1 speed scaling to the maximum absolute speed value of 30.11 M1 minimum speed and 30.12 M1 maximum speed. – Set 99.14 M1 nominal (base) speed to the base speed of motor 1. – Set 30.11 M1 minimum speed and 30.12 M1 maximum speed to ± maximum speed. – Make sure that the setting of 31.30 M1 overspeed trip margin is in between 1.6 x 46.01 M1 speed scaling (1.6 = 32000/20000).						
	0 … 30000	1500	rpm	See 46.02	n	y	Parameter
46.02	**M1 speed scaling actual**						
	Motor 1 speed scaling actual and acceleration/deceleration ramp rate. Shows the 16-bit scaling of all speed related parameters in rpm. The scaling value corresponds to 20000 speed units in e.g. fieldbus or master-follower communication. See 46.01 M1 speed scaling. Defines the acceleration/ deceleration ramp rate. See 23.12 Acceleration time 1 and 23.13 Deceleration time 1. The speed acceleration and deceleration ramp times are therefore related to 46.02 M1 speed scaling actual and not to 30.11 M1 minimum speed or 30.12 Maximum speed.						
	0 … 30000	-	rpm	1 = 1 rpm	y	n	Signal
46.03	**M1 torque scaling**						
	Motor 1 torque scaling. Sets the 16-bit scaling of all torque related parameters in % of 99.02 M1 nominal torque. The set scaling value corresponds to 10000 in e.g. fieldbus or master-follower communication.						
	0.00 … 325.00	100.00	%	See 46.04	n	y	Parameter
46.04	**M1 torque scaling actual**						
	Motor 1 torque scaling actual. Shows the 16-bit scaling of all torque related parameters in % of 99.02 M1 nominal torque. The scaling value corresponds to 10000 in e.g. fieldbus or master-follower communication. See 46.03 M1 torque scaling. Motor 1 nominal torque in Nm or lb ft can be seen in 99.02 M1 nominal torque.						
	0.00 … 325.00	-	%	100 = 1 %	y	n	Signal

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
46.06	**Speed reference zero scaling**						
	Speed corresponding to minimum fieldbus reference. Defines a speed corresponding to a zero reference received from a fieldbus. For example, with a setting of 500, the fieldbus reference range from 0 … 20000 speed units would correspond to a speed range from 500 … 46.02 M1 speed scaling actual. **Note**: This parameter is effective only with the ABB Drives communication profile.						
	0 … 30000	0	rpm	See 46.02	n	y	Parameter
46.11	**Filter time motor speed**						
	Motor speed feedback filter time constant. Filter time constant for 01.01 Used motor speed filtered, 01.02 EMF speed filtered, 01.03 OnBoard tacho speed filtered, 01.04 OnBoard encoder speed filtered, 01.05 Encoder 1 speed filtered and 01.06 Encoder 2 speed filtered. **Note**: This filter is used for speed feedback signals to be displayed e.g. in door meters. It does not influence the speed feedback for the drive control.						
	0 … 32500	500	ms	1 = 1 ms	n	y	Parameter
46.13	**Filter time motor torque**						
	Motor torque signal filter time constant. Filter time constant for 01.17 Motor torque filtered. Is used for the EMF controller and the EMF feed forward.						
	0 … 32500	1000	ms	1 = 1 ms	n	y	Parameter
46.14	**Filter time power output**						
	Output power signal filter time constant. Filter time constant for signal 01.24 Output power in kW.						
	0 … 32500	500	ms	1 = 1 ms	n	y	Parameter
46.21	**At speed hysteresis**						
	Levels for At setpoint indication in speed control. Defines the At setpoint levels for a speed controlled drive. When the absolute difference between 22.01 Speed reference unlimited and 90.01 Motor speed for control is in the 46.21 At speed hysteresis, the drive sets 06.15.b08 Main status word. 						
	0.00 … 30000.00	20.00	rpm	See 46.02	n	y	Parameter
46.23	**At torque hysteresis**						
	Levels for At setpoint indication in torque control. Defines the At setpoint levels for a torque controlled drive. When the absolute difference between 26.73 Torque reference 4 and 01.17 Motor torque filtered is in the 46.23 At torque hysteresis, the drive sets 06.15.b08 Main status word. 						
	0.00 … 325.00	10.00	%	See 46.04	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
46.31	**Above speed level**						
	Above level indication for speed control. Defines the level for the Above level indication in a speed controlled drive. When 90.01 Motor speed for control exceeds the level, the drive sets 06.17.b10 Drive status word 2. **Note**: With 46.31 Above speed level it is possible to automatically switch between two 2 sets of acceleration/deceleration times for the speed ramp or two sets of proportional gain and integration time for the speed controller. See 23.11 Ramp set selection = Speed level and 25.13 Speed controller set selection = Speed level or Speed error.						
	0.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter
46.33	**Above torque level**						
	Above level indication for torque control. Defines the level for the Above level indication in a torque controlled drive. When 01.17 Motor torque filtered exceeds the level, the drive sets 06.17.b10 Drive status word 2.						
	0.00 … 325.00	300.00	%	See 46.04	n	y	Parameter

47 Data storage

Data storage parameters that can be written to and read from using other parameters' source and target settings.

Note: There are different storage parameters for different data types. Integer-type storage parameters 47.11 … 47.28 cannot be used as source for other parameters. No **Other**; source selection possible.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
47.01	**Data storage 1 real32**						
	Data storage parameter 1. Storage parameters 47.01 … 47.08: – Are 32-bit real (floating-point) numbers that can be used as source values for other parameters, e.g. as Other; source selection. – Can be used as the target for received 16-bit data. See group 62 D2D and DDCS receive data. – Can be used as the source of transmitted 16-bit data. See group 61 D2D and DDCS transmit data. – Scaling and range are defined by parameters 47.31 … 47.38. This data storage parameter is of is of the type retain. Its value will be saved when the drive is de-energized. Thus, it will not lose its value.						
	See 47.31	0.000	-	See 47.31	n	y	Parameter
47.02	**Data storage 2 real32**						
	Data storage parameter 2. See 47.01 Data storage 1 real32.						
	See 47.32	0.000	-	See 47.32	n	y	Parameter
47.03	**Data storage 3 real32**						
	Data storage parameter 3. See 47.01 Data storage 1 real32.						
	See 47.33	0.000	-	See 47.33	n	y	Parameter
47.04	**Data storage 4 real32**						
	Data storage parameter 4. See 47.01 Data storage 1 real32.						
	See 47.34	0.000	-	See 47.34	n	y	Parameter
47.05	**Data storage 5 real32**						
	Data storage parameter 5. See 47.01 Data storage 1 real32.						
	See 47.35	0.000	-	See 47.35	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
47.06	**Data storage 6 real32**						
	Data storage parameter 6. See 47.01 Data storage 1 real32.						
	See 47.36	0.000	-	See 47.36	n	y	Parameter
47.07	**Data storage 7 real32**						
	Data storage parameter 7. See 47.01 Data storage 1 real32.						
	See 47.37	0.000	-	See 47.37	n	y	Parameter
47.08	**Data storage 8 real32**						
	Data storage parameter 8. See 47.01 Data storage 1 real32.						
	See 47.38	0.000	-	See 47.38	n	y	Parameter
47.11	**Data storage 1 int32**						
	Data storage parameter 9. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.12	**Data storage 2 int32**						
	Data storage parameter 10. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.13	**Data storage 3 int32**						
	Data storage parameter 11. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.14	**Data storage 4 int32**						
	Data storage parameter 12. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.15	**Data storage 5 int32**						
	Data storage parameter 13. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.16	**Data storage 6 int32**						
	Data storage parameter 14. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.17	**Data storage 7 int32**						
	Data storage parameter 15. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
47.18	**Data storage 8 int32**						
	Data storage parameter 16. 32-bit integer.						
	-2147483648 … 2147483647	0	-	-	n	y	Parameter
47.21	**Data storage 1 int16**						
	Data storage parameter 17. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.22	**Data storage 2 int16**						
	Data storage parameter 18. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.23	**Data storage 3 int16**						
	Data storage parameter 19. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.24	**Data storage 4 int16**						
	Data storage parameter 20. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.25	**Data storage 5 int16**						
	Data storage parameter 21. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.26	**Data storage 6 int16**						
	Data storage parameter 22. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.27	**Data storage 7 int16**						
	Data storage parameter 23. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.28	**Data storage 8 int16**						
	Data storage parameter 24. 16-bit integer.						
	-32768 … 32767	0	-	1 = 1	n	y	Parameter
47.31	**Data storage 1 real32 type**						
	Data type for 47.01 Data storage 1 real32. Defines the scaling and range of 47.01 Data storage 1 real32. The scaling is used when the data storage parameter: – Receives 16-bit data. See group 62 D2D and DDCS receive data. – Transmits 16-bit data. See group 61 D2D and DDCS transmit data. 0: **Unscaled**; data storage only. Range: -2147483.264 … 2147473.264. 1: **Transparent**; Scaling: 1 = 1. Range: -32768 … 32767. 2: **General**; Scaling: 100 = 1. Range: -327.68 … 327.67. 3: **Torque**; the scaling is defined by 46.04 M1 torque scaling actual. Range: -325.00 … 325.00. 4: **Speed**; the scaling is defined by 46.02 M1 speed scaling actual. Range: -30000.00 … 30000.00. 5: **Current**; the scaling is in percent of 99.11 M1 nominal current: 100 = 1 %. Range: -325.00 … 325.00.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
47.32	**Data storage 2 real32 type**						
	Data type for 47.02 Data storage 2 real32. Defines the scaling and range of 47.02 Data storage 2 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.33	**Data storage 3 real32 type**						
	Data type for 47.03 Data storage 3 real32. Defines the scaling and range of 47.03 Data storage 3 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.34	**Data storage 4 real32 type**						
	Data type for 47.04 Data storage 4 real32. Defines the scaling and range of 47.04 Data storage 4 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.35	**Data storage 5 real32 type**						
	Data type for 47.05 Data storage 5 real32. Defines the scaling and range of 47.05 Data storage 5 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.36	**Data storage 6 real32 type**						
	Data type for 47.06 Data storage 6 real32. Defines the scaling and range of 47.06 Data storage 6 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.37	**Data storage 7 real32 type**						
	Data type for 47.07 Data storage 7 real32. Defines the scaling and range of 47.07 Data storage 7 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter
47.38	**Data storage 8 real32 type**						
	Data type for 47.08 Data storage 8 real32. Defines the scaling and range of 47.08 Data storage 8 real32. See 47.31 Data storage 1 real32 type.						
	0 … 5	Unscaled	-	1 = 1	n	y	Parameter

49 Panel port communication

Communication settings for the control panel port on the drive.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
49.01	**Node ID number**						
	Control panel/PC tool link node ID number. Defines the node ID of the drive. All drives connected to the network must have a unique node ID. **Note**: For drives in a network, it is advisable to reserve 49.01 Network ID number = 1 for spare/replacement drives.						
	1 … 32	1	-	1 = 1	n	y	Parameter
49.03	**Baud rate**						
	Control panel/PC tool link speed. Defines the transfer rate of the control panel/PC tool link. 0: **9.6 kbps**; 9.6 kbit/s. 1: **38.4 kbps**; 38.4 kbit/s. 2: **57.6 kbps**; 57.6 kbit/s. 3: **86.4 kbps**; 86.4 kbit/s. 4: **115.2 kbps**; 115.2 kbit/s. 5: **230.4 kbps**; 230.4 kbit/s. 6: **460.8 kbps**; 460.8 kbit/s.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	7: **921.6 kbps**; 921.6 kbit/s.						
	0 … 7	230.4 kbps	-	1 = 1	n	y	Parameter
49.04	**Communication loss time**						
	Control panel/PC tool link communication loss timeout. Defines the time delay for the control panel/PC tool communication before the action defined in 49.05 Communication loss action is executed. Time count starts when the communication link fails to update the message.						
	0 … 32500	1000	ms	1 = 1 ms	n	y	Parameter
49.05	**Communication loss action**						
	Control panel/PC tool link communication loss action. Selects how the drive reacts to a control panel/PC tool communication loss. 0: **No action**; none, disable communication loss function. 1: **Fault**; the event generates fault 7081 Control panel/PC tool link communication and the motor stops due to 31.13 Fault stop mode communication. This occurs only when the drive is controlled from the control panel/PC tool (local mode). 2: **Warning**; the event generates warning A7EE Control panel/PC tool link communication. This occurs even though no control is expected from the control panel/PC tool. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the evet generates warning A7EE Control panel/PC tool link communication and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A7EE Control panel/PC tool link communication and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break.						
	0 … 4	No action	-	1 = 1	n	y	Parameter
49.06	**Refresh settings**						
	Control panel/PC tool link communication refresh command. Applies the settings of parameters 49.01 … 49.05. The value reverts automatically to Done, when the refresh is done. **Note**: Refreshing may cause a communication break, so reconnecting the drive may be required. 0: **Done**; 0, normal operation or refreshing done. 1: **Refresh**; 1, refresh parameters 49.01 … 49.05.						
	0 … 1	Done	-	1 = 1	y	y	Parameter

50 Fieldbus adapter (FBA)

Fieldbus communication configuration.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
50.01	**FBA A enable**						
	Fieldbus adapter A enable/disable. Enables/Disables communication between the drive and fieldbus adapter A. Specifies the location of the adapter in slot1 … slot3. 0: **Disable**; disable communication between drive and fieldbus adapter A. 1: **Option slot1**; enable communication between drive and fieldbus adapter A. The adapter is located in slot1. 2: **Option slot2**; enable communication between drive and fieldbus adapter A. The adapter is located in slot2. 3: **Option slot3**; enable communication between drive and fieldbus adapter A. The adapter is located in slot3.						
	0 … 3	Disable	-	1 = 1	n	n	Parameter
50.02	**FBA A comm loss func**						
	Fieldbus adapter A communication loss action. Selects how the drive reacts to a fieldbus communication loss. 0: **No action**; none, disable communication loss function. 1: **Fault**; the event generates fault 7510 FBA A communication and the motor stops due to 31.13 Fault stop mode communication. This occurs only when the drive is controlled from the fieldbus. 2: **Warning**; the event generates warning A7C1 FBA A communication. This occurs even though no control is expected from the fieldbus. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the evet generates warning A7C1 FBA A communication and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A7C1 FBA A communication and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 5: **Fault always**; the event generates fault 7510 FBA A communication and the motor stops due to 31.13 Fault stop mode communication. This occurs even though no control is expected from the fieldbus.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
50.03	**FBA A comm loss timeout**						
	Fieldbus adapter A communication loss timeout. Defines the time delay for the fieldbus communication before the action defined in 50.02 FBA A comm loss func is executed. Time count starts when the communication link fails to update the message.						
	0 … 32500	300	ms	1 = 1 ms	n	y	Parameter
50.04	**FBA A ref1 type**						
	Fieldbus adapter A reference 1 type. Selects the type and scaling of 03.05 FBA A reference 1 sent by the master (e.g. PLC) to fieldbus adapter A. 0: **Auto**; automatic type and scaling according to which reference chain the incoming reference is connected to. If the reference is not connected to any chain, setting Transparent is applied.						

Parameter	Auto type and scaling
22.11 Speed reference 1 source	Speed
22.12 Speed reference 2 source	

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	23.32 Direct speed reference						
	26.11 Torque reference 1 source 26.12 Torque reference 2 source	Torque					
	27.22 Current reference source	Current					
	28.18 EMF reference source 28.20 EMF voltage correction source 28.29 Flux correction source	General					
	1: **Transparent**; No scaling is applied. 2: **General**; Generic reference with a scaling of 100 = 1 (e.g. integer and two decimals). 3: **Torque**; the scaling is defined by 46.04 M1 torque scaling actual. 4: **Speed**; the scaling is defined by 46.02 M1 speed scaling actual. 5: **Current**; the scaling is in percent of 99.11 M1 nominal current: 100 = 1 %.						
	0 … 5	Auto	-	1 = 1	n	y	Parameter
50.05	**FBA A ref2 type**						
	Fieldbus adapter A reference 2 type. Selects the type and scaling of 03.06 FBA A reference 2 sent by the master (e.g. PLC) to fieldbus adapter A. See 50.04 FBA A ref1 type.						
	0 … 5	Auto	-	1 = 1	n	y	Parameter
50.07	**FBA A actual 1 type**						
	Fieldbus adapter A actual value 1 type. Selects the type/source and scaling of actual value 1 sent by fieldbus adapter A to the master (e.g. PLC). 0: **Auto**; type/source and scaling follow the type of reference 1 selected by 50.04 FBA A ref1 type. For individual settings see below. 1: **Transparent**; The value selected by 50.10 FBA A act1 transparent source is sent as actual value 1. No scaling is applied. The 16-bit scaling is 1 = 1 unit. 2: **General**; The value selected by parameter 50.10 FBA A act1 transparent source is sent as actual value 1 with a 16-bit scaling of 100 = 1 unit (e.g. integer and two decimals). 3: **Torque**; 01.17 Motor torque filtered is sent as actual value 1. The scaling is defined by 46.04 M1 torque scaling actual. 4: **Speed**; 01.01 Used motor speed filtered is sent as actual value 1. The scaling is defined by 46.02 M1 speed scaling actual. 5: **Current**; 27.05 Motor current is sent as actual value 1. The scaling is in percent of 99.11 M1 nominal current. 6: **Position**; Motor position is sent as actual value 1. See 90.06 Motor position scaled.						
	0 … 6	Auto	-	1 = 1	n	y	Parameter
50.08	**FBA A actual 2 type**						
	Fieldbus adapter A actual value 2 type. Selects the type/source and scaling of actual value 2 sent by fieldbus adapter A to the master (e.g. PLC). See 50.07 FBA A actual 1 type.						
	0 … 6	Auto	-	1 = 1	n	y	Parameter
50.09	**FBA A SW transparent source**						
	Fieldbus adapter A status word transparent source. Selects the source of the status word when the fieldbus adapter is set to a transparent communication profile e.g. by its configuration parameters in group 51. The parameter to be used is fieldbus dependent. **Other**; source selection e.g. 06.15 Main Status Word. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
50.10	**FBA A act1 transparent source**						
	Fieldbus adapter A actual value 1 transparent source. Selects the source of actual value 1 sent by fieldbus adapter A to the master (e.g. PLC), when 50.07 FBA A actual 1 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
50.11	**FBA A act2 transparent source**						
	Fieldbus adapter A actual value 2 transparent source. Selects the source of actual value 2 sent by fieldbus adapter A to the master (e.g. PLC), when 50.08 FBA A actual 2 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
50.12	**FBA A debug mode**						
	Fieldbus adapter A debug mode. Enables the display of the raw (unmodified) data received from and sent to fieldbus adapter A. The data are displayed in parameters 50.13 … 50.18. **Note**: This functionality should only be used for debugging. 0: **Disable**; disable the display of raw data from fieldbus adapter A. 1: **Enable**; enable the display of raw data from fieldbus adapter A.						
	0 … 1	Disable	-	1 = 1	n	n	Parameter
50.13	**FBA A control word**						
	Fieldbus adapter A raw control word. Displays the raw (unmodified) control word sent by the master (e.g. PLC) to fieldbus adapter A if 50.12 FBA A debug mode = Enable.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
50.14	**FBA A reference 1**						
	Fieldbus adapter A raw reference 1. Displays the raw (unmodified) reference 1 (REF1) sent by the master (e.g. PLC) to fieldbus adapter A if 50.12 FBA A debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
50.15	**FBA A reference 2**						
	Fieldbus adapter A raw reference 2. Displays the raw (unmodified) reference 2 (REF2) sent by the master (e.g. PLC) to fieldbus adapter A if 50.12 FBA A debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
50.16	**FBA A status word**						
	Fieldbus adapter A raw status word. Displays the raw (unmodified) status word sent by fieldbus adapter A to the master (e.g. PLC) if 50.12 FBA A debug mode = Enable.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
50.17	**FBA A actual value 1**						
	Fieldbus adapter A raw actual value 1. Displays the raw (unmodified) actual value 1 (ACT1) sent by fieldbus adapter A to the master (e.g. PLC) if 50.12 FBA A debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal

<table>
<tr><td>Index</td><td colspan="7">Name</td></tr>
<tr><td></td><td colspan="7">Text</td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>50.18</td><td colspan="7">FBA A actual value 2</td></tr>
<tr><td></td><td colspan="7">Fieldbus adapter A raw actual value 2.
Displays the raw (unmodified) actual value 2 (ACT2) sent by fieldbus adapter A to the master (e.g. PLC) if 50.12 FBA A debug mode = Enable.</td></tr>
<tr><td></td><td>-2147483648 … 2147483647</td><td>-</td><td>-</td><td>1 = 1</td><td>y</td><td>n</td><td>Signal</td></tr>
<tr><td>50.21</td><td colspan="7">FBA A timelevel sel</td></tr>
<tr><td></td><td colspan="7">Fieldbus adapter A communication time levels.
In general, lower time levels of read/write services reduce the CPU load. The table below shows the time levels of read/write services for cyclic high and cyclic low data depending on 50.21 FBA A timelevel sel:

<table><tr><th>50.21 FBA A timelevel sel</th><th>Cyclic high*</th><th>Cyclic low**</th></tr><tr><td>Normal</td><td>2 ms</td><td>10 ms</td></tr><tr><td>Fast</td><td>500 µs</td><td>2 ms</td></tr><tr><td>Very fast</td><td>250 µs</td><td>2 ms</td></tr><tr><td>Monitoring</td><td>10 ms</td><td>2 ms</td></tr></table>
*Cyclic high data consist of status word, ACT1 and ACT2 from the fieldbus.
**Cyclic low data consist of the parameter data mapped in groups 52 FBA A data in, 53 FBA A data out and acyclic data.
Control word, REF1 and REF2 from the fieldbus are handled as interrupts generated on receipt of cyclic high messages.
0: Normal; normal speed.
1: Fast; fast speed.
2: Very fast; very fast speed.
3: Monitoring; low speed. Optimized for PC tool communication and monitoring usage.</td></tr>
<tr><td></td><td>0 … 3</td><td>Normal</td><td>-</td><td>1 = 1</td><td>n</td><td>n</td><td>Parameter</td></tr>
<tr><td>50.29</td><td colspan="7">FBA A profile</td></tr>
<tr><td></td><td colspan="7">0: ABB drive profile;
4: DCP;</td></tr>
<tr><td></td><td>0 … 4</td><td>ABB drive profile</td><td>-</td><td>1 = 1</td><td>n</td><td>n</td><td>Parameter</td></tr>
<tr><td>50.31</td><td colspan="7">FBA B enable</td></tr>
<tr><td></td><td colspan="7">Fieldbus adapter B enable/disable.
Enables/Disables communication between the drive and fieldbus adapter B. Specifies the location of the adapter in slot1 … slot3.
0: Disable; disable communication between drive and fieldbus adapter B.
1: Option slot1; enable communication between drive and fieldbus adapter B. The adapter is located in slot1.
2: Option slot2; enable communication between drive and fieldbus adapter B. The adapter is located in slot2.
3: Option slot3; enable communication between drive and fieldbus adapter B. The adapter is located in slot3.</td></tr>
<tr><td></td><td>0 … 3</td><td>Disable</td><td>-</td><td>1 = 1</td><td>n</td><td>n</td><td>Parameter</td></tr>
<tr><td>50.32</td><td colspan="7">FBA B comm loss func</td></tr>
<tr><td></td><td colspan="7">Fieldbus adapter B communication loss action.
Selects how the drive reacts to a fieldbus communication loss.
0: No action; none, disable communication loss function.
1: Fault; the event generates fault 7520 FBA B communication and the motor stops due to 31.13 Fault stop mode communication. This occurs only when the drive is controlled from the fieldbus.
2: Warning; the event generates warning A7C2 FBA B communication. This occurs even though no control is expected from the fieldbus.</td></tr>
</table>

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	WARNING! Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the evet generates warning A7C2 FBA B communication and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A7C2 FBA B communication and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 5: **Fault always**; the event generates fault 7520 FBA B communication and the motor stops due to 31.13 Fault stop mode communication. This occurs even though no control is expected from the fieldbus.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
50.33	**FBA B comm loss timeout**						
	Fieldbus adapter B communication loss timeout. Defines the time delay for the fieldbus communication before the action defined in 50.32 FBA B comm loss func is executed. Time count starts when the communication link fails to update the message.						
	0 … 32500	300	ms	1 = 1 ms	n	y	Parameter
50.34	**FBA B ref1 type**						
	Fieldbus adapter B reference 1 type. Selects the type and scaling of 03.07 FBA B reference 1 sent by the master (e.g. PLC) to fieldbus adapter B. See 50.04 FBA A ref1 type.						
	0 … 5	Auto	-	1 = 1	n	y	Parameter
50.35	**FBA B ref2 type**						
	Fieldbus adapter B reference 2 type. Selects the type and scaling of 03.08 FBA B reference 2 sent by the master (e.g. PLC) to fieldbus adapter A. See 50.04 FBA A ref1 type.						
	0 … 5	Auto	-	1 = 1	n	y	Parameter
50.37	**FBA B actual 1 type**						
	Fieldbus adapter B actual value 1 type. Selects the type/source and scaling of actual value 1 sent by fieldbus adapter B to the master (e.g. PLC). See 50.07 FBA A actual 1 type.						
	0 … 6	Auto	-	1 = 1	n	y	Parameter
50.38	**FBA B actual 2 type**						
	Fieldbus adapter B actual value 2 type. Selects the type/source and scaling of actual value 2 sent by fieldbus adapter B to the master (e.g. PLC). See 50.07 FBA A actual 1 type.						
	0 … 6	Auto	-	1 = 1	n	y	Parameter
50.39	**FBA B SW transparent source**						
	Fieldbus adapter B status word transparent source. Selects the source of the status word when the fieldbus adapter is set to a transparent communication profile e.g. by its configuration parameters in group 54. The parameter to be used is fieldbus dependent. **Other**; source selection e.g. 06.15 Main Status Word. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
50.40	**FBA B act1 transparent source**						
	Fieldbus adapter B actual value 1 transparent source. Selects the source of actual value 1 sent by fieldbus adapter B to the master (e.g. PLC), when 50.37 FBA B actual 1 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
50.41	**FBA B act2 transparent source**						
	Fieldbus adapter B actual value 2 transparent source. Selects the source of actual value 2 sent by fieldbus adapter B to the master (e.g. PLC), when 50.38 FBA B actual 2 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
50.42	**FBA B debug mode**						
	Fieldbus adapter B debug mode. Enables the display of the raw (unmodified) data received from and sent to fieldbus adapter B. The data are displayed in parameters 50.43 … 50.48. **Note**: This functionality should only be used for debugging. 0: **Disable**; disable the display of raw data from fieldbus adapter B. 1: **Enable**; enable the display of raw data from fieldbus adapter B.						
	0 … 1	Disable	-	1 = 1	n	n	Parameter
50.43	**FBA B control word**						
	Fieldbus adapter B raw control word. Displays the raw (unmodified) control word sent by the master (e.g. PLC) to fieldbus adapter B if 50.42 FBA B debug mode = Enable.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
50.44	**FBA B reference 1**						
	Fieldbus adapter B raw reference 1. Displays the raw (unmodified) reference 1 (REF1) sent by the master (e.g. PLC) to fieldbus adapter B if 50.42 FBA B debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
50.45	**FBA B reference 2**						
	Fieldbus adapter B raw reference 2. Displays the raw (unmodified) reference 2 (REF2) sent by the master (e.g. PLC) to fieldbus adapter B if 50.42 FBA B debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
50.46	**FBA B status word**						
	Fieldbus adapter B raw status word. Displays the raw (unmodified) status word sent by fieldbus adapter B to the master (e.g. PLC) if 50.42 FBA B debug mode = Enable.						
	00000000h … FFFFFFFFh	-	-	1 = 1	y	n	Signal
50.47	**FBA B actual value 1**						
	Fieldbus adapter B raw actual value 1. Displays the raw (unmodified) actual value 1 (ACT1) sent by fieldbus adapter B to the master (e.g. PLC) if 50.42 FBA B debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
50.48	**FBA B actual value 2**						
	Fieldbus adapter B raw actual value 2. Displays the raw (unmodified) actual value 2 (ACT2) sent by fieldbus adapter B to the master (e.g. PLC) if 50.42 FBA B debug mode = Enable.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
50.51	**FBA B timelevel sel**						
	Fieldbus adapter B communication time levels. See 50.21 FBA A timelevel sel.						
	0 … 3	Normal	-	1 = 1	n	n	Parameter
50.59	**FBA B profile**						
	0: **ABB drive profile**; 4: **DCP**;						
	0 … 4	ABB drive profile	-	1 = 1	n	n	Parameter

51 FBA A settings

Fieldbus adapter A configuration.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
51.01	**FBA A type**						
	Fieldbus adapter A type. Displays the type of the connected fieldbus adapter A module. 0: **None**; module is not found or is not properly connected or is disabled by 50.01 FBA A enable. 1: FPBA; 32: **FCAN**; 37: **FDNA**; 101: **FCNA**; 128: **FENA-11/21**; 135: **FECA**; 136: **FEPL**; 485: **FSCA**;						
	0 … 500	-	-	1 = 1	y	n	Signal
51.02 … 51.26	**FBA A Par2 … FBA A Par26**						
	Fieldbus adapter A configuration parameter. Parameters 51.02 … 51.26 are adapter module-specific. For more information, see the documentation of the fieldbus adapter module. **Note**: Not all of these parameters are necessarily in use.						
	0 … 65535	0	-	1 = 1	n	y	Parameter
51.27	**FBA A par refresh**						
	Fieldbus adapter A refresh. Validates any changed fieldbus adapter A module configuration settings. The value reverts to Done automatically, when the refresh is done. 0: **Done**; 0, refreshing done. 1: **Refresh**; 1, refreshing.						
	0 … 1	Done	-	1 = 1	y	n	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
51.28	**FBA A par table ver**						
	Fieldbus adapter A parameter table revision. Displays the parameter table revision of the fieldbus adapter A module-mapping file (stored in the memory of the drive) in format axyz, where ax = major table revision number and yz = minor table revision number.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
51.29	**FBA A drive type code**						
	Fieldbus adapter A drive type code. Displays the drive type code in the fieldbus adapter A module-mapping file (stored in the memory of the drive).						
	0 … 65535	-	-	1 = 1	y	n	Signal
51.30	**FBA A mapping file ver**						
	Fieldbus adapter A mapping file revision. Displays the fieldbus adapter A module-mapping file revision stored in the memory of the drive in decimal format.						
	0 … 65535	-	-	1 = 1	y	n	Signal
51.31	**D2FBA A comm status**						
	Fieldbus adapter A communication status. Displays the status of the fieldbus adapter A module communication. 0: **Not configured**; fieldbus adapter A is not configured. 1: **Initializing**; fieldbus adapter A is initializing. 2: **Time out**; a timeout has occurred in the communication between fieldbus adapter A and the drive. 3: **Configuration error**; fieldbus adapter A configuration error. Mapping file is not found in the file system of the drive or mapping file upload has failed more than three times. 4: **Off-line**; fieldbus adapter A communication is off-line. 5: **On-line**; fieldbus adapter A communication is on-line or fieldbus adapter A has been configured not to detect a communication break. For more information, see the documentation of the fieldbus adapter. 6: **Reset**; fieldbus adapter A is performing a hardware reset.						
	0 … 6	-	-	1 = 1	y	n	Signal
51.32	**FBA A comm SW ver**						
	Fieldbus adapter A, firmware patch and build versions. Displays the patch and build versions of the adapter module A firmware in format xxyy, where xx = patch version number and yy = build version number. **Example**: C802 = 200.02 (patch version 200, build version 2).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
51.33	**FBA A appl SW ver**						
	Fieldbus adapter A, firmware major and minor versions. Displays the major and minor versions of the adapter module A firmware in format xyy, where x = major revision number and yy = minor revision number. **Example**: 300 = 3.00 (major version 3, minor version 00).						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal

52 FBA A data in

Selection of data sent by fieldbus adapter A to the master (e.g. PLC).
Note: 32-bit values require two consecutive parameters. Whenever a 32-bit value is selected in a data parameter, the next parameter is automatically reserved.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
52.01 … 52.12	**FBA A data in1 … FBA A data in12**						
	Fieldbus adapter A data from the drive to the master (e.g. PLC). Parameters 52.01 … 52.12 select data sent by fieldbus adapter A to the master (e.g. PLC). **Other**; source selection (10 ms update). 0: **None**; inactive. FBA A data in is disabled. 1: **CW 16bit**; control word (16-bit) (2 ms update). Taken from 06.09 Used main control word. 2: **Ref1 16bit**; reference REF1 (16-bit) (2 ms update). Taken from 3.05 FBA A reference 1. 3: **Ref2 16bit**; reference REF2 (16-bit) (2 ms update). Taken from 3.06 FBA A reference 2. 4: **SW 16bit**; status word (16-bit) (2 ms update). Taken from 06.15 Main status word. 5: **Act1 16bit**; actual value 1 ACT1 (16-bit) (2 ms update). Depending on 50.07 FBA A actual 1 type. 6: **Act2 16bit**; actual value 2 ACT2 (16-bit) (2 ms update). Depending on 50.08 FBA A actual 2 type. 11: **CW 32bit**; control word (32-bit) (2 ms update). Taken from 06.09 Used main control word. 12: **Ref1 32bit**; reference REF1 (32-bit) (2 ms update). Taken from 3.05 FBA A reference 1. 13: **Ref2 32bit**; reference REF2 (32-bit) (2 ms update). Taken from 3.06 FBA A reference 2. 14: **SW 32bit**; status word (32-bit) (2 ms update). Taken from 06.15 Main status word. 15: **Act1 32bit**; actual value 1 ACT1 (32-bit) (2 ms update). Depending on 50.07 FBA A actual 1 type. 16: **Act2 32bit**; actual value 2 ACT2 (32-bit) (2 ms update). Depending on 50.08 FBA A actual 2 type. 24: **SW2 16bit**; status word 2 (16-bit) (2 ms update). ??????						
	0 … 24	None	-	1 = 1	n	y	Parameter

53 FBA A data out

Selection of data sent by the master (e.g. PLC) to fieldbus adapter A.
Note: 32-bit values require two consecutive parameters. Whenever a 32-bit value is selected in a data parameter, the next parameter is automatically reserved.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
53.01 … 53.12	**FBA A data out1 … FBA A data out12**						
	Fieldbus adapter A data from the master (e.g. PLC) to the drive. Parameters 53.01 … 53.12 select data sent by the master (e.g. PLC) to fieldbus adapter A. **Other**; source selection (10 ms update). 0: **None**; inactive. FBA A data out is disabled. 1: **CW 16bit**; control word (16-bit) (2 ms update). Send to 06.01 Main control word. 2: **Ref1 16bit**; reference REF1 (16-bit) (2 ms update). Send to 3.05 FBA A reference 1. 3: **Ref2 16bit**; reference REF2 (16-bit) (2 ms update). Send to 3.06 FBA A reference 2. 11: **CW 32bit**; control word (32-bit) (2 ms update). Send to 06.01 Main control word. 12: **Ref1 32bit**; reference REF1 (32-bit) (2 ms update). Send to 3.05 FBA A reference 1. 13: **Ref2 32bit**; reference REF2 (32-bit) (2 ms update). Send to 3.06 FBA A reference 2. 21: **CW2 16bit**; status word 2 (16-bit) (2 ms update). ?????						
	0 … 21	None	-	1 = 1	n	y	Parameter

54 FBA B settings
Description see group 51 FBA A settings.

55 FBA B data in
Description see group 52 FBA A data in.

56 FBA B data out
Description see group 53 FBA A data out.

58 Embedded fieldbus
Embedded fieldbus (EFB) configuration.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
58.01	**Protocol enable**						
	Embedded fieldbus enable/disable. Enables/Disables the embedded fieldbus and selects the protocol to use. **Note**: When the embedded fieldbus interface is enabled, the device-to-device link in group 60 DDCS communication is disabled. 0: **None**; inactive, disable communication. 1: **Modbus RTU**; enable Embedded fieldbus interface. Modbus RTU protocol is used.						
	0 … 1	None	-	1 = 1	n	n	Parameter
58.02	**Protocol ID**						
	Protocol ID and revision. Displays the protocol ID and revision.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
58.03	**Node address**						
	Embedded fieldbus node address. Defines the node address of the drive for the embedded fieldbus communication. All drives connected to the network must have a unique node address. **Notes**: – The address range for the embedded fieldbus is 1 … 247. – For drives in a network, it is advisable to reserve 58.03 Node address = 1 for spare/replacement drives. – Changes to 58.03 Node address take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control.						
	0 … 255	1	-	1 = 1	n	y	Parameter
58.04	**Baud rate**						
	Embedded fieldbus link speed. Defines the transfer rate of the embedded fieldbus link. **Note**: Changes to 58.04 Baud rate take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control. 2: **9.6 kbps**; 9.6 kbit/s. 3: **19.2 kbps**; 19.2 kbit/s. 4: **38.4 kbps**; 38.4 kbit/s. 5: **57.6 kbps**; 57.6 kbit/s. 6: **76.8 kbps**; 76.8 kbit/s. 7: **115.2 kbps**; 115.2 kbit/s.						
	2 … 7	19.2 kbps	-	1 = 1	n	y	Parameter

<table>
<tr><td rowspan="3">Index</td><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>58.05</td><td colspan="7">Parity</td></tr>
<tr><td></td><td colspan="7">Embedded fieldbus, parity bit and stop bits.
Selects the type of parity bit and the number of stop bits.
Note: Changes to 58.05 Parity take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control.
0: 8 NONE 1; eight data bits, no parity bit, one stop bit.
1: 8 NONE 2; eight data bits, no parity bit, two stop bits.
2: 8 EVEN 1; eight data bits, even parity bit, one stop bit.
3: 8 ODD 1; eight data bits, odd parity bit, one stop bit.</td></tr>
<tr><td></td><td>0 … 3</td><td>8 EVEN 1</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>58.06</td><td colspan="7">Communication control</td></tr>
<tr><td></td><td colspan="7">Embedded fieldbus refresh command.
Applies any changed embedded fieldbus settings or activates silent mode. The value reverts automatically to Enabled, when the refresh is done.
0: Enable; normal operation or refreshing done.
1: Refresh; refresh changed configuration settings of the embedded fieldbus.
2: Silent mode; activate the silent mode. No messages are transmitted. Silent mode can be terminated by setting 58.06 Communication = Refresh.</td></tr>
<tr><td></td><td>0 … 2</td><td>Enable</td><td>-</td><td>1 = 1</td><td>y</td><td>y</td><td>Parameter</td></tr>
<tr><td>58.07</td><td colspan="7">Communication diagnostics</td></tr>
<tr><td></td><td colspan="7">Embedded fieldbus, communication status word.
Displays the status of the embedded fieldbus communication.
Bit assignment:

<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Remarks</th></tr>
<tr><td>0</td><td>Init failed</td><td>1</td><td>Embedded fieldbus initialization failed.</td></tr>
<tr><td>1</td><td>Addr config err</td><td>1</td><td>Node address not allowed by protocol.</td></tr>
<tr><td>2</td><td>Silent mode</td><td>1</td><td>Drive not allowed transmitting.</td></tr>
<tr><td></td><td></td><td>0</td><td>Drive allowed transmitting.</td></tr>
<tr><td>3</td><td>reserved</td><td></td><td></td></tr>
<tr><td>4</td><td>Wiring error</td><td>1</td><td>Error detected: Possibly A/B wires swapped.</td></tr>
<tr><td>5</td><td>Parity error</td><td>1</td><td>Error detected: Check 58.04 Baud rate and 58.05 Parity.</td></tr>
<tr><td>6</td><td>Baud rate error</td><td>1</td><td>Error detected: Check 58.05 Parity and 58.04 Baud rate.</td></tr>
<tr><td>7</td><td>No bus activity</td><td>1</td><td>0 bytes received during the last 5 seconds</td></tr>
<tr><td>8</td><td>No packets</td><td>1</td><td>0 packets (addressed to any device) detected during the last 5 seconds.</td></tr>
<tr><td>9</td><td>Noise or addressing error</td><td>1</td><td>Error detected: Interference or another drive with the same address is online.</td></tr>
<tr><td>10</td><td>Comm loss</td><td>1</td><td>0 packets addressed to the unit received within 58.16 Communication loss time.</td></tr>
<tr><td>11</td><td>CW/Ref loss</td><td>1</td><td>No control word or references received within 58.16 Communication loss time.</td></tr>
<tr><td>12</td><td>reserved</td><td></td><td></td></tr>
<tr><td>13</td><td>reserved</td><td></td><td></td></tr>
<tr><td>14</td><td>reserved</td><td></td><td></td></tr>
<tr><td>15</td><td>reserved</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td></td><td>0000h … FFFFh</td><td>-</td><td>-</td><td>1 = 1</td><td>y</td><td>n</td><td>Signal</td></tr>
</table>

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
58.08	**Received packets**						
	Embedded fieldbus, number of received packets addressed to the drive. Displays a count of valid packets addressed to the drive. During normal operation, this number increases constantly. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 4294967295	0	-	1 = 1	n	y	Parameter
58.09	**Transmitted packets**						
	Embedded fieldbus; number of transmitted packets. Displays a count of valid packets transmitted by the drive. During normal operation, this number increases constantly. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 4294967295	0	-	1 = 1	n	y	Parameter
58.10	**All packets**						
	Embedded fieldbus, number of all received packets. Displays a count of valid packets addressed to any device on the bus. During normal operation, this number increases constantly. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 4294967295	0	-	1 = 1	n	y	Parameter
58.11	**UART errors**						
	Embedded fieldbus, number of UART errors. Displays a count of character errors received by the drive. An increasing count indicates a configuration problem on the bus. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 4294967295	0	-	1 = 1	n	y	Parameter
58.12	**CRC errors**						
	Embedded fieldbus, number of CRC errors. Displays a count of packets with a CRC error received by the drive. An increasing count indicates interference on the bus. Can be reset from the control panel by keeping Reset depressed for over 3 seconds.						
	0 … 4294967295	0	-	1 = 1	n	y	Parameter
58.14	**Communication loss action**						
	Embedded fieldbus, communication loss action. Selects how the drive reacts to a fieldbus communication loss. **Note**: Changes to 58.14 Communication loss action take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control. 0: **No action**; none, disable communication loss function. 1: **Fault**; the event generates fault 6681 EFB communication and the motor stops due to 31.13 Fault stop mode communication. This occurs only when the drive is controlled from the fieldbus. 2: **Warning**; the event generates warning A7CE EFB communication. This occurs even though no control is expected from the fieldbus. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 3: **Last speed**; the evet generates warning A7CE EFB communication and freezes the speed to the level the drive was operating at. The last speed is determined based on the speed feedback using an 850 ms low-pass filter. **WARNING!** Make sure that it is safe to continue operation in case of a communication break. 4: **Speed reference safe**; the event generates warning A7CE EFB communication and sets the speed to the value defined in 22.46 Speed reference safe. **WARNING!** Make sure that it is safe to continue operation in case of a communication break.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	5: **Fault always**; the event generates fault 6681 EFB communication and the motor stops due to 31.13 Fault stop mode communication. This occurs even though no control is expected from the fieldbus.						
	0 … 5	No action	-	1 = 1	n	y	Parameter
58.15	**Communication loss mode**						
	Embedded fieldbus, communication loss mode. Defines which message types reset the timeout counter for detecting a fieldbus communication loss. See 58.14 Communication loss action and 58.16 Communication loss time. **Note**: Changes to 58.15 Communication loss mode take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control. 1: **Any message**; any message addressed to the drive resets the timeout. 2: **CW/Ref1/Ref2**; a write of the control word or a reference from the fieldbus resets the timeout.						
	1 … 2	CW/Ref1/Ref2	-	1 = 1	n	y	Parameter
58.16	**Communication loss time**						
	Embedded fieldbus communication loss timeout. Defines the time delay for the fieldbus communication before the action defined in 58.14 Communication loss action is executed. See 58.15 Communication loss mode. **Note**: Changes to 58.16 Communication loss time take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control.						
	0 … 32500	300	ms	1 = 1 ms	n	y	Parameter
58.17	**Transmit delay**						
	Embedded fieldbus minimum response delay. Defines a minimum response delay in addition to any fixed delay imposed by the protocol. Note: Changes to 58.17 Transmit delay take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control.						
	0 … 32500	0	ms	1 = 1	n	y	Parameter
58.18	**EFB control word**						
	Embedded fieldbus raw control word. Displays the raw (unmodified) control word sent by the Modbus controller (e.g. PLC) to the drive. For debugging purposes.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
58.19	**EFB status word**						
	Embedded fieldbus raw status word. Displays the raw (unmodified) status word sent by the drive to the Modbus controller (e.g. PLC). For debugging purposes.						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
58.25	**Control profile**						
	Embedded fieldbus control profile. Defines the control profile used by the protocol. 0: **ABB Drives**; ABB Drives profile (with a 16-bit control word) with registers in the classic format for backward compatibility. 2: **Transparent**; transparent profile (16-bit or 32-bit control word) with registers in the classic format.						
	0 … 2	ABB Drives	-	1 = 1	n	y	Parameter
58.26	**EFB ref1 type**						
	Embedded fieldbus reference 1 type. Selects the type and scaling of 03.09 EFB reference 1 sent by the Modbus controller (e.g. PLC) to the embedded fieldbus. 0: **Auto**; automatic type and scaling according to which reference chain the incoming reference is connected to. If the reference is not connected to any chain, setting Transparent is applied.						

Parameter	Auto type and scaling
22.11 Speed reference 1 source	Speed

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	22.12 Speed reference 2 source 23.32 Direct speed reference						
	26.11 Torque reference 1 source 26.12 Torque reference 2 source	Torque					
	27.22 Current reference source	Current					
	28.18 EMF reference source 28.20 EMF voltage correction source 28.29 Flux correction source	General					
	1: **Transparent**; No scaling is applied. 2: **General**; Generic reference with a scaling of 100 = 1 (e.g. integer and two decimals). 3: **Torque**; the scaling is defined by 46.04 M1 torque scaling actual. 4: **Speed**; the scaling is defined by 46.02 M1 speed scaling actual. 5: **Current**; the scaling is in percent of 99.11 M1 nominal current: 100 = 1 %.						
	1 … 5	Auto	-	1 = 1	n	y	Parameter
58.27	**EFB ref2 type**						
	Embedded fieldbus reference 2 type. Selects the type and scaling of 03.10 EFB reference 2 sent by the Modbus controller (e.g. PLC) to the embedded fieldbus. See 58.26 EFB ref1 type.						
	1 … 5	Auto	-	1 = 1	n	y	Parameter
58.28	**EFB act1 type**						
	Embedded fieldbus actual value 1 type. Selects the type/source and scaling of actual value 1 sent by the embedded fieldbus to the Modbus controller (e.g. PLC). 0: **Auto**; type/source and scaling follow the type of reference 1 selected by 58.26 EFB ref1 type. For individual settings see below. 1: **Transparent**; The value selected by 58.31 EFB act1 transparent source is sent as actual value 1. No scaling is applied. The 16-bit scaling is 1 = 1 unit. 2: **General**; The value selected by parameter 58.31 EFB act1 transparent source is sent as actual value 1 with a 16-bit scaling of 100 = 1 unit (e.g. integer and two decimals). 3: **Torque**; 01.17 Motor torque filtered is sent as actual value 1. The scaling is defined by 46.04 M1 torque scaling actual. 4: **Speed**; 01.01 Used motor speed filtered is sent as actual value 1. The scaling is defined by 46.02 M1 speed scaling actual. 5: **Current**; 27.05 Motor current is sent as actual value 1. The scaling is in percent of 99.11 M1 nominal current. 6: **Position**; Motor position is sent as actual value 1. See 90.06 Motor position scaled.						
	1 … 6	Auto	-	1 = 1	n	y	Parameter
58.29	**EFB act2 type**						
	Embedded fieldbus actual value 2 type. Selects the type/source and scaling of actual value 2 sent by the embedded fieldbus to the Modbus controller (e.g. PLC). See 58.28 EFB act1 type.						
	1 … 6	Auto	-	1 = 1	n	y	Parameter
58.30	**EFB status word transparent source**						
	Embedded fieldbus status word transparent source. Selects the source of the status word when 58.25 Control profile = Transparent. Other; source selection e.g. 06.15 Main Status Word. 0: Not selected; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
58.31	**EFB act1 transparent source**						
	Embedded fieldbus actual value 1 transparent source. Selects the source of actual value 1 sent by the embedded fieldbus to the Modbus controller (e.g. PLC), when 58.28 EFB act1 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
58.32	**EFB act2 transparent source**						
	Embedded fieldbus actual value 2 transparent source. Selects the source of actual value 2 sent by the embedded fieldbus to the Modbus controller (e.g. PLC), when 58.29 EFB act2 type = Transparent or General. **Other**; source selection e.g. a value from group 1. 0: **Not selected**; no source selected.						
	0 … 0	Not selected	-	1 = 1	n	y	Parameter
58.33	**Addressing mode**						
	Embedded fieldbus addressing mode. Defines the mapping between parameters and holding registers in the 400101 … 465535 Modbus register range. **Note**: Changes to 58.33 Addressing mode take effect after the unit is rebooted or the new setting is validated by 58.06 Communication control. 0: **Mode 0**; 16-bit values (groups 1 … 99, indexes 1 … 99): Register address = 400000 + 100 × parameter group + parameter index. For example, parameter 22.80 would be mapped to register 400000 + 2200 + 80 = 402280. 32-bit values (groups 1 … 99, indexes 1 … 99): Register address = 420000 + 200 × parameter group + 2 × parameter index. For example, parameter 22.80 would be mapped to register 420000 + 4400 + 160 = 424560. 1: **Mode 1**; 16-bit values (groups 1 … 255, indexes 1 … 255): Register address = 400000 + 256 × parameter group + parameter index. For example, parameter 22.80 would be mapped to register 400000 + 5632 + 80 = 405712. 2: **Mode 2**; 32-bit values (groups 1 … 127, indexes 1 … 255): Register address = 400000 + 512 × parameter group + 2 × parameter index. For example, parameter 22.80 would be mapped to register 400000 + 11264 + 160 = 411424.						
	0 … 2	Mode 0	-	1 = 1	n	y	Parameter
58.34	**Word order**						
	Embedded fieldbus word order. Selects in which order 16-bit registers of 32-bit parameters are transferred. For each register, the first byte contains the high order byte and the second byte contains the low order byte. Note: Changes to 58.34 Word order take effect after the drive is rebooted or the new setting is validated by 58.06 Communication control. 0: HI-LO; the 1st register contains the high order word. The 2nd register contains the low order word. 1: LO-HI; the 1st register contains the low order word. The 2nd register contains the high order word.						
	0 … 1	LO-HI	-	1 = 1	n	y	Parameter
58.101 … 58.124	**Data I/O 1 … Data I/O 24**						
	Embedded fieldbus I/O data. Defines the address in the drive, which the Modbus master accesses when it reads from or writes to register address 400001 … 400024.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	The master defines the type of the data (input/output). The value is transmitted in a Modbus frame consisting of two 16- bit words. If the value is 16-bit, it is transmitted in the LSW (least significant word). If the value is 32-bit, the subsequent parameter is also reserved for it and must be set to None. **Notes**: – Input means data transfer from the drive to the master (e.g. PLC). – Output means data from the master (e.g. PLC) to the drive. **Other**; source selection (10 ms update). 0: **None**; inactive. Data I/O is disabled. 1: **CW 16bit**; control word (16-bit) (2 ms update). Taken from 06.09 Used main control word./Send to 06.01 Main control word. 2: **Ref1 16bit**; reference 1 REF1 (16-bit) (2 ms update). Taken from 03.09 EFB reference 1./Send to 03.09 EFB reference 1. 3: **Ref2 16bit**; reference 2 REF2 (16-bit) (2 ms update). Taken from 03.10 EFB reference 2./Send to 03.10 EFB reference 2. 4: **SW 16bit**; status word (16-bit) (2 ms update). Taken from 06.15 Main status word./NA. 5: **Act1 16bit**; actual value 1 ACT1 (16-bit) (2 ms update). Depending on 58.28 EFB act1 type./NA. 6: **Act2 16bit**; actual value 2 ACT2 (16-bit) (2 ms update). Depending on 58.29 EFB act2 type./NA. 11: **CW 32bit**; control word (32-bit) (2 ms update). Taken from 06.09 Used main control word./Send to 06.01 Main control word. 12: **Ref1 32bit**; reference 1 REF1 (32-bit) (2 ms update). Taken from 03.09 EFB reference 1./Send to 03.09 EFB reference 1. 13: **Ref2 32bit**; reference 2 REF2 (32-bit) (2 ms update). Taken from 03.10 EFB reference 2./Send to 03.10 EFB reference 2. 14: **SW 32bit**; status word (32-bit) (2 ms update). Taken from 06.15 Main status word. 15: **Act1 32bit**; actual value 1 ACT1 (32-bit) (2 ms update). Depending on 58.28 EFB act1 type./NA. 16: **Act2 32bit**; actual value 2 ACT2 (32-bit) (2 ms update). Depending on 58.29 EFB act2 type./NA. 21: **CW2 16bit**; status word 2 (16-bit) (2 ms update). Taken from ??????./Send to ??????. 24: **SW2 16bit**; status word 2 (16-bit) (2 ms update). Taken from ??????./NA. 31: **RO/DIO control word**; see 10.99 RO/DIO control word. Taken from 10.99 RO/DIO control word./Send to 10.99 RO/DIO control word. 32: **AO1 data storage**; see 13.91 AO1 data storage. Taken from 13.91 AO1 data storage./Send to 13.91 AO1 data storage. 33: **AO2 data storage**; see 13.92 AO2 data storage. Taken from 13.92 AO2 data storage./Send to 13.92 AO2 data storage. 40: **Feedback data storage**; see 40.91 Feedback data storage. Taken from 40.91 Feedback data storage./Send to 40.91 Feedback data storage. 41: **Setpoint data storage**; see 40.92 Setpoint data storage. Taken from 40.92 Setpoint data storage./Send to 40.92 Setpoint data storage.						
	0 … 41	None	-	1 = 1	n	y	Parameter

60 DDCS Communication

DDCS communication configuration.
The DDCS protocol is used in the communication between:
Drives in a master-follower configuration.
Drives and an external controller such as an AC 800M.
All of the above utilize a fiber optic link, which requires FDCO modules. Master-follower and external controller communication can also be implemented through shielded twisted-pair cable via connector XD2D (drive-to-drive link) of the drive.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
60.01							
60.xx							

61 D2D and DDCS transmit data

Defines the data sent from the drive to the DDCS/D2D link.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
61.01							
61.xx							

62 D2D and DDCS receive data

Defines the data sent from the DDCS/D2D link to the drive.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
62.01							
62.xx							

70 DCSLink Communication

Defines the DCSLink communication.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
70.01							
70.xx							

74 … 89 Application specific groups

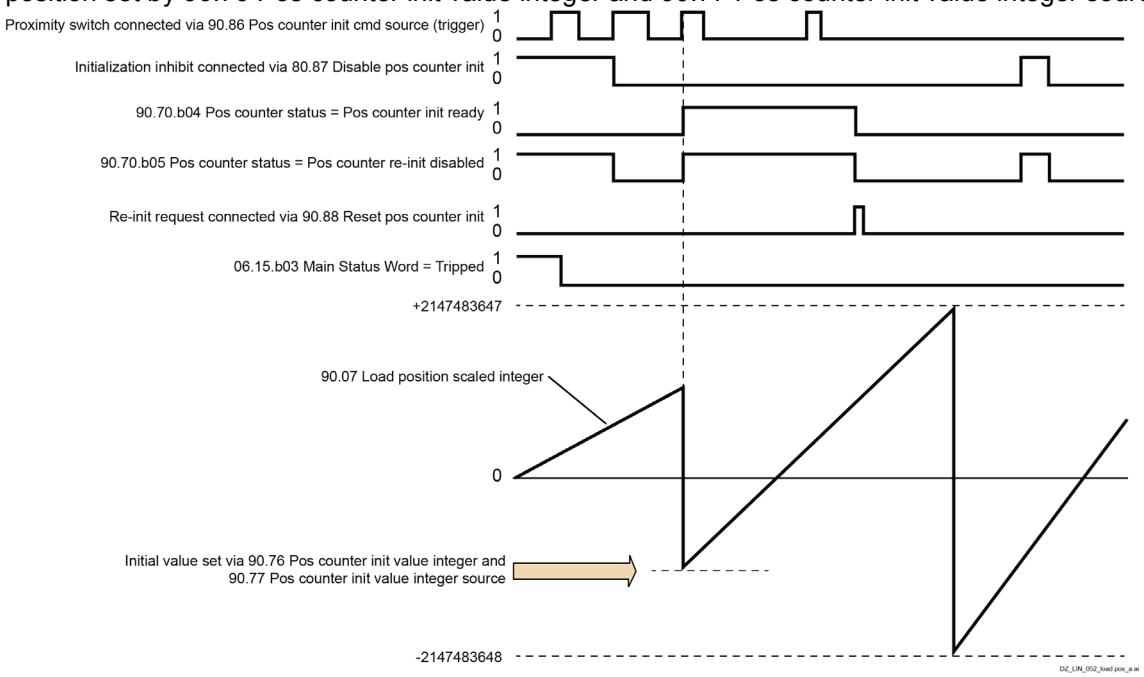
Groups used for application programming.

90 Feedback selection

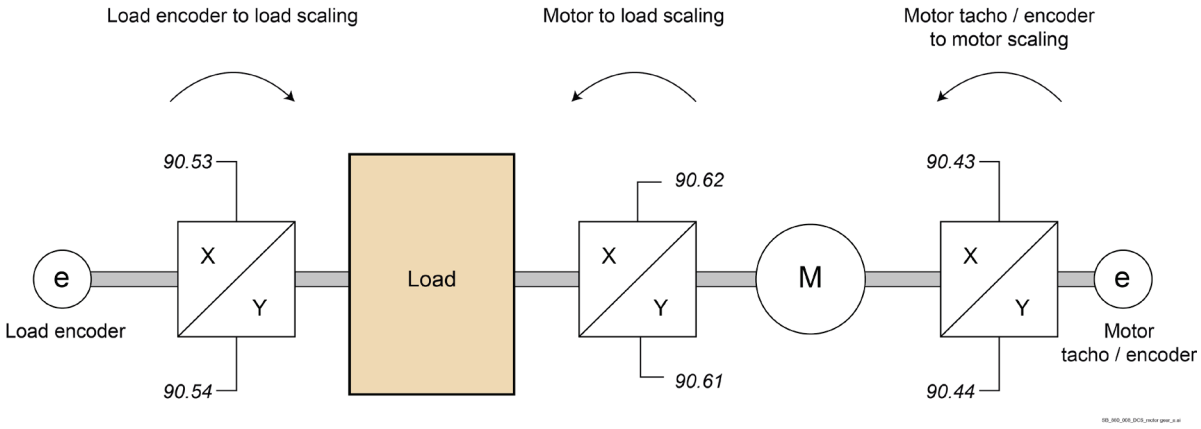
Motor and load feedback configuration.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
90.01	**Motor speed for control**						
	Measured (tacho/encoder), EMF or external motor speed used for control. Displays measured, EMF or external motor speed depending on the used feedback. See 90.41 M1 feedback selection. For measured or EMF motor speed a filter time constant is defined by 46.11 Filter time motor speed. In case a measured or external feedback is selected, it is also scaled by the motor gear function. See 90.43 Motor gear numerator and 90.44 Motor gear denominator.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
90.02	**Motor position**						
	Motor position. Displays the motor position, within one revolution, received from the source selected by 90.41 Motor feedback selection. This parameter is only valid for encoder speed feedback. An encoder feedback is scaled by the motor gear function. See 90.43 Motor gear numerator and 90.44 Motor gear denominator.						
	0.00000000 … 1.00000000	-	rev	32767 = 1 rev	y	n	Signal
90.03	**Load speed**						
	Measured (tacho/encoder), EMF or external load speed. Displays measured, EMF or external load speed depending on the used feedback. See 90.51 Load feedback selection. A filter time constant is defined by 90.52 Load speed filter time. In case an encoder feedback from the load is selected, it is also scaled by the load gear function. See 90.53 Load gear numerator and 90.54 Load gear denominator. In case a feedback from the motor is used, it is inversely scaled by 90.61 Gear numerator and 90.62 Gear denominator (90.62 divided by 90.61).						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
90.04	**Load position**						
	Load position. Displays the (rotational) load position received from the source selected by 90.51 Load feedback selection. This parameter is only valid for encoder speed feedback. In case an encoder feedback from the load is selected, it is also scaled by the load gear function. See 90.53 Load gear numerator and 90.54 Load gear denominator. In case a feedback from the motor is used, it is inversely scaled by 90.61 Gear numerator and 90.62 Gear denominator (90.62 divided by 90.61). Offset and resolution are defined by 90.56 Load position offset and 90.57 Load position resolution.						

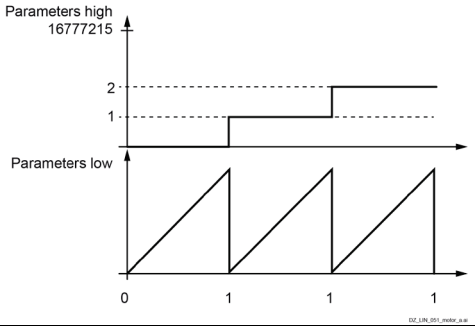
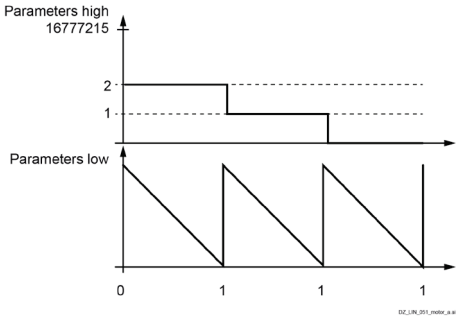
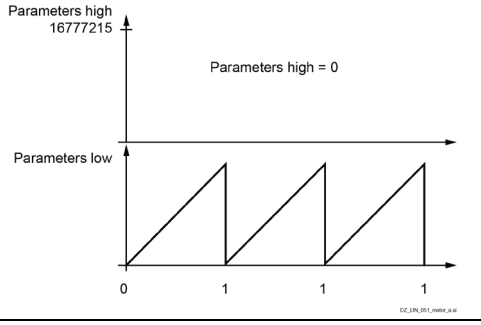
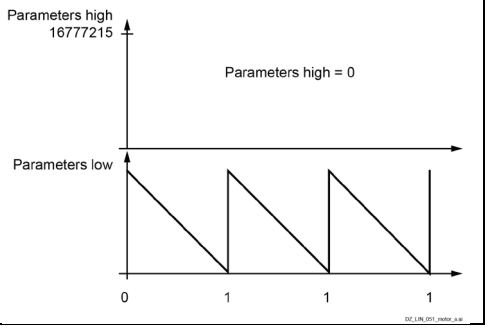
Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
90.05	**Load position scaled**						
	Scaled (translatory) load position in decimal format. Displays the output of the position counter function in decimal format. The position is relative to the initial position set by 90.80 Pos counter init value and 90.81 Pos counter init value. The number of decimal places is defined by 90.82 Pos counter decimals. **Note**: This is a floating-point parameter and the accuracy is compromised near the ends of the range. Consider using 90.07 Load position scaled integer instead.						
	-2147483.648 … 2147483.647	-	-	1 = 1	y	n	Signal
90.06	**Motor position scaled**						
	Scaled motor position. Displays the calculated (rotational) motor position. The axis mode (linear or rollover) and resolution are defined by 90.48 Motor position axis mode and 90.49 Motor position resolution. **Note**: The position value can be sent on a fast time level to the fieldbus controller by selecting Position in either 50.07 FBA A actual 1 type, 50.08 FBA A actual 2 type, 50.37 FBA B actual 1 type or 50.38 FBA B actual 2 type.						
	-2147483.648 … 2147483.647	-	-	1 = 1	y	n	Signal
90.07	**Load position scaled integer**						
	Scaled (translatory) load position in integer format. Displays the output of the position counter function as an integer. The position is relative to the initial position set by 90.76 Pos counter init value integer and 90.77 Pos counter init value integer source.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal

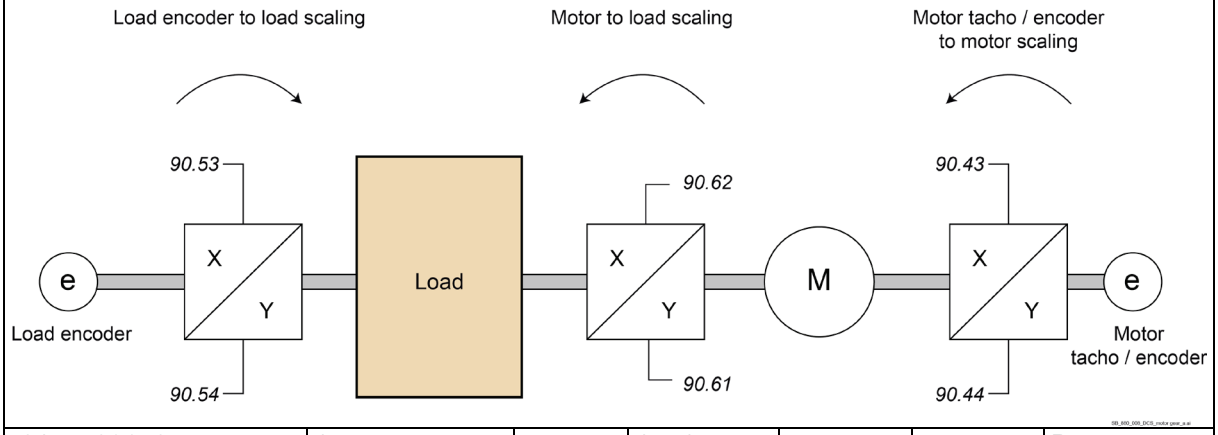


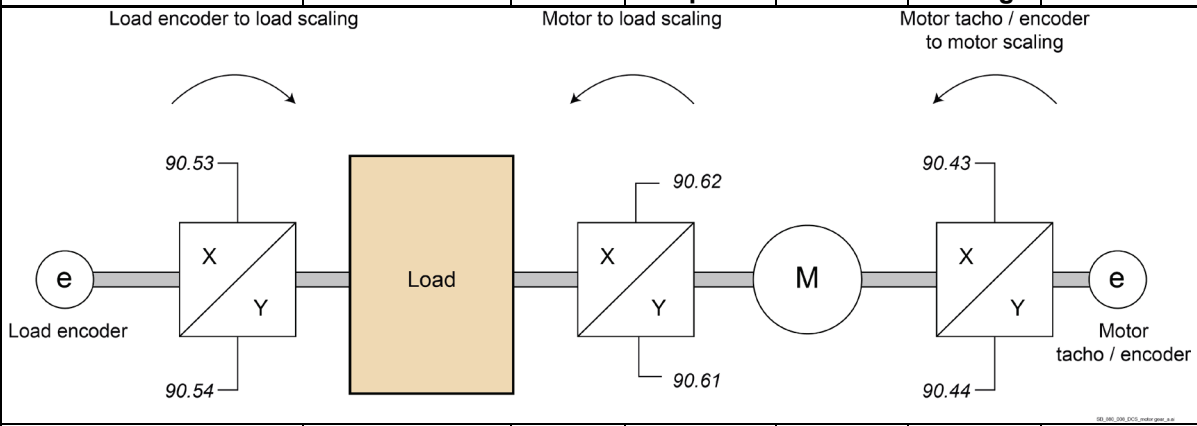
Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
90.10	**Encoder 1 speed**						
90.11	**Encoder 1 position**						
90.12	**Encoder 1 multiturn revolutions**						
90.13	**Encoder 1 revolution extension**						
90.14	**Encoder 1 position raw**						
90.15	**Encoder 1 revolutions raw**						
90.20	**Encoder 2 speed**						
90.21	**Encoder 2 position**						
90.22	**Encoder 2 multiturn revolutions**						
90.23	**Encoder 2 revolution extension**						
90.24	**Encoder 2 position raw**						
90.25	**Encoder 2 revolutions raw**						
90.26	**Motor revolution extension**						
	Motor revolution count extension. Displays the revolution count extension for the motor. The counter is incremented, when the position wraps around in positive direction and decremented in negative direction. See 90.41 Motor feedback selection.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
90.27	**Load revolution extension**						
	Load revolution count extension. Displays the revolution count extension for the load. The counter is incremented, when the position wraps around in positive direction and decremented in negative direction. See 90.51 Load feedback selection.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
90.40	**External speed**						
	External speed feedback. If 90.41 M1 feedback selection = External this parameter can be written to by e.g. Adaptive Program, application program or overriding control.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
90.41	**M1 feedback selection**						
	Motor 1 speed feedback selection. Selects the motor speed feedback for motor control. 1: **OnBoard encoder**; the speed feedback is measured by means of a pulse encoder connected to the SDCS-CON-H01. See group 94. **Encoder 1Encoder 2**4: **Tacho**; the speed feedback is measured by means of an analog tacho connected to the SDCS-CON-H01. See group 94. 5: **EMF**; the speed feedback is calculated from the EMF (base speed area) and field current (field weakening area). Thus, it is possible to go into the field weakening range, but with a low performance compared to encoder or analog tacho feedback. **Commissioning hint**: The flux linearization must be tuned manually. 6: **External**; 90.40 External speed is updated by Adaptive Program, application program or overriding control. 7 = **EMF voltage**; the speed feedback is calculated from the EMF only. Thus, no field weakening is possible.						
	1 … 7	EMF	-	1 = 1	n	y	Parameter

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
90.42	**Motor speed filter time**							
	Motor speed feedback filter time constant. Filter time constant for 90.01 Motor speed for control. **Note**: There are three different filters for speed feedback and speed error: – 90.42 Motor speed filter time is filtering the speed feedback and should be used for filter time constants smaller than 30 ms. – 24.18 Speed error filter time 1 and 24.19 Speed error filter time 2 are filtering the speed error and should be used for filter time constants greater than 30 ms. Set 24.18 Speed error filter time 1 = 24.19 Speed error filter time 2.							
		0 … 32500	5	ms	1 = 1 ms	n	y	Parameter
90.43	**Motor gear numerator**							
	Motor gear numerator. 90.43 Motor gear numerator and 90.44 Motor gear denominator define a gear function between motor speed feedback and motor control. The gear function is used to correct a difference between motor and measured (tacho/encoder) speed, for example if the tacho/encoder is not mounted directly on the motor shaft. $\frac{Motor\ speed}{Measured\ (tacho/encoder)\ speed} = \frac{90.43\ Motor\ gear\ numerator}{90.44\ Motor\ gear\ denominator}$  							
		-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.44	**Motor gear denominator**							
	Motor gear denominator. See 90.43 Motor gear numerator.							
		-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.48	**Motor position axis mode**							
	Axis type for the motor position. Selects the axis type for the motor position measurement. 0: **Linear**; linear. 1: **Rollover**; the value is between 0 and 1 revolutions, and rolls over at 360 degrees.							

Setting	Parameters low	Parameters high
	90.11 Encoder 1 position 90.21 Encoder 2 position	90.12 Encoder 1 multiturn revolutions 90.13 Encoder 1 revolution extension

<table>
<tr><td rowspan="3">Index</td><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">
<table>
<tr><td></td><td>94.16 OnBoard encoder position</td><td>90.22 Encoder 2 multiturn revolutions
90.23 Encoder 2 revolution extension
94.18 OnBoard encoder revolution</td></tr>
<tr><td>Linear</td><td>0.00000000 == 0° and 1.00000000 == 360°</td><td>1 == 1 revolution</td></tr>
<tr><td></td><td>Forward direction:
 
</td><td>Reverse direction:
 
</td></tr>
<tr><td>Rollover</td><td>0.00000000 == 0° and 1.00000000 == 360°</td><td>Always zero</td></tr>
<tr><td></td><td>Forward direction:
 
</td><td>Reverse direction:
 
</td></tr>
</table>
</td></tr>
<tr><td></td><td>0 … 1</td><td>Rollover</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>90.49</td><td colspan="7">Motor position resolution</td></tr>
<tr><td></td><td colspan="7">Motor position resolution.
Defines how many bits are used for the motor position count within one revolution. For example, with the setting of 16, the position value is multiplied by 2^{16} = 65536 to be displayed in 90.06 Motor position scaled and thus, also or for the fieldbuses.</td></tr>
<tr><td></td><td>0 … 31</td><td>16</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>90.51</td><td colspan="7">Load feedback selection</td></tr>
<tr><td></td><td colspan="7">Load speed feedback selection.
Selects the load speed feedback and position feedbacks for the control. The values are scaled by 90.53 Load gear numerator and 90.54 Load gear denominator.
0: None; no load feedback selected.
1: OnBoard encoder; load feedbacks are updated based on the speed and position values read from a pulse encoder connected to the SDCS-CON-H01. See group 94.
Encoder 1Encoder 28: Motor feedback; the source selected by 90.41 Motor feedback selection can also be used for load feedback. Any difference between the motor and load speed/position can be compensated using the inverted ratio between 90.61 Gear numerator and 90.62 Gear denominator (90.62 divided by 90.61).</td></tr>
<tr><td></td><td>0 … 8</td><td>None</td><td>-</td><td>1 = 1</td><td>n</td><td>y</td><td>Parameter</td></tr>
<tr><td>90.52</td><td colspan="7">Load speed filter time</td></tr>
<tr><td></td><td colspan="7">Load speed feedback filter time constant.
Filter time constant for 90.03 Load speed.</td></tr>
<tr><td></td><td>0 … 32500</td><td>5</td><td>ms</td><td>1 = 1 ms</td><td>n</td><td>y</td><td>Parameter</td></tr>
</table>

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
90.53	**Load gear numerator**						
	Load (e.g. driven equipment) gear numerator. 90.53 Load gear numerator and 90.54 Load gear denominator define a gear function between load speed and encoder feedback selected by 90.51 Load feedback selection. The gear function is used to correct a difference between load and encoder speed, for example if the encoder is not mounted directly on the rotated machinery. $\frac{Load\ speed}{Encoder\ speed} = \frac{90.53\ Load\ gear\ numerator}{90.54\ Load\ gear\ denominator}$						
							
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.54	**Load gear denominator**						
	Load (e.g. driven equipment) gear denominator. See 90.53 Load gear numerator.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.56	**Load position offset**						
	Load side position offset. Defines a load side position offset.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.57	**Load position resolution**						
	Load position resolution. Defines how many bits are used for the load position count within one revolution. For example, with the setting of 16, the position value is multiplied by 2^{16} = 65536 to be displayed in 90.04 Load position.						
	0 … 31	16	-	1 = 1	n	y	Parameter
90.61	**Gear numerator**						
	Gear numerator (motor side). 90.61 Gear numerator and 90.62 Gear denominator define a gear function between motor and load speed. $\frac{Motor\ speed}{Load\ speed} = \frac{90.61\ Gear\ numerator}{90.62\ Gear\ denominator}$						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	Load encoder to load scaling / Motor to load scaling / Motor tacho / encoder to motor scaling  						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.62	**Gear denominator** Gear denominator (load side). See 90.61 Gear numerator.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.63	**Feed constant numerator** Feed constant numerator. 90.63 Feed constant numerator and 90.64 Feed constant denominator define the feed constant for the position calculation. $\frac{90.63\ Feed\ constant\ numerator}{90.62\ Feed\ constant\ denominator}$ The feed constant converts rotational motion into translatory motion. E.g., the feed constant is the distance the load moves during one turn of the motor shaft. See 90.05 Load position scaled.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.64	**Feed constant denominator** Feed constant denominator. See 90.63 Feed constant numerator.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.70	**Pos counter status** Position counter status word. Displays the status of the position counter. Bit assignment:						

Bit	Name	Value	Remarks
0	OnBoard encoder feedback	1	OnBoard encoder is selected as load feedback source.
1			
2			
3	Motor feedback	1	Motor is feedback selected as load feedback source.
4	Pos counter init ready	1	Position counter is successfully initialized.
		0	Position counter is not initialized or encoder feedback was lost. Fresh counter initialization is recommended.

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
			Note: Always zero if 90.85 Pos counter sync mode = Cyclic.				
	5 Pos counter re-init disabled	1	Position counter initialization is prevented. See 90.87 Disable pos counter init.				
	6 Position data inaccurate	1	Encoder feedback intermittent or lost. If the drive is stopped, the position counting will continue based on encoder data after the connection is restored.				
	7 … 15 reserved						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
90.73	**Pos counter error and boot activation**						
	Position counter, error handling. Selects how the position counter reacts to loss of load feedback. 0: **Request re-initialization**; 90.70.b04 Pos counter status is cleared. Re-initialization of the position counter is recommended. 1: **Continue from previous value**; the position counting resumes from the previous value over a loss of load feedback or drive reboot. 90.70.b04 Pos counter status is not cleared, but 90.70.b06 Pos counter status is set to indicate that an error has occurred.						
	0 … 1	Request re-initialization	-	1 = 1	n	y	Parameter
90.76	**Pos counter init value integer**						
	Position counter, initial position integer value. Defines an initial position or distance for the position counter as an integer value. For this, set 90.77 Pos counter init value integer source = Pos counter init value integer. Result see 90.07 Load position scaled integer.						
	-2147483648 … 2147483647	1	-	1 = 1	n	y	Parameter
90.77	**Pos counter init value integer source**						
	Position counter, source of the initial position integer value. Selects the source of the initial position integer value. When the device selected by 90.86 Pos counter init cmd source (trigger) activates, the selection in 90.77 Pos counter init value integer source becomes the position of the load. **Other**; source selection. 0: **Zero**; 0. 1: **Pos counter init value integer**; see selection in 90.76 Pos counter init value integer.						
	0 … 1	Zero	-	1 = 1	n	y	Parameter
90.80	**Pos counter init value**						
	Position counter, initial position value. Defines an initial position or distance for the position counter as a decimal number. For this, set 90.81 Pos counter init value source = Pos counter init value. The number of decimal places is defined by 90.82 Pos counter decimals. Result see 90.05 Load position scaled.						
	-2147483.648 … 2147483.647	1	-	1 = 1	n	y	Parameter
90.81	**Pos counter init value source**						
	Position counter, source of the initial position value. Selects the source of the initial position value. When the device selected by 90.86 Pos counter init cmd source (trigger) activates, the selection in 90.81 Pos counter init value source becomes the position of the load. **Other**; source selection. 0: **Zero**; 0. 1: **Pos counter init value**; see selection in 90.80 Pos counter init value.						
	0 … 1	Zero	-	1 = 1	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
90.82	**Pos counter decimals**						
	Position counter, number of decimal places. Scales the values of 90.05 Load position scaled and 90.80 Pos counter init value when written to or read by an external source (e.g. fieldbus). The setting corresponds to the number of decimal places. **Examples with a setting of 3:** – An integer value written into 90.80 Pos counter init value by an external source is divided by 1000. The value written is 12345 and the value shown is 12.345. – The value of 90.05 Load position scaled is multiplied by 1000 when read by an external source. The value shown is 12.345 and the value written is 12345.						
	0 … 9	3	-	1 = 1	n	y	Parameter
90.85	**Pos counter sync mode**						
	Position counter, synchronization mode. Position counter synchronization mode for encoder feedback. 0: **Single**; the next synchronization of the encoder feedback must be prepared by resetting 90.70.b04 Pos counter status using 90.88 Reset pos counter init ready. 1: **Cyclic**; the synchronization of the encoder feedback happens at every occurrence of the synchronization event.						
	0 … 1	Single	-	1 = 1	n	y	Parameter
90.86	**Pos counter init cmd source (trigger)**						
	Position counter, source of the initialization command. Selects a digital source e.g. a limit switch that initializes the position counter. When the digital source triggers, the selection in 90.77 Pos counter init value integer source becomes the position of the load. 0 = No trigger. 0 → 1 = Trigger. **Note**: The position counter initialization can be prevented by 90.87 Disable pos counter init. **Other [bit]**; source selection. 0: **No trigger**; 0, normal operation. 1: **Trigger**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status. 50: **Z OnBoard**; taken from the zero channel of the OnBoard encoder. 51: **Z OnBoard forward**; taken from zero channel the OnBoard encoder and the motor is rotating forward. See 06.21.b01 Speed control status word. 52: **Z OnBoard reverse**; taken from zero channel the OnBoard encoder and the motor is rotating reverse. See 06.21.b02 Speed control status word. **Z encoder 1Z encoder 1 forwardZ encoder 1 reverseZ encoder 2Z encoder 2 forwardZ encoder 2 reverse**						
	0 … 58	No trigger	-	1 = 1	n	y	Parameter
90.87	**Disable pos counter init**						
	Position counter, source of the initialization inhibit command. Selects a source that prevents the initialization of the position counter. Thus, it blocks the synchronization command. 0 = Release. 1 = Disable. **Other [bit]**; source selection. 0: **Release**; 0, normal operation.						

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	1: **Disable**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	Release	-	1 = 1	n	y	Parameter
90.88	**Reset pos counter init ready**						
	Position counter, source of the initialization command reset. Selects a source that enables a new initialization of the position counter. It resets 90.70.b04 Pos counter status. 0 = No reset. 0 → 1 = Reset. **Other [bit]**; source selection. 0: **No Reset**; 0. 1: **Reset**; 1. 3: **DI1**; 10.02.b00 DI delayed status. 4: **DI2**; 10.02.b01 DI delayed status. 5: **DI3**; 10.02.b02 DI delayed status. 6: **DI4**; 10.02.b03 DI delayed status. 7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status.						
	0 … 19	No Reset	-	1 = 1	n	y	Parameter

91 Encoder module settings

Configuration of the encoder interface modules.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
91.01							
91.xx							

92 Encoder 1 configuration

Settings for encoder 1.

Notes:

- The contents of the parameter group varies according to the selected encoder type.
- It is recommended that encoder connection 1 (this group) is used whenever possible since the data received through this interface is fresher than the data received through connection 2 (group 93).

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
92.01							
92.xx							

93 Encoder 2 configuration

Settings for encoder 2.

Notes:

- The contents of the parameter group varies according to the selected encoder type.
- It is recommended that encoder connection 1 (group 92) is used whenever possible since the data received through that interface is fresher than the data received through connection 2 (this group).

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
93.01							
93.xx							

94 OnBoard speed feedback configuration

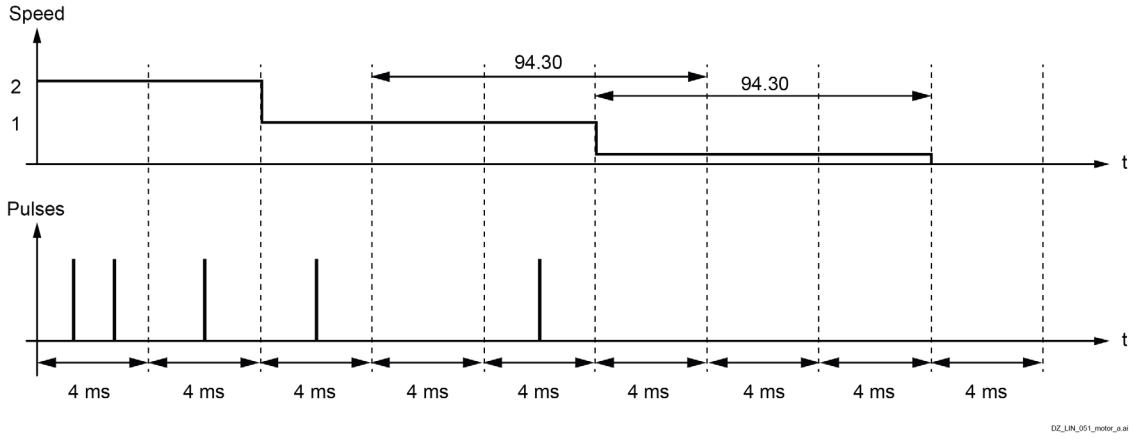
Settings for analog tacho and OnBoard encoder.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
94.01	**EMF speed**						
	EMF speed. Displays the speed feedback calculated from the EMF in rpm.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
94.02	**Tacho voltage**						
	Value of XTAC (tacho terminals). Displays the value of the tacho connected to XTAC in V.						
	-3250.0 … 3250.0	-	V	10 = 1 V	y	n	Signal
94.03	**Tacho speed**						
	Tacho speed. Displays the speed feedback measured by the tacho in rpm.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
94.04	**OnBoard encoder speed**						
	OnBoard encoder speed. Displays the speed feedback measured by the OnBoard encoder in rpm.						
	-30000.00 … 30000.00	-	rpm	See 46.02	y	n	Signal
94.07	**M1 tacho type**						
	Type of connected tacho. Depending on the type of the connected tacho, a hardware filter of 40 ms is activated. 0: **DC tacho**; filter disabled. 1: **AC tacho**; filter enabled.						
	0 … 1	DC tacho	-	1 = 1	n	y	Parameter
94.08	**M1 tacho voltage at 1000 rpm**						
	Motor 1 tacho voltage at 1000 rpm. A tacho generates this voltage at a speed of 1000 rpm, see tacho nameplate. It is used to calculate 94.10 M1 tacho tuning gain. Measure and set the value using 99.20 Tuning requested = Speed feedback assistant. – 94.08 M1 tacho voltage at 1000 rpm ≥ 1 V, the value is set by hand. – 94.08 M1 tacho voltage at 1000 rpm = 0 V, the value is to be measured by means of the speed feedback assistant. – 94.08 M1 tacho voltage at 1000 rpm ≤ -1 V, the value was successfully measured and set by means of the speed feedback assistant.						
	-270.0 … 270.0	60.0	V	10 = 1 V	n	y	Parameter
94.09	**M1 tacho max displayable speed**						
	Motor 1 maximum displayable speed. Internally used maximum tacho speed for motor 1. This value is depending on the tacho output voltage, see 94.08 M1 tacho voltage at 1000 rpm, and the maximum speed of the drive system. For maximum speed, see 46.02 M1 speed scaling actual, 30.11 M1 minimum speed, 30.12 M1 maximum speed, 31.30 M1 overspeed trip margin and 99.14 M1 nominal (base) speed. The value is only valid if written to by: – Via 99.20 Tuning requested = Speed feedback assistant. – Via 94.08 M1 tacho voltage at 1000 rpm. – Via parameter download.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter
94.10	**M1 tacho tuning gain**						
	Motor 1 tacho tuning gain. Internally used tacho gain tuning for motor 1. The value is only valid if written to by: – Via 99.20 Tuning requested = Speed feedback assistant. – Via 94.08 M1 tacho voltage at 1000 rpm. – Via parameter download.						
	0 … 5	5	-	1 = 1	n	y	Parameter
94.11	**M1 tacho fine-tuning adjust**						
	Motor 1 tacho fine-tuning adjust. Internally used fine-tuning adjust of the tacho. The value equals the speed feedback measured by means of a hand held tacho. Set the value of 94.11 M1 tacho fine-tuning adjust to the measured speed feedback of a hand held tacho. The value is only valid if written to by: – Via 99.20 Tuning requested = Tacho fine-tuning. During the tacho fine-tuning 90.41 M1 feedback selection is automatically forced to EMF. – Via parameter download. **Attention**: The value of 94.11 M1 tacho fine-tuning adjust has to be the measured speed feedback of a hand held tacho and not to the delta between speed reference and measured speed.						
	-30000.00 … 30000.00	0.00	rpm	See 46.02	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
94.12	**M1 tacho fine-tuning factor**						
	Motor 1 tacho fine-tuning factor. Internally used tacho fine-tuning factor for motor 1. The value is only valid if written to by: – Via 99.20 Tuning requested = Tacho fine-tuning. During the tacho fine-tuning 90.41 M1 feedback selection is automatically forced to EMF. – Via parameter download.						
	0.30 … 3.00	1.00	-	100 = 1	n	y	Parameter
94.16	**OnBoard encoder position**						
	OnBoard encoder position within one revolution. Displays the OnBoard encoder position, within one revolution. See 90.48 Motor position axis mode.						
	0.00000000 … 1.00000000	-	rev	32767 = 1 rev	y	n	Signal
94.18	**OnBoard encoder revolution extension**						
	OnBoard encoder revolution count extension. Displays the revolution count extension for the OnBoard encode. See 90.48 Motor position axis mode. The counter is incremented, when the encoder position wraps around in positive direction and decremented in negative direction. See 90.11 Encoder 1 position.						
	-2147483648 … 2147483647	-	-	1 = 1	y	n	Signal
94.23	**OnBoard encoder pulses/revolution**						
	OnBoard encoder pulses per revolution (ppr). Defines the OnBoard encoder pulses per revolution, see encoder nameplate.						
	0 … 65535	2048	ppr	1 = 1 ppr	n	y	Parameter
94.24	**OnBoard encoder type**						
	OnBoard encoder type. Selects the type of the OnBoard encoder. 0: **Quadrature**; quadrature encoder with two channels, A and B. 1: **Single-track**; single-track encoder with one channel, A. **Note**: With this setting, the measured speed value is always positive regardless of direction of rotation.						
	0 … 1	Quadrature	-	1 = 1	n	y	Parameter
94.25	**OnBoard encoder speed calculation mode**						
	OnBoard encoder speed calculation mode. Selects the speed calculation mode. 0: **A&B all**; channels A and B rising and falling edges are used for the speed calculation and direction. Set 94.24 OnBoard encoder type = Quadrature. The speed evaluation factor = 4. 1: **A all, B direction**; channel A rising and falling edges are used for speed calculation. Channel B defines the direction of rotation. Set 94.24 OnBoard encoder type = Quadrature. The speed evaluation factor = 2. 2: **A rising, B direction**; channel A rising edges are used for speed calculation. Channel B defines the direction of rotation. Set 94.24 OnBoard encoder type = Quadrature. The speed evaluation factor = 1. 3: **A falling, B direction**; channel A falling edges are used for speed calculation. Channel B defines the direction of rotation. Set 94.24 OnBoard encoder type = Quadrature. The speed evaluation factor = 1. 4: **A all**; channel A rising and falling edges are used for speed calculation. EMF speed feedback defines the direction of rotation. Can be used, if channel B is defective. Set 94.24 OnBoard encoder type = Single-track. The speed evaluation factor = 2.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	5: **B all**; channel B rising and falling edges are used for speed calculation. EMF speed feedback defines the direction of rotation. Can be used, if channel A is defective. Set 94.24 OnBoard encoder type = Single-track. The speed evaluation factor = 2.						
	0 … 5	A&B all	-	1 = 1	n	y	Parameter
94.26	**OnBoard encoder transient filter**						
	OnBoard encoder transient filter. Activates the transient filtering for the OnBoard encoder. Thus, unintentional changes in direction of rotation are ignored. Should be activated when the connected mechanics are vibrating heavely. 0: **0.0 µs**; filter not active. 1: **3.2 µs**; fast filter time. 2: **6.4 µs**; medium filter time. 3: **12.8 µs**; slow filter time.						
	0 … 3	0.0 µs	-	1 = 1	n	y	Parameter
94.29	**OnBoard encoder cable fault mode**						
	OnBoard encoder, mode for a cable fault. Selects which encoder track channels are monitored for wiring faults. In case of problems, the event generates fault A7E1 Speed feedback device. One track is the combination of A+/A-, B+/B- or Z+/Z-. 0: **Tracks A+/A- B+/B-**; tracks A+/A- and B+/B-. 1: **Tracks A+/A-, B+/B-, Z+/Z-**; tracks A+/A-, B+/B- and Z+/Z-.						
	0 … 1	Tracks A, B, Z	-	1 = 1	n	y	Parameter
94.30	**OnBoard encoder maximum pulse waiting time**						
	OnBoard encoder, maximum pulse waiting time. When an encoder is used as speed feedback device the actual speed is measured by counting pulses per cycle time. The base (minimum) cycle time for the measurement is synchronized with the mains (every 3.3 ms or 2.77 ms). 94.30 OnBoard encoder maximum pulse waiting time determines the pulse waiting time for the speed feedback calculation of the OnBoard encoder. If no pulse edges are detected within the pulse waiting time, the measured speed feedback is set to zero. Increasing the time can improve measuring performance especially at low, near zero speeds.						



Notes:

– Formula to calculate the maximum speed using an encoder:

$$n_{max}\,[rpm] = \frac{300\ kHz\ \times 60\ s}{ppr}$$

with: ppr = pulses per revolution, see 94.23 OnBoard encoder pulses/revolution.
300 kHz are the maximum allowed input frequency.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	– Formula to calculate the minimum speed resolution using an encoder: $n_{max}\ [rpm] = \frac{60\ s}{k\ \times\ ppr\ \times t_{cycle}}$ with: k = speed evaluation factor, see 94.25 OnBoard encoder speed calculation mode. ppr = pulses per revolution, see 94.23 OnBoard encoder pulses/revolution. t_{cycle} = cycle time of the speed feedback measurement, either 3.3 ms or 2.77 ms. – Only the speed measurement is affected. The position is updated whenever a new pulse edge is detected. When the measured speed from the interface is zero, the drive updates its speed data based on position changes.						
	0 … 200	3	ms	1 = 1 ms	n	y	Parameter

95 HW configuration

Various hardware-related settings.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
95.15	**Set: Special HW settings**						
	Bit | Name | Value | Remarks						
95.24	**Service mode** Drive service mode. The service mode contains Type code settings, thyristor test and firing pulse test procedures. Service mode is automatically reset to Normal mode after the deleting the application or thyristor test is finished/failed. In case errors occur during the selected procedure, AF90 Autotuning is generated. The reason of the error can be seen in the auxiliary codes and in 05.22 Diagnostic. Service mode = Set: Type code or Firing pulses Vxx has to be set back to Normal mode by the user. **Note**: The reference chain is blocked while 95.24 Service mode ≠ Normal mode. 0: **Normal mode**; normal operating mode depending on 99.06 Operation mode. 1: **Set: Type code**; enables setting of following parameters: – 28.61 Set: M1 field exciter current scaling. – 42.66 Set: M2 field exciter current scaling. – 95.15 Set: Special HW settings. – 95.25 Set: Type code. – 95.27 Set: Drive DC current scaling. – 95.28 Set: Drive AC voltage scaling. (see 96.16) 5: **Thyristor test**; starts a complete Thyristor test. All thyristors are tested. The result is shown in 05.22 Diagnostic. 11: **Firing pulses V11**; only firing pulses for thyristor V11 are released. 12: **Firing pulses V12**; only firing pulses for thyristor V12 are released. 13: **Firing pulses V13**; only firing pulses for thyristor V13 are released. 14: **Firing pulses V14**; only firing pulses for thyristor V14 are released. 15: **Firing pulses V15**; only firing pulses for thyristor V15 are released. 16: **Firing pulses V16**; only firing pulses for thyristor V16 are released. 21: **Firing pulses V21**; only firing pulses for thyristor V21 are released. 22: **Firing pulses V22**; only firing pulses for thyristor V22 are released. 23: **Firing pulses V23**; only firing pulses for thyristor V23 are released. 24: **Firing pulses V24**; only firing pulses for thyristor V24 are released. 25: **Firing pulses V25**; only firing pulses for thyristor V25 are released. 26: **Firing pulses V26**; only firing pulses for thyristor V26 are released.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0 …26	Normal mode					Parameter

95.25 Set: Type code

Set the type code of the drive.
Contains the drives current-, voltage-, temperature measurement and its quadrant type. 95.25 Set: Type code is preset in the factory and is write protected. To enable use 95.24 Service mode = Set: Type code. The change of the type code is immediately taken over.
95.24 Service mode has to be set back to Normal mode by the user.
0: **None**; the type code is set by the user, see 95.26 Set: Drive block bridge 2, 95.27 Set: Drive DC current scaling, 95.28 Set: Drive AC voltage scaling and 95.29 Set: Drive max bridge temperature e.g. for rebuild kits.
1: **S01-0020-04**; type code, see table.
…
152: **S02-5200-05**; type code, see table.

The drive's basic type code: **DCS880-AAB-CCCC-DDEF**			
Product family:	DCS880		DC converter
Product type:	AA	= S0	Standard converter module
		= R0	Rebuild kit
		= E0	Panel solution
		= A0	Enclosed converter
Bridge type:	B	= 1	Single bridge (2-Q)
		= 2	2 anti-parallel bridges (4-Q)
Module type:	CCCC	=	Rated DC current (IP00)
Rated AC voltage:	DD	= 04	230 V_{AC} … 415 V_{AC}
		= 05	230 V_{AC} … 525 V_{AC}
		= 06	270 V_{AC} … 600 V_{AC}
		= 07	315 V_{AC} … 690 V_{AC}
		= 08	360 V_{AC} … 800 V_{AC}
		= 10	450 V_{AC} … 990 V_{AC}
		= 12	540 V_{AC} … 1200 V_{AC}
Power connection:	E	= X	Standard H1 … H7
		= R	Right side H8
		= L	Left side H8
Revision code:	F	= 0	1st generation

Attention: When using H1 … H5 modules the current and voltage range of the type code setting is limited to max 1190 A_{DC} and max 600 V_{AC}.

0 … 1000	None	-	1 = 1	n	n	Parameter

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
95.26	**Set: Drive block bridge 2**						
	Set the quadrant type of the drive (1 or 2 bridges). Bridge 2 can be blocked. 0: **Auto**; operation mode is taken from 95.25 Set: Type code. If 95.25 Set: Type code = None set 95.26 Set: Drive block bridge 2 = Block bridge 2 or Release bridge 2. 1: **Block bridge 2**; block bridge 2 (≡ 2-Q operation), e.g. for 2-Q rebuild kits. 2: **Release bridge 2**; release bridge 2 (≡ 4-Q operation), e.g. 4-Q for rebuild kits. This value overrides the type code and is immediately visible in 07.34 Drive block bridge 2 set.						
	0 … 2	Auto	-	1 = 1	n	n	Parameter
95.27	**Set: Drive DC current scaling**						
	Set the nominal DC current of the drive. Adjustment of DC current measuring channels (SDCS-PIN-H01 or SDCS-PIN-H51). 95.27 Set: Drive DC current scaling is write protected. To enable use 95.24 Service mode = Set: Type code. 0 A = take value from 95.25 Set: Type code. 1 … 32500 A = take value from 95.27 Set: Drive DC current scaling. This value overrides the type code and is immediately visible in 07.35 Drive DC current scaling set. 95.24 Service mode has to be set back to Normal mode by the user. **Attention**: When using H1 … H5 modules the current and voltage range of the type code setting is limited to max 1190 A_{DC} and max 600 V_{AC}.						
	0 … 32500	-	A	1 = 1 A	n	n	Parameter
95.28	**Set: Drive AC voltage scaling**						
	Set the nominal AC voltage of the drive. Adjustment of AC voltage measuring channels (SDCS-PIN-H01 or SDCS-PIN-H51). 95.28 Set: Drive AC voltage scaling is write protected. To enable use 95.24 Service mode = Set: Type code. 0.0 V = take value from 95.25 Set: Type code. 0.1 … 3250.0 V = take value from 95.28 Set: Drive AC voltage scaling. This value overrides the type code and is immediately visible in 07.37 Drive AC voltage scaling set. 95.24 Service mode has to be set back to Normal mode by the user. **Attention**: When using H1 … H5 modules the current and voltage range of the type code setting is limited to max 1190 A_{DC} and max 600 V_{AC}.						
	0.0 … 3250.0	-	V	10 = 1 V	n	n	Parameter
95.29	**Set: Drive max bridge temperature**						
	Set the maximum bridge temperature of the drive. Adjustment of the drive bridge temperature tripping level. 0°C/32°F = take value from 95.25 Set: Type code. 1°C … 149°C/33°F … 300°F = take value from 95.29 Set: Drive max bridge temperature. 150°C/301°F = the temperature supervision is inactive, e.g. for rebuild kits. This value overrides the type code and is immediately visible in 07.38 Drive max bridge temperature set. Maximum setting for converters size H7 and H8 is 55°C/131°F, because the cooling air input temperature is measured. For more details, see DCS880 Hardware manual (3ADW000xxx). The unit is selected by 96.02 Unit selection.						
	-80 … 1000	-	°C or °F	1 = 1°C or °F	n	n	Parameter
95.32	**DC current measurement adjust**						
	Set the DC current measurement adjust of the drive. 95.32 DC current measurement adjust in percent of 07.35 Drive DC current scaling set is used to cover drives with different current measuring circuits for bridge 1 and bridge 2. It rescales the measured armature current if bridge 2 is active.						
	12.5 … 800.0	100.0	%	10 = 1 %	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
95.33	**DC current measurement offset**						
	Set the DC current measurement offset of the drive. The offset value in percent of 99.11 M1 nominal current is added to the armature current measurement. 95.33 DC current measurement offset adjusts 01.10 Motor current in to the real armature current. Setting 95.33 DC current measurement offset = 10.1 (default) disables the manual offset. **Commissioning hint**: In case a 2-Q converter module is used and the motor turns with speed reference equals zero increase 95.33 DC current measurement offset until the motor is not turning anymore.						
	-10.0 … 10.1	0.0	%	10 = 1 %	n	y	Parameter
95.34	**DC voltage measurement adjust**						
	Set the DC voltage measurement adjust of the drive. 95.34 DC voltage measurement adjust in percent of 07.37 Drive AC voltage scaling set is used to cover drives with different voltage measuring circuits for armature and mains voltage. It rescales the armature voltage measurement.						
	12.5 … 800.0	100.0	%	10 = 1 %	n	y	Parameter
95.35	**DC voltage measurement offset**						
	Set the DC voltage measurement offset of the drive. The offset value in percent of 99.12 M1 nominal voltage added to the armature voltage measurement. 95.35 DC voltage measurement offset adjusts 01.21 Armature voltage in V to the real armature voltage. Setting 95.35 DC voltage measurement offset = 10.1 % (default) disables the manual offset and activates the automatic offset. The automatic offset is done after the On command is given. See 06.09.b00 Used main control word. If a DC-breaker / DC-contactor is used set 95.35 DC voltage measurement offset = 0.						
	-10.0 … 10.1	10.1	%	10 = 1 %	n	y	Parameter
95.36	**DC voltage measurement hardware filter**						
	DC voltage measurement hardware filter. Hardware filter for the DC voltage measuring circuit. 0: **Filter off**; the filter time is set to 200 µs. 1: **Filter on**; the filter time is set to 10 ms.						
	0 … 1	Filter off	-	1 = 1	n	y	Parameter
95.39	**PLL input deviation**						
	PLL input deviation. Actual measured mains voltage cycle (period) time. Is used as input of the PLL controller. For 50 Hz mains the value should be: $\frac{1}{50\ Hz} = 20\ ms\ \equiv 0°$. For 60 Hz mains the value should be: $\frac{1}{60\ Hz} = 16.67\ ms\ \equiv 0°$.						
	-180.00 … 180.00	-	°	100 = 1°	y	n	Signal
95.40	**PLL output, internal mains frequency**						
	PLL output. Calculated and internally controlled mains frequency. Output of PLL controller.						
	0.00 … 100.00	-	Hz	100 = 1 Hz	y	n	Signal
95.43	**PLL offset sync transformer**						
	PLL offset due to a sync transformer. Compensation of a synchronization transformer's phase shift compared to the mains transformer. The maximum phase shift compensation is ±60.00°.						
	-60.00 … 60.00	0.00	°	100 = 1°	n	y	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
95.44	**PLL deviation level**						
	PLL deviation to block current controller. Maximum allowed deviation of the PLL controller. The current controller is blocked in case the limit is reached. For 50 Hz mains is valid: $\frac{1}{50\ Hz} = 20\ ms\ \equiv 0°$. For 60 Hz mains is valid: $\frac{1}{60\ Hz} = 16.67\ ms\ \equiv 0°$.						
	5.00 … 20.00	10.00	°	100 = 1°	n	y	Parameter
95.45	**PLL proportional gain**						
	PLL p-part. Gain of firing unit's phase lock loop.						
	0.01 … 2.00	0.50	-	100 = 1	n	y	Parameter
95.46	**PLL filter time**						
	PLL filter time constant. Filter of firing unit's phase lock loop.						
	0.0 … 500.0	0.0	ms	10 = 1 ms	n	y	Parameter
95.47	**PLL Uk compensation**						
	PLL mains transformer u_k compensation. The measured firing angle of the firing unit's PLL can be corrected in order to compensate the error caused by the commutation notches of the thyristors. The compensation depends on the u_k (short circuit voltage) of the mains. 95.47 PLL Uk compensation defines the mains short circuit voltage, in percent of 99.01 Mains voltage, which is caused by the unit's nominal current for the PLL correction: $PLL\ u_k\ compenzation = u_k \times \frac{S_c}{S_t} \times 100\ \%$ With: u_k = related mains short circuit voltage. S_c = apparent power of the drive. S_t = apparent power of transformer. **Commissioning hint**: 95.47 PLL Uk compensation is used to compensate for the phase shift of the mains due to the thyristors switching, in case the mains are measured on the secondary side of the dedicated transformer. This situation leads to unstable output currents during high loads. Increase 95.47 PLL Uk compensation slowly (1 by 1) until the output current becomes stable.						
	0.0 … 15.0	0.0	%	1 = 0.1	n	y	Parameter

96 System

Language selection; access levels; macro selection; parameter save and restore; control board reboot; user parameter sets; unit selection; data logger triggering; parameter checksum calculation; user lock.

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
96.01	**Language** Select language. Selects the language of the parameter interface and other displayed information when viewed on the control panel. **Notes:** – Not all languages listed below are necessarily supported. – 96.01 Language does not affect the languages visible in the PC tool. 0: **Not selected**; none. 1029: **Czech**; Czech. 1030: **Dansk**; Danish. 1031: **Deutsch**; German. 1033: **English**; English. 1035: **Suomi**; Finnish. 1036: **Français**; French. 1040: **Italiano**; Italian. 1043: **Nederlands**; Dutch. 1045: **Polski**; Polish. 1049: **Russki**; Russian. 1053: **Svenska**; Swedish. 1055: **Türkçe**; Turkish. 2052: **Chinese (Simplified, PRC)**; Simplified Chinese. 2070: **Portugues**; Portuguese. 3082: **Español**; Spanish.	0 … 4000	English	-	1 = 1	n	y	Parameter
96.02	**Unit selection** Unit selection word. Selects the unit of parameters indicating power, temperature and torque. Bit assignment:	0000h … FFFFh	0000h	-	1 = 1	n	y	Parameter
96.03	**Unit for speed control** Unit for the speed control. Sets the speed control unit. 0: **rpm**; in rpm. 1: **%;** in percent of 99.14 M1 nominal (base) speed. Set 99.14 M1 nominal (base) speed = 100 %. 2: **V**; in volt. Set 99.14 M1 nominal (base) speed = 99.12 M1 nominal voltage from 99.07. Following signals / parameters are affected: – Liste von R&D **Note**: After changing, the speed control unit restart the PC tool to make the change visible.							

Bit	Name	Value	Remarks
0	Power unit	1	hp
		0	kW
1	reserved		
2	Temperature unit	1	°F
		0	°C
3	reserved		
4	Torque unit	1	Lb ft
		0	Nm
5 … 15	reserved		

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	0 … 2	rpm	-	1 = 1	n	y	Parameter
96.04	**Access levels active**						

Active access levels.
Shows, which access levels, have been activated by 96.07 Pass code and 96.102 User lock functionality.
Bit assignment:

Bit	Name	Value	Remarks
0	End user	1	End user active.
1	Service	1	Service active.
2	Advanced programmer	1	Advanced programmer active.
3	reserved		
4	reserved		
5	reserved		
6	reserved		
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	reserved		
13	reserved		
14	Parameter lock	1	Parameter lock active.
15	reserved		

0000h … FFFFh	-	-	1 = 1	y	n	Signal

96.07 Pass code

Pass code.
Enter a pass code to activate the parameter lock or to configure the user lock. See 96.102 User lock functionality.
Parameter lock:
Entering “358” toggles the parameter lock, which prevents the changing of all other parameters through control panel or PC tool.
User lock (opening generates warning A6B0 User lock open):
Entering the user pass code, by default “10000000”, unhides parameters 96.100 … 96.102. Now it is possible to define a new user pass code and to select the actions to be prevented.
Entering an invalid pass code will close an open user lock, by hiding parameters 96.100 … 96.102. After entering the code, check that the parameters are in fact hidden.
Note: We recommend changing the default user pass code.
Example: For better cyber security, set a user pass code preventing change of parameter values or loading of firmware and other files.
To activate the user lock for the first time, enter the default user pass code “10000000” into 96.07 Pass code. This unhide parameters 96.100 … 96.102. Then enter a new user pass code into 96.100 Change user pass code and confirm the code in 96.101 Confirm user pass code. In 96.102 User lock functionality define the actions to be prevented.
To close the user lock, enter an invalid user pass code into 96.07 Pass code then activate 96.27 Control board boot or cycle the power. With the lock closed, parameters 96.100 … 96.102 are hidden.
To reopen the lock, enter Your user pass code into 96.07 Pass code. This will again unhide parameters 96.100 … 96.102.
WARNING!
Do not forget Your user pass code. The factory has no means to reset the control board! A **new** control board has to be purchased.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	00000000 … 99999999	00000000	-	1 = 1	y	y	Parameter
96.08	**Local control**						
	Local control access. Enables/Disables local control. Start and stop buttons on the control panel and the local controls of the PC tool. **WARNING!** Before disabling local control, ensure that the control panel or PC tool is not needed to stop the drive. 0: **Disable**; disable local control. 1: **Enable**; enable local control.						
	0 … 1	Enable	-	1 = 1	n	y	Parameter
96.11	**Macro active**						
	Shows the active macro. Shows which macro is currently selected. To change the macro, use 96.14 Macro select. 0: **None**; no macro selected. 1: **Default**; default parameter set. See 96.15 Parameter restore = Default. 10: **Factory**; factory parameter set. See 96.14 Macro select. 11: **Manual/Constant**; macro manual/constant speed. See 96.14 Macro select. 12: **Hand/Auto**; macro hand (manual)/automatic. See 96.14 Macro select. 13: **Hand/Motor Potentiometer**; macro hand (manual) / motor potentiometer. See 96.14 Macro select. 14: **Motor Potentiometer**; macro motor potentiometer. See 96.14 Macro select. 15: **Torque control**; macro torque control. See 96.14 Macro select. 16: **Torque limit**; macro torque limit. See 96.14 Macro select. 17: **2 wire US DC-contactor**; macro 2 wire with US style DC-contactor. See 96.14 Macro select. 18: **3 wire US DC-contactor**; macro 3 wire with US style DC-contactor. See 96.14 Macro select. 19: **3 wire standard**; macro 3 wire standard. See 96.14 Macro select. 20: **Demo unit**; macro for the demo unit. See 96.14 Macro select.						
	0 … 20	-	-	1 = 1	y	n	Signal
96.14	**Macro select**						
	Selects a macro (pre-defined parameter set). Selects a macro. The value reverts automatically to Done, when the macro selection is done. The selected macro is shown in 96.11 Macro active. **Notes:** – Only macro depending parameters will be set. The rest of the parameters will not be changed. – It is possible to change all preset parameters of a loaded macro. – Selecting the actual macro again restores all macro depending parameters to the macro's default values. 0: **Done**; normal operation or application macro selection done. 10: **Factory**; factory parameter set. 11: **Manual/Constant**; macro manual/constant speed. 12: **Hand/Auto**; macro hand (manual)/automatic. 13: **Hand/Motor Potentiometer**; macro hand (manual) / motor potentiometer. 14: **Motor Potentiometer**; macro motor potentiometer. 15: **Torque control**; macro torque control. 16: **Torque limit**; macro torque limit. 17: **2 wire US DC-contactor**; macro 2 wire with US style DC-contactor. 18: **3 wire US DC-contactor**; macro 3 wire with US style DC-contactor. 19: **3 wire standard**; macro 3 wire standard. 20: **Demo unit**; parameter set for the demo unit.						
	0 … 20	Done	-	1 = 1	n	n	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
96.15	**Parameter restore**						
	Reset parameter values. Restores the default settings of the firmware. Depending on the choice only certain parameters or all parameter are restored. The value reverts automatically to Done, when the restore is done. **Note**: Restoring may cause a communication break, so reconnecting the drive may be required. 0: **Done**; normal operation or restore done. 8: **Restore**; all parameter are restored to default, except: – Motor 1 and Motor 2 parameters. – Control panel/PC communication settings. – I/O extension module settings. – Fieldbus adapter settings. – Encoder configuration data. – Macro depending parameters. – 99.10 Nominal mains voltage. – User lock parameters 96.100 … 96.102. 62: **Clear**; all parameter are restored to default, except: – Control panel/PC communication settings. – Fieldbus adapter settings. – Encoder configuration data. – Macro depending parameters. – 99.10 Nominal mains voltage. – User lock parameters 96.100 … 96.102. 70: **Default**; all parameters are restored to default.						
	0 … 70	Done	-	1 = 1	n	n	Parameter
96.16	**Parameter save manually**						
	Save/Load parameters and enable/disable an application program. Saves valid parameter values to permanent memory. 96.16 Parameter save manually should be used to save e.g. values sent from a fieldbus. 96.16 Parameter save manually is also used to save/load a parameter set on/from the memory unit and to enable/disable application programs. The value reverts automatically to Done, when the parameter save is done. **Notes:** – Use the parameter save function only when needed. – A new parameter value is saved automatically when changed from the control panel or PC tool but not when altered through a fieldbus adapter connection. 0: **Done**; normal operation or parameter save/all other actions are done. 1: **Save**; command to save parameters or saving parameters in progress. (Parameter set is already on memory unit. For user sets see 96.19.) (Parameter set is already on memory unit. For user sets see 96.19.) 4: **Enable application**; enables the application program. (R&D have a look into it.) 5: **Disable application**; disables the application program. (R&D have a look into it.) (Not possible due to system.)						
	0 … 6	Done	-	1 = 1	y	n	Parameter
96.19	**User set status**						
	User parameter set status display. Shows the status of the user parameter sets. 0: **None**; No user parameter sets have been saved. 1: **Loading**; currently loading a user parameter set. 2: **Saving**; currently saving a user parameter set. 3: **Faulted**; invalid or empty user set. 4: **User set 1**; user set 1 is loaded. 5: **User set 2**; user set 2 is loaded. 6: **User set 3**; user set 3 is loaded.						

<table>
<tr><th>Index</th><th>Name</th><th></th><th></th><th></th><th></th><th></th><th></th></tr>
<tr><td></td><td>Text</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td></td><td colspan="7">7: User set 4; user set 4 is loaded.</td></tr>
<tr><td></td><td>0 … 7</td><td>-</td><td>-</td><td>1 = 1</td><td>y</td><td>n</td><td>Signal</td></tr>
<tr><td>96.22</td><td colspan="7">User set save/load
User parameter set handling.
Enables the saving and restoring of up to four user parameter sets. The value reverts automatically to Done, when the loading or saving is done.
Notes:
– Hardware configuration settings such as I/O extension module, fieldbus and encoder configuration parameters (groups 14 … 16, 47, 51 … 56, 58 and 92 … 93) are not included in the user parameter sets.
– Forced input/output values such as 10.03 DI force selection and 10.04 DI force data are not included in the user parameter sets.
– The user parameter set that was in use before powering down the drive is in use after the next power-up. Except User set I/O mode is used.
– Parameter changes made after loading a user parameter set are not automatically stored in it. They must be saved again using 96.22 User set save/load.
– The loaded user parameter set is shown in 96.19 User set status and 06.18.b06 … b09 Drive status word 3.
– The PC tool backup function only saves the active parameter set. Thus, user set 1 … user set 4 must be backed-up separately.
0: Done; normal operation, loading or saving is done.
1: User set I/O mode; load user parameter set using 96.23 User set I/O mode in1 and 96.24 User set I/O mode in2.
2: Load set 1; load user set 1.
3: Load set 2; load user set 2.
4: Load set 3; load user set 3.
5: Load set 4; load user set 4.
18: Save to set 1; save parameters to user set 1.
19: Save to set 2; save parameters to user set 2.
20: Save to set 3; save parameters to user set 3.
21: Save to set 4; save parameters to user set 4.</td></tr>
<tr><td></td><td>0 … 21</td><td>Done</td><td>-</td><td>1 = 1</td><td>y</td><td>n</td><td>Parameter</td></tr>
<tr><td>96.23</td><td colspan="7">User set I/O mode in1
Load user sets using digital I/O.
With 96.22 User set save/load = User set I/O mode it is possible to select user parameter sets via 96.23 User set I/O mode in1 and 96.24 User set I/O mode in2 according to the following table.

<table>
<tr><th>Source defined by 96.23 User set I/O mode in1</th><th>Source defined 96.24 User set I/O mode in2</th><th>Selected user parameter set</th></tr>
<tr><td>0</td><td>0</td><td>User set 1</td></tr>
<tr><td>1</td><td>0</td><td>User set 2</td></tr>
<tr><td>0</td><td>1</td><td>User set 3</td></tr>
<tr><td>1</td><td>1</td><td>User set 4</td></tr>
</table>
0 = Always off.
1 = Always on.
Other [bit]; source selection.
0: Not selected; 0, normal operation.
1: Selected; 1.
3: DI1; 10.02.b00 DI delayed status.
4: DI2; 10.02.b01 DI delayed status.
5: DI3; 10.02.b02 DI delayed status.
6: DI4; 10.02.b03 DI delayed status.</td></tr>
</table>

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	7: **DI5**; 10.02.b04 DI delayed status. 8: **DI6**; 10.02.b05 DI delayed status. 11: **DIO1**; 11.02.b00 DIO delayed status. 12: **DIO2**; 11.02.b01 DIO delayed status. 19: **DIL**; 10.02.b15 DI delayed status						
	0 … 19	Not selected	-	1 = 1	y	n	Parameter
96.24	**User set I/O mode in2**						
	Load user sets using digital I/O. See 96.23 User set I/O mode in1.						
	0 … 19	Not selected	-	1 = 1	y	n	Parameter
96.27	**Control board boot**						
	Reboot the control board. Reboots the control unit. No cycling the power of the complete drive required. The value reverts automatically to Done, when the reboot is done. **Other [bit]**; source selection. 0: **Done**; 0, normal operation or reboot done. 1: **Reboot**; 1, reboot the control board.						
	0 … 1	Done	-	1 = 1	y	n	Parameter
96.28	**FSO reboot**						
	Reboot the FSO-xx safety functions module. Reboots the optional FSO-xx safety functions module. **Note**: The value does not revert to done automatically. **Other [bit]**; source selection. 0: **Done**; 0, normal operation or reboot done. 1: **Reboot**; 1, reboot the FSO-xx safety functions module.						
	0 … 1	Done	-	1 = 1	y	n	Parameter
96.31	**Time sync source status**						

Time source status word.
Displays the time source status word. See 96.35 Time sync primary source.
Bit assignment:

Bit	Name	Value	Remarks
0	Time tick received	1	1st priority tick received: Tick has been received from 1st priority source.
1	Aux Time tick received	1	2nd priority tick received: Tick has been received from 2nd priority.
2	Tick interval is too long	1	Yes: Tick interval too long, accuracy compromised.
3	DDCS controller	1	Tick received: Tick has been received from an external DDCS-PLC.
4	M/F	1	Tick received: Tick has been received through the master-follower link.
5	reserved		
6	D2D	1	Tick received: Tick has been received through the drive-to-drive link.
7	FBA A	1	Tick received: Tick has been received through fieldbus adapter A.
8	FBA B	1	Tick received: Tick has been received through fieldbus adapter A.
9	EFB	1	Tick received: Tick has been received through the embedded fieldbus.
10	reserved		
11	Panel link	1	Tick received:

Index	Name / Text	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type

			Tick has been received from the control panel, or the PC tool connected to the control panel.
12	Ethernet tool link	1	Tick received: Tick has been received from the PC tool through a FENA module.
13	Parameter setting	1	Tick received: Tick has been set by parameters 96.37 … 96.39.
14	RTC	1	RTC time in use: Time and date have been read from the real-time clock.
15	Drive On-Time	1	Drive on-time in use: Time and date are displaying drive on-time.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0000h … FFFFh	-	-	1 = 1	y	n	Signal

96.32 Drive time

Actual drive time.
Shows the 24 h drive time in format hh:mm:ss. The drive time is set by parameters 96.35 … 96.39.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
00:00:00 … 23:59:59	-	-	1 = 1	y	n	Signal

96.35 Time sync primary source

1st priority time synchronization source.
Defines the 1st priority external source for the drive time and date synchronization.
0: **Internal**; no external source selected.
1: **DDCS controller**; external DDCS-PLC.
2: **FBA A or FBA B**; fieldbus adapter A or fieldbus adapter B.
3: **FBA A**; fieldbus adapter A.
4: **FBA B**: fieldbus adapter B.
5: **D2D or M/F**; master station of a master-follower link or drive-to-drive link.
6: **EFB**; embedded fieldbus.
8: **Panel link**; control panel, or the PC tool connected to the control panel.
9: **Ethernet tool link**; PC tool through a FENA module.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0 … 9	Internal	-	1 = 1	y	n	Parameter

96.36 M/F and D2D clock sync

Activate the clock synchronization (master only).
Activates the clock synchronization for master-follower and drive-to-drive communication.
0: **Inactive**; clock synchronization not active.
1: **Active**; clock synchronization active.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
0 … 1	Inactive	-	1 = 1	y	n	Parameter

96.37 Full days since 1st Jan 1980

Days since beginning of 1980.
Number of full days passed since beginning of the year 1980. Together with 96.28 Time in minutes within 24 h and 96.39 Time in ms within one minute makes it possible to set the date and time in the drive via the parameter interface from a fieldbus or application program. This may be necessary if the fieldbus protocol does not support time synchronization.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
1…59999	0	Days	1 = 1 Day	y	n	Parameter

96.38 Time in minutes within 24 h

Minutes since midnight.
Number of full minutes passed since midnight. For example, the value 860 corresponds to 14:20.
See 96.37 Full days since 1st Jan 1980.

Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
1 … 1439	0	min	1 = 1 min	y	n	Parameter

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
96.39	**Time in ms within one minute**						
	Number of milliseconds since last minute. Number of milliseconds passed since last minute. See 96.37 Full days since 1st Jan 1980.						
	0 … 59999	0	ms	1 = 1 ms	y	n	Parameter
96.51	**Clear fault and event logger**						
96.61	**User data logger status word**						
	User data logger status word. Provides status information about the user data logger. Bit assignment:						
	0000h … FFFFh	-	-	1 = 1	y	n	Signal
96.63	**User data logger trigger**						
	Trigger source for the user data logger. Triggers or selects a source that triggers the user data logger. 0 = No trigger command. 1 = Trigger. **Other [bit]**; source selection. 0: **No trigger command**; 0, normal operation. 1: **Trigger**; 1.						
	0 … 1	No trigger command	-	1 = 1	y	n	Parameter
96.64	**User data logger start**						
	Start source for the user data logger. Starts or selects a source that starts the user data logger. 0 = No start command. 1 = Start. **Other [bit]**; source selection. 0: **No start command**; 0, normal operation. 1: **Start**; 1.						
	0 … 1	No start command	-	1 = 1	y	n	Parameter
96.65	**Factory data logger time level**						
	Factory data logger sample time. – Selects the sampling interval for the factory data logger. The values that are recorded in the factory data logger are: – 06.09 Used main control word. – 06.15 Main Status Word. – 06.25 Current controller status word 2.						

Bit	Name	Value	Remarks
0	Running	1	Running.
		0	The post-trigger time is passed.
1	Triggered	1	Triggered.
		0	Restarted.
2	Data available	1	Contains data that can be read.
		0	Contains no data.
3	Configured	1	Configured.
			Not configured.
4 … 15	reserved		

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	– 99.01 Mains voltage. – 24.01 Used speed reference. – 90.01 Motor speed for control. – 27.02 Used current reference. – 27.05 Motor current. – 27.18 Firing angle. – 28.15 M1 field current. This selection of parameters cannot be changed by the user. 500: **500 µs**; 500 microseconds. 2000: **2 ms**; 2 milliseconds. 10000: **10 ms**; 10 milliseconds.						
	500 … 10000	500	-	1 = 1	y	n	Parameter
96.70	**Disable adaptive program**						
	Enable/Disable an adaptive program. Enables/Disables an adaptive program, if present. 0 = Disable adaptive program. 1 = Enable adaptive program. **Other [bit]**; source selection. 0: **Disable adaptive program**; 0, normal operation. 1: **Enable adaptive program**; 1.						
	0 … 1	Disable adaptive program	-	1 = 1	y	n	Parameter
96.100	**Change user pass code**						
	New user pass code. Only visible when the user lock is open. To change the current user pass code, enter a new one here and confirm using 96.101 Confirm user pass code. Warning A6B1 User pass code not confirmed is active until the new pass code is confirmed. To cancel changing the pass code, close the user lock without confirming. To close the user lock, enter an invalid user pass code into 96.07 Pass code then activate 96.27 Control board boot or cycle the power. See 96.07 Pass code.						
	10000000 … 99999999	10000000	-	1 = 1	y	y	Parameter
96.101	**Confirm user pass code**						
	Confirms the new user pass code. Only visible when the user lock is open. Confirms the new user pass code entered in 96.100 Change user pass code. See 96.07 Pass code.						
	10000000 … 99999999	10000000	-	1 = 1	y	y	Parameter
96.102	**User lock functionality**						
	Selects the actions to be prevented by the user lock. Only visible when the user lock is open. Selects the actions or functionalities to be prevented by the user lock. Note: Changes made, take effect after the user lock is closed. See parameter 96.07 Pass code. Bit assignment:						

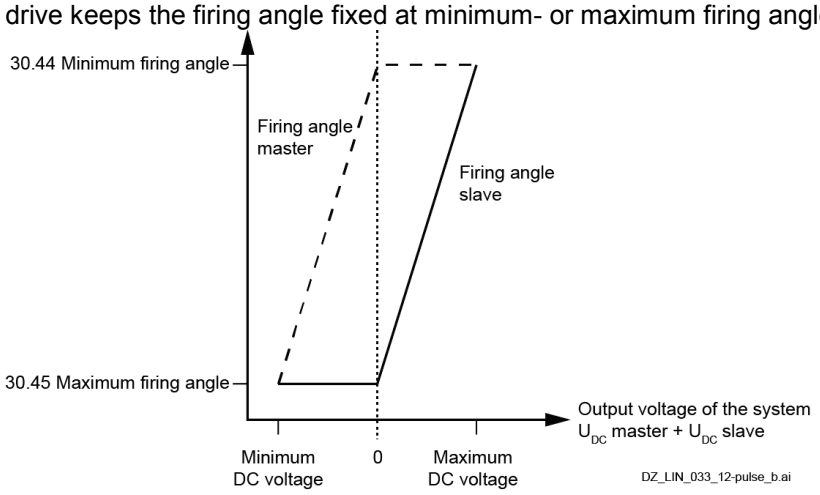
Bit	Name	Value	Remarks
0	Disable ABB access levels	1	Disable ABB access levels like service, advanced programmer, etc. See 96.04 Access levels active.
1	Freeze parameter lock state	1	Prevent changing the parameter lock state. See 96.07 Pass code = 358.
2	Disable file download	1	Prevent loading of files to drive. This applies to: – Firmware upgrades.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
				– Safety functions module FSO-xx configuration. – Parameter restore. See 96.15 Parameter restore. – Loading of adaptive or application programs. – Changing the home view of the control panel. – Editing drive texts. – Editing the favorite parameters list on the control panel. – Configuration settings made via the control panel such as time/date formats and enabling/disabling the clock display.			
	3 … 15	reserved					
	0000h … FFFFh	-	-	1 = 1	n	y	Parameter

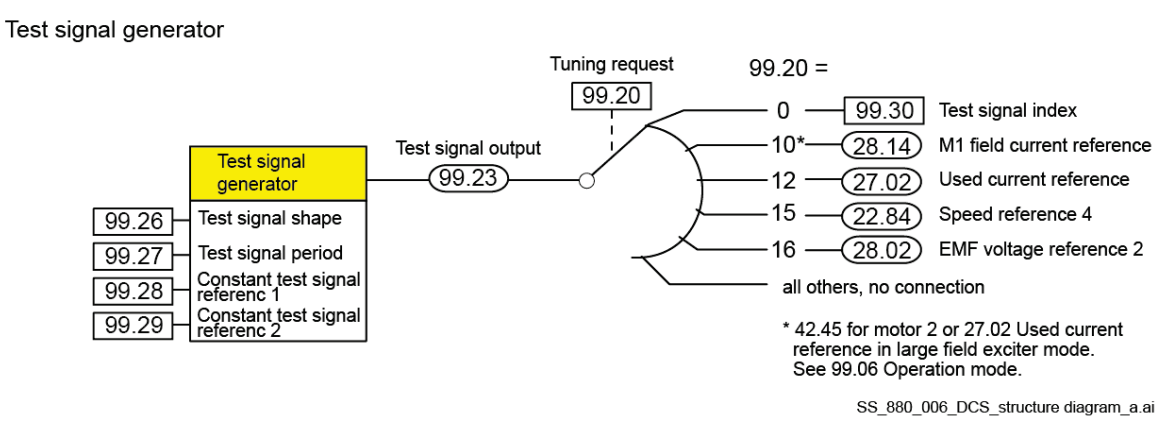
99 Motor data

Motor configuration settings.

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
99.01	**Mains voltage**						
	Mains voltage. Measured mains voltage in percent of 99.10 Nominal mains voltage.						
	0.00 … 325.00	-	%	100 = 1 %	y	n	Signal
99.02	**M1 nominal torque**						
	Motor 1, calculated nominal torque. Motor 1 nominal torque is calculated the following way: $99.02\ M1\ nominal\ torque = \frac{60}{2\pi} \times \frac{[99.12\ M1\ nominal\ voltage - 99.11\ M1\ nominal\ current \times 27.32\ M1\ armature\ resistance] \times 99.11\ M1\ nominal\ current}{99.14\ M1\ nominal\ (base)\ speed}$ The unit is selected by 96.02 Unit selection.						
	0 … 200000000	-	Nm or Lb ft	1 = 1 Nm or Lb ft	y	n	Signal
99.03	**M1 nominal power**						
	Motor 1, calculated nominal power. Motor 1 nominal power is calculated the following way: $99.03\ M1\ nominal\ power = \frac{99.12\ M1\ nominal\ voltage \times 99.11\ M1\ nominal\ current}{1000}$ The unit is selected by 96.02 Unit selection.						
	0 … 32500	-	kW or hp	1 = 1 kW or hp	y	n	Signal
99.06	**Operation mode**						
	Operation mode of the drive. Specifies the operating mode of the drive. 0: **Armature converter**; the drive is used as a 6-pulse single armature converter. 1: **Large field exciter**; the drive is used as a large field exciter. Attention: The digital input for the external overvoltage protection is assigned by means of 20.47 Overvoltage protection trigger source. 2: **12-pulse parallel master**; the drive is used as 12-pulse parallel master. Connected to a 3-winding transformer having 30° phase shift between secondary windings.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	3: **12-pulse parallel slave**; the drive is used as 12-pulse parallel slave. Connected to a 3-winding transformer having 30° phase shift between secondary windings. 4: **12-pulse serial master**; the drive is used as 12-pulse serial master. Connected to a 3-winding transformer having 30° phase shift between secondary windings. 5: **12-pulse serial slave**; the drive is used as 12-pulse serial slave. Connected to a 3-winding transformer having 30° phase shift between secondary windings. 6: **6-pulse serial master**; the drive is used as 6-pulse serial master. Connected to a 3-winding transformer having no (0°) phase shift between secondary windings. 7: **6-pulse serial slave**; the drive is used as 6-pulse serial slave. Connected to a 3-winding transformer having no (0°) phase shift between secondary windings. 8: **Serial sequential master**; the drive is used as a serial sequential master. Connected to a 3-winding transformer having no (0°) phase shift or 30° phase shift between secondary windings. 9: **Serial sequential slave**; the drive is used as a serial sequential slave. Connected to a 3-winding transformer having no (0°) phase shift or 30° phase shift between secondary windings. Sequential control of the firing angles. Only one of the two drives changes the firing angle. The other drive keeps the firing angle fixed at minimum- or maximum firing angle limit.  						
	0 … 9	Armature converter	-	1 = 1	n	n	Parameter
99.07	**M1 used field exciter type** Motor 1 field exciter type. 99.07 M1 used field exciter type ≠ None, activates motor 1 field exciter. Now it reacts to an On command and generates field current. **Note**: To start both field exciters (motor 1 and motor 2) set also 42.49 M2 used field exciter type ≠ None. 0: **None**; no or third party field exciter connected. 1: **OnBoard**; integrated 1-Q field exciter (for sizes H1 … H4 only). 2: **DCF803-0016**; external 1-Q 16 A field exciter used for field currents from 0.3 A to 16 A. 3: **DCF803-0025**; internal 1-Q 25 A field exciter (for size H5 and H6 only) used for field currents from 0.3 A to 25 A. 4: **DCF803-0035**; external 1-Q 35 A field exciter used for field currents from 0.3 A to 35 A. 5: **DCF803 terminal 5 A**; external 1-Q 16 A field exciter (DCF803-0016), internal 1-Q 25 A field exciter (DCF803-0025) or external 1-Q 35 A field exciter (DCF803-0035) used for field currents from 0.3 A to 5 A. Note: Use 5 A terminals. 6: **DCF803-0050**; external 1-Q 50 A field exciter. 7: **DCF804-0050**; external 4-Q 50 A field exciter. 8: **DCF803-0060**; external 1-Q 60 A field exciter.						

Index	Name / Text / Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	9: **DCF804-0060**; external 4-Q 60 A field exciter. 10: **DCS880-S01**; external 2-Q standard DCS880 module. 11: **DCS880-S02**; external 4-Q standard DCS880 module. 16: **External field exciter via AI1**; third party field exciter, acknowledge via AI1. 17: **External field exciter via AI2**; third party field exciter, acknowledge via AI2. 18: **External field exciter via AI3**; third party field exciter, acknowledge via AI3. 19: **Multiple field exciters**; see DCS880 Multiple field exciters motor control (3ADW000xxx).						
	0 … 19	OnBoard	-	1 = 1	n	y	Parameter
99.10	**Nominal mains voltage**						
	Nominal mains voltage. Nominal mains voltage (AC) of the supply. The default and maximum values are preset automatically according to 95.25 Set: Type coder and 95.28 Set: Drive AC voltage scaling. The absolute maximum is 1200.0 V_{AC}.						
	0.0 … 95.25/95.28	95.25/95.28	V	10 = 1 V	n	y	Parameter
99.11	**M1 nominal current**						
	Motor 1 nominal current. Motor 1 nominal armature current (DC) from the motor rating plate. **Notes:** – For 12-pulse parallel mode, see DCS880 12-pulse manual (3ADW000xxx). – In case the converter is used as a large field exciter set the value to the nominal field current from the motor rating plate. See 99.06 Operation mode. – The allowable range for the motor nominal current is 10 % … 230 % of the nominal drive current. See 7.35 Drive DC current scaling set.						
	0 … 32500	0	A	1 = 1 A	n	y	Parameter
99.12	**M1 nominal voltage**						
	Motor 1 nominal voltage. Motor 1 nominal armature voltage (DC) from the motor rating plate. **Notes:** – For 12-serial parallel mode or serial sequential mode, see DCS880 12-pulse manual (3ADW000xxx). – In case the converter is used as a large field exciter set the value to the nominal field voltage from the motor rating plate. See 99.06 Operation mode.						
	0.0 … 3250.0	350.0	V	10 = 1 V	n	y	Parameter
99.13	**M1 nominal field current**						
	Motor 1 nominal field current. Motor 1 nominal field current from the motor rating plate. **Note**: In case the converter is used as a large field exciter use 99.11 M1 nominal current to set the nominal field current.						
	-3250.0 … 3250.0	0.3	A	10 = 1 A	n	y	Parameter
99.14	**M1 nominal (base) speed**						
	Motor 1 nominal (base) speed. Motor 1 nominal (base) speed from the motor rating plate, usually the field weak point.						
	-30000.00 … 30000.00	1500.00	rpm	See 46.02	n	y	Parameter
99.17	**Last tuning performed**						
	Last performed tuning. Shows the type of tuning that was performed last. See 99.20 Tuning request.						
	0 …16	-			y	n	Signal

<table>
<tr><th rowspan="3">Index</th><td colspan="7">Name</td></tr>
<tr><td colspan="7">Text</td></tr>
<tr><td>Range</td><td>Default</td><td>Unit</td><td>Scale/ Fbeq16</td><td>Volatile</td><td>Change running</td><td>Type</td></tr>
<tr><td>99.20</td><td colspan="7">Tuning request
Drive tuning request.
The tuning request contains all auto- and manual tuning procedures.
Tuning request is automatically reset to Normal mode after an autotuning procedure is finished or failed. In case errors occur during the selected AF90 Autotuning. The reason of the error can be seen in the auxiliary codes.
When choosing manual tuning 99.20 Tuning request has to be set back to Normal mode by the user.
Notes:
– The reference chain is blocked while 99.20 Tuning request ≠ Normal mode.
– Depending on 06.18B04/B05 Drive status word 3 the field current of motor 1 or motor 2 is tuned.
– A standard DCS800 converter used as a large field exciter cannot be tuned by means of the armature converter it is connected to. Tune the field current controller by setting 99.20 Tuning request = Field current autotuning in the large field exciter itself.
0: Normal mode; normal operating mode depending on 99.06 Operation mode.
1: Field current autotuning; autotuning the field current controller.
Attention: The field autotuning is realized through increasing the field voltage (≡ decreasing the firing angel) and not via field current reference. Please note that the limits in group 30 will not be taken in consideration during the autotuning. The maximum field current during tuning can be reduced by adapting 99.13 M1 nominal field current if required.
2: Armature current autotuning; autotuning the armature current controller.
3: Speed feedback assistant; test the speed feedback. See 90.41 M1 feedback selection, 94.08 M1 tacho voltage at 1000 rpm, 94.23 OnBoard encoder pulses/revolution, 94.24 OnBoard pulse encoder type and 94.25 OnBoard encoder speed calculation mode.
4: Speed controller autotuning; autotuning the speed controller.
5: EMF controller autotuning; autotuning the EMF controller.
6: Flux linearization autotuning; autotuning the flux linearization.
10: Field current manual tuning; manual tuning of the field current controller.
11: Field reversal assistant; assistant to test the field reversal.
12: Armature current manual tuning; manual tuning of the Armature current controller.
13: Find discontinuous current limit; find the discontinuous current limit.
14: Tacho fine-tuning; tacho fine-tuning. See 94.11 M1 tacho fine-tuning adjust and 94.12 M1 tacho fine-tuning factor.
15: Speed controller manual tuning; manual tuning the speed controller.
16: EMF controller manual tuning; manual tuning the EMF controller.</td></tr>
<tr><td></td><td>0 …16</td><td>Normal mode</td><td></td><td></td><td>y</td><td>n</td><td>Parameter</td></tr>
<tr><td>99.23</td><td colspan="7">Test signal output
Test signal generator, output.
Output signal of the test signal generator.
Note: The range, the unit and the scaling for the fieldbus communication depends on the chosen sink. See 99.20 Tuning request and 99.30 Test signal index.
 
</td></tr>
</table>

Index	Name						
	Text						
	Range	Default	Unit	Scale/ Fbeq16	Volatile	Change running	Type
	99.20/99.30	0	99.20/99.30	99.20/ 99.30	y	n	Signal
99.26	**Test signal shape**						
	Test signal generator, shape. Signal forms for the test signal generator and the manual tuning functions. See 99.20 Tuning request. **Note**: After a power-up, the value is set back to Zero and thus disables the test signal generator. 0: **Zero**; not in use. 1: **Square wave**; a square wave is used. 2: **Triangle**; a triangle wave is used. 3: **Sine save**; a sine wave is used. 4: **Constant test signal 1**; a constant value set with 99.28 Constant test signal reference 1 is used. 5: **Constant test signal 2**; a constant value set with 99.29 Constant test signal reference 2 is used.						
	0 … 5	Zero	-	1 = 1	y	y	Parameter
99.27	**Test signal period**						
	Test signal generator, time period. The time period for the test signal generator and the manual tuning functions. See 99.20 Tuning request. **Note**: After a power-up, the value is set back to 0.00.						
	0.00 … 655.35	0.00	s	10 = 1 s	y	y	Parameter
99.28	**Constant test signal reference 1**						
	Test signal generator, test signal reference 1. Constant test reference 1 for the test signal generator and the manual tuning functions. See 99.20 Tuning request. **Notes:** – The range, the unit and the scaling for the fieldbus communication depends on the chosen sink. See 99.20 Tuning request and 99.30 Test signal index. – After a power-up, the value is set back to 0. **Examples:** – 100.00 % voltage ≡ 10,000. – 100.00 % current ≡ 10,000. – 100.00 % power ≡ 10,000. – 100.00 % torque ≡ see 46.04 M1 torque scaling actual ≡ 10,000. – 100.00 % speed ≡ 46.02 M1 speed scaling actual ≡ 20,000.						
	99.20/99.30	0	99.20/99.30	99.20/ 99.30	y	y	Parameter
99.29	**Constant test signal reference 2**						
	Test signal generator, test signal reference 2. Constant test reference 2 for the test signal generator and the manual tuning functions. See 99.28 Constant test signal reference 1.						
	99.20/99.30	0	99.20/99.30	99.20/ 99.30	y	y	Parameter
99.30	**Test signal index**						
	Test signal generator, test signal index. Index pointer to the sink (signal/parameter) for the test signal generator. E.g. a setting of 2207 equals 22.07 Speed reference. **Notes:** – 99.30 Test signal index must not be used for the manual tuning functions of 99.20 Tuning request. – After a power-up, the value is set back to 0.						
	0 … 9999	0	-	1 = 1	y	y	Parameter

Fault tracing

What this chapter contains

This chapter lists all warning/fault messages including possible causes and corrective actions. By means of this chapter, the causes of all warnings/faults can be identified and corrected. If not, an ABB service representative should be contacted.
Warnings/faults are listed below in separate tables. Each table is sorted by warning and fault code.

Safety

WARNING! Only qualified electricians are allowed to service the drive. Read the Safety instructions on the first pages of the DCS880 Hardware manual (3ADW000xxx) before working on the drive.

Indications

Warnings and faults

Warnings/faults indicate an abnormal drive status. The codes and names of active warnings/faults are displayed on the control panel of the drive as well as in the PC tool. Via fieldbus only the codes of the warnings/faults are available.
Warnings do not need to be reset. They stop showing when the cause of the warning ceases. Warnings do not latch and the drive will continue to operate the motor.
Faults do latch inside the drive. They cause the drive to trip and the motor stops. After the cause of a fault has been removed, the fault can be reset from a selectable source. See 20.13 Fault reset selection. This can be the control panel, the PC tool, a digital input of the drive or the fieldbus. After the fault is reset, the drive can be restarted.
Note: Some faults require a reboot of the control board, either by cycling the power or via 96.27 Control board boot. This is mentioned in the fault listing wherever appropriate.
The warning/fault indications can be directed to a relay output or a digital input/output by selecting Warning, Tripped or Tripped (-1) in the source selection parameter. See groups:

- 10 Standard DI, RO.
- 11 Standard DIO, FI, FO.
- 14 … 16 I/O extension module 1 … 3.

Events

In addition to warnings and faults, there are notices that are only recorded in the event logs of the drive. The codes of these notices are included in the Warning messages table.

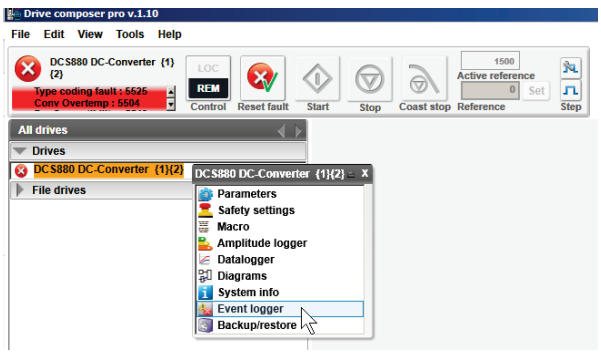
Editable messages

For some warnings/faults, the message text can be edited and instructions and contact information added. To edit these messages, choose **Menu - Settings - Edit texts** on the control panel.

Warning/fault history and analysis

Event logs

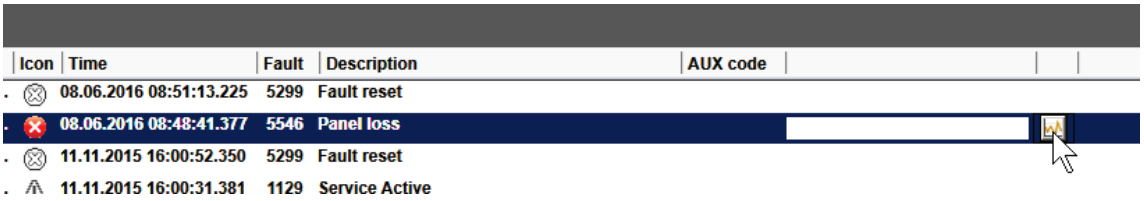
The drive has several event logs, to access, choose **Menu - Event log** on the control panel. The event logs can also be accessed and reset using the PC tool.



The event logs contain faults, warnings and notices, as well as cleared entries. Each event log contains 32 most recent events. All indications in the event logs are stored including a time stamp and other information.

Auxiliary codes
Some events generate auxiliary codes helping to pinpoint the problem.
The auxiliary codes are displayed on the control panel together with a corresponding message. It is also stored in the event logs details. In the PC tool, auxiliary codes can be found in the event listing.

Factory data logger
The drive has a factory data logger that samples preselected drive values. The default sampling time is 500 µs. See 96.65 Factory data logger time level for additional sampling times.
Approximately 7000 samples are recorded immediately before and after a fault. They are saved to the memory unit of the drive. The fault data of the last five faults are only accessible in the event log of the Drive composer pro PC tool.

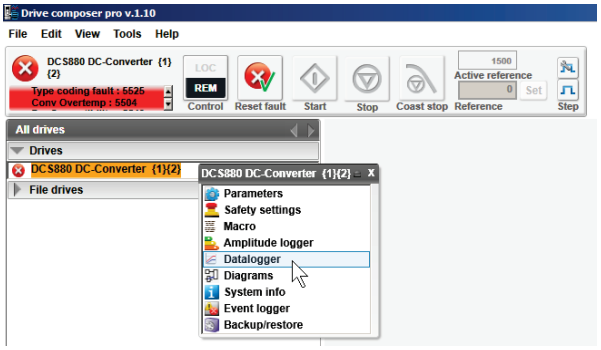


The values that are recorded in the factory data logger are:
- 06.09 Used main control word.
- 06.15 Main Status Word.
- 06.25 Current controller status word 2.
- 99.01 Mains voltage.
- 24.01 Used speed reference.
- 90.01 Motor speed for control.
- 27.02 Used current reference.
- 27.05 Motor current.
- 27.18 Firing angle.
- 28.15 M1 field current.

This selection of parameters cannot be changed by the user.

User data logger

A custom data logger can be configured using the Drive composer pro PC tool.



This functionality enables the free selection of up to eight drive parameters to be sampled at selectable intervals. The triggering conditions and the length of the monitoring period can also be defined by the user within the limit of approximately 8000 samples.
In addition to the PC tool, the status of the logger is shown in 96.61 User data logger status word. The triggering sources can be selected by 96.63 User data logger trigger and 96.64 User data logger start. The configuration, status and collected data is saved on the memory unit for later analysis.

Parameters that contain warning/fault information

The drive stores a list of active faults and the one causing the trip in signals 04.01 … 04.05. Active warnings are shown in signals 04.06 … 04.10. The group 04 also displays a list of faults and warnings that have previously occurred.

Event word (parameters 04.40 … 04.72)

04.40 Event word 1 can be configured by the user to indicate the status of 16 selectable events, e.g. faults, warnings or notices. It is possible to specify an auxiliary code for each event to filter out other auxiliary codes.

QR Code generation for mobile service application

A QR Code or a series of QR Codes can be generated by the drive for display on the control panel. The QR Code contains drive identification data, information on the latest events, status information and counter parameters. The code can be read with a mobile device containing the ABB service application, which then sends the data to ABB for analysis. For more information on the application, contact your local ABB service representative.
The QR Code can be generated by choosing **Menu - Assistants - QRCode** on the control panel.

Warnings

Warning levels

The warning handling provides 5 warning levels.

Warning level 1

- The drive keeps on running and the warning is indicated.
- After the drive is stopped, the main contactor cannot be switched on again (no re-start possible).

Warning level 2

- The drive keeps on running and the warning is indicated.
- The fan contactor stays on as long as the warning is pending.
- After the warning disappears 20.40 Drive/Motor fan delay time starts.

Warning level 3

- Auto-reclosing logic is active (auto re-start). See 06.18.b10 Drive status word 3.
- Ready run is disabled, but the drive is automatically restarted when the warning condition vanishes. See 06.15.b01 Main Status Word.
- The firing angle is forced to 150°.
- Single firing pulses to suppress the DC current are given.

Warning level 4

- The drive keeps on running and the warning is indicated.

Warning level 5

- Used for STO related warnings. See safety supplement for functional safety converter DCS880 (3ADW000452).

Warning messages

The list contains the warning/notice code in hex, its name, the cause and hints what to do.
Note: The list also contains notices that only appear in the Event log.

Code	Warning/Notice	Cause and what to do	Warning level
A103	DC-breaker acknowledge.	Selected motor, DC-breaker acknowledge at the DI is missing. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given, thus the drive cannot be started or re-started while the DC-breaker acknowledge is missing. Check: – The setting of 20.35 DC breaker acknowledge source, if necessary invert the signal.	3

Code	Warning/Notice	Cause and what to do	Warning level
A105	Dynamic braking acknowledge.	Selected motor, dynamic braking is still pending. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given, thus the drive cannot be started or re-started while dynamic braking is active, except if 21.01 Start mode = Flying start dynamic braking. Check: – The setting of 20.43 Dynamic braking acknowledge source. – The setting of 21.01 Start mode.	3
A111	Mains low voltage.	Mains/AC side low (under-) voltage. See also 3280. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The setting of 31.51.Mains loss mode, 31.52 Mains loss down time, 31.53 Mains loss low level 1 and 31.54 Mains loss low level 2. – That the mains voltage scaling is correct. See 99.10 Nominal mains voltage. – The cutting of the voltage coding resistors on the SDCS-PIN-H51. – The condition of the mains (voltage, cabling, fuses, switchgear). – That all 3 phases are present directly at the drive. – H1 … H5: measure the fuses F100 … F102 on the SDCS-PIN-H01. – H6 … H8: check and measure the connections XU1/XU2, XV1/XV2 and XW1/XW2 on the SDCS-PIN-H51. – That the mains voltage is within the set tolerance. – For mains supply imbalance. – For loose mains cable connections. – That the mains contactor closes and opens. – For H1 … H4, that the field circuit has no short circuit or ground fault. – In case an On command is given and the measured mains voltage is too low for longer than 500 ms A111 Mains low voltage is set. If the problem persist for longer than 10 s 3280 Mains low voltage is generated.	3
A112	P2P and M/F communication.	Peer to peer and master-follower communication loss. See also F544. Check: – DCSLink node ID settings. See 70.05 DCSLink node ID. – The setting of 31.13 Fault stop mode communication and 70.07 DCSLink comm loss function. – The setting of 70.17 Mailbox 1 node ID, 70.23 Mailbox 2 node ID, 70.29 Mailbox 3 node ID and 70.35 Mailbox 4 node ID. – The setting of 70.18 Mailbox 1 cycle time/timeout, 70.24 Mailbox 2 cycle time/timeout, 70.30 Mailbox 3 cycle time/timeout and 70.36 Mailbox 4 cycle time/timeout. – The DCSLink cable connections. – The DCSLink terminations.	4
A114	Armature current deviation.	27.02 Used current reference differs from 27.05 Motor current for longer than 5 sec by more than 20 % of nominal motor current. If the current controller cannot match the given current reference, the warning signal is created. Normally the reason is a too small incoming voltage compared to the motor EMF.	4

Code	Warning/Notice	Cause and what to do	Warning level
		For non-motoric applications, it is possible to block the warning using 06.11.b07 Auxiliary control word 2. Check: – For blown DC fuses. – The ratio between mains voltage and armature voltage (either the mains voltage is too low or the motor's armature voltage is too high). – If the setting of 30.44 Minimum firing angle is too high.	
A116	Brake long falling	Selected motor, the acknowledge signal for the mechanical brake closed (applied) stage at the DI is missing. Check: – The mechanical brake settings in group 44 Mechanical brake control. – The mechanical brake itself. – The mechanical brake cable connections. – The used digital inputs and outputs (groups 10 and 11).	4
A117	Armature current ripple.	One or several thyristors may carry no current. See also F517. Check: – The values of 01.50 Current ripple and 01.51 Current ripple filtered1. – The setting of 31.46 Current ripple function and 31.47 Current ripple level. – For too high gain of current controller. See 27.29 M1 current proportional gain. – The positive/negative current feedback with an oscilloscope (6 pulses within one cycle visible?). – The thyristor gate-cathode resistance. – The thyristor gate connection. – The current transformers (T51, T52). – The condition of the mains (voltage, cabling, fuses, switchgear).	4
A118	Application.	Application file new or different. Check the auxiliary code. Actions see below.	1
	0001	Found a new application on the memory unit. Activate the application on the memory unit by means of 96.16 Parameter save manually = Enable application.	
	0002	Application in drive memory and on memory unit are different. Activate the application on the memory unit by means of 96.16 Parameter save manually = Enable application.	
A120	Overvoltage protection active.	Overvoltage protection DCF806 is active and the drive is blocked. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The setting of 20.47 Overvoltage protection trigger source if necessary invert the signal. – The field converter cables and connections.	3
A130	Mains phase loss. Programmable, see 31.21 Mains phase loss.	One or several mains voltage phase(s) are missing. See also 3130. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The condition of the mains (voltage, cabling, fuses, switchgear). – That all 3 phases are present directly at the drive.	3

Code	Warning/Notice	Cause and what to do	Warning level
		– H1 … H5: measure the fuses F100 … F102 on the SDCS-PIN-H01. – H6 … H8: check and measure the connections XU1/XU2, XV1/XV2 and XW1/XW2 on the SDCS-PIN-H51. – For mains supply imbalance. – For loose mains cable connections. – That the mains contactor closes and opens.	
A132	Parameter setting conflict.	Parameter settings conflicting with other parameters. The parameters causing the warning can be identified in the auxiliary code (format YYZZ). YY specifies the parameter group. In case of 00, see the actions below. ZZ specifies the parameter number or the actions below.	4
	0070	No field reversal possible due to 28.54 Field current force direction = External reverse.	
	0071	Flux linearization parameters not consistent. See 28.29 Field current at 40 % flux, 28.30 Field current at 70 % flux and 28.31 Field current at 90 % flux.	
	0072	Wrong firing angle limitation. See 30.44 Minimum firing angle and 30.45 Maximum firing angle.	
	0073	Armature data not consistent. Check if: – 99.11 M1 nominal current is set to zero. – 99.12 M1 nominal voltage and 99.11 M1 nominal current are fitting with the drive. In case they are much smaller than the drive, the internal calculation of 27.32 M1 armature resistance and 27.33 M1 armature inductance can cause an internal overflow. Set 27.32 M1 armature resistance and 27.33 M1 armature inductance to zero. For 27.32 M1 armature resistance following limitation is valid: $\frac{(27.32) \times 4096 \times (99.11)}{1000 \times (99.12)} \leq 32767$ For 27.33 M1 armature inductance following limitation is valid: $\frac{(27.33) \times 4096 \times (99.11)}{1000 \times (99.12)} \leq 32767$	
	0077	Encoder 1 parameters not consistent. Check: – 46.02 M1 speed scaling actual or 42.14 M2 speed scaling actual. – 92.10 Pulses/revolution. – 92.11 Pulse encoder type. At scaling speed the pulse frequency must be greater than 600 Hz according to following formula: $f \geq 600Hz = \frac{ppr \times evaluation \times speed\ scaling}{60s}$ $f \geq 600Hz = \frac{(92.10) \times (92.11) \times (46.02\ or\ 42.14)}{60s}$ E.g. the speed scaling must be greater than 9 rpm for a quadrature pulse encoder (with two channels, A and B) and 1024 pulses.	

Code	Warning/Notice	Cause and what to do	Warning level
	0078	Encoder 2 parameters not consistent. Check: 46.02 M1 speed scaling actual or 42.14 M2 speed scaling actual. 93.10 Pulses/revolution. 93.11 Pulse encoder type. At scaling speed the pulse frequency must be greater than 600 Hz according to following formula: $f \geq 600Hz = \frac{ppr \times evaluation \times speed\ scaling}{60s}$ $f \geq 600Hz = \frac{(93.10) \times (93.11) \times (46.02\ or\ 42.14\ )}{60s}$ E.g. the speed scaling must be greater than 9 rpm for a quadrature pulse encoder (with two channels, A and B) and 1024.	
A137	Speed not zero.	Re-start of the drive is not possible. Speed zero has not been reached. See 21.08 M1 zero speed level. Set On = Run = 0 and check if the actual speed is within the zero speed limit. This warning is valid: – For a normal stop. Off1 command in case of 21.01 Start mode = Start from zero. – For a coast stop. Off2 (emergency off/fast current off) command. – For an emergency stop. Off3 (emergency stop) command. – Even if the drive power is cycled. Check: – The settings of 21.08 M1 zero speed level, 21.01 Start mode and 90.41 M1 feedback selection. – The function of the used speed feedback devices (tacho / encoder).	1
A2B3	Residual current detected. Programmable, see 31.18 Residual current detection type.	The drive has detected an unbalance typically due to a residual current in the motor or the motor cables. Sum of I_{L1}, I_{L2}, $I_{L3} \neq$ zero. See also A2B3. Check: – The settings of 31.17 Residual current detection source, 31.18 Residual current detection type, 31.19 Residual current detection level and 31.20 Residual current detection delay. – The sum current transformer, if necessary change transformer or connected drive hardware. – The insulation resistances of motor and motor cables. Disconnect the mains, verify safe isolation from supply in armature and field circuits and make insulation tests for the complete installation. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.	1
A490	Incorrect temperature sensor setup.	Sensor type mismatch. Check the settings of temperature source parameters 35.11 and 35.21 against 91.21 and 91.24.	1
		Faulty wiring between an encoder interface module and the temperature sensor. Check the wiring of the sensor. The auxiliary code identifies the encoder interface module. 0: Encoder interface Module 1. 1: Encoder interface Module 2.	

Code	Warning/Notice	Cause and what to do		Warning level
A491	Motor temperature 1 measured/estimated. (Editable message text)	Measured/Estimated motor temperature 1 has exceeded the warning level. See also 4981. Wait until the motor/motor model is cooled down. The fan contactor stays on as long as the warning is pending. Check: – The value of 35.02 Measured temperature 1. – The real motor temperature. Let motor cool down and restart. – The value of 35.13 Temperature 1 warning level. – The cooling of the motor or other temperature measured equipment. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The motor fan supply voltage. – The motor fan direction of rotation. – The motor fan components. – The motor cooling air inlet (e.g. filters). – The motor cooling air outlet. – The motor load and drive ratings. – Inadmissible load cycle. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it. Hint: – The measured/estimated motor temperature is blocked, if 35.11 Temperature 1 source = Disable.		2
A492	Motor temperature 2 measured/estimated. (Editable message text)	Measured/Estimated motor temperature 2 has exceeded the warning level. See also 4982. Wait until the motor/motor model is cooled down. The fan contactor stays on as long as the warning is pending. Check: – The value of 35.03 Measured temperature 2. – The real motor temperature. Let motor cool down and restart. – The value of 35.23 Temperature 2 warning level. – The cooling of the motor or other temperature measured equipment. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The motor fan supply voltage. – The motor fan direction of rotation. – The motor fan components. – The motor cooling air inlet (e.g. filters). – The motor cooling air outlet. – The motor load and drive ratings. – Inadmissible load cycle. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it. Hint: – The measured/estimated motor temperature is blocked, if 35.21 Temperature 2 source = Disable.		2
A497	Motor temperature slot1 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-xx) installed in slot1 indicates overtemperature.	Depending on the used module, a PTC and/or KTY temperature sensor can be attached. See also 4991 … 4993. Check:	2
A498	Motor temperature slot2 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-		2

Code	Warning/Notice	Cause and what to do		Warning level
		xx) installed in slot2 indicates overtemperature.	– The cooling of the motor or other temperature measured equipment. – The motor load and drive ratings. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it.	
A499	Motor temperature slot3 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-xx) installed in slot3 indicates overtemperature.		2
A4A0	Control board temperature measured.	Excessive control board temperature. Check the auxiliary code (format XXXX ZZZZ). ZZZZ indicates the problem. Actions see below.		2
	None	Temperature above warning limit of xx °C or xx °F. Check: – The value of 05.10 Control board temperature. – The ambient conditions. – The airflow and fan operation. – The heatsink fins for dust pick-up.		
	0001	Thermistor broken. Contact an ABB service representative for control board replacement.		
A4B0	Bridge temperature measured.	Excessive bridge temperature. See also 4310. Wait until the bridge is cooled down. The fan contactor stays on as long as the warning is pending. Shutdown temperature, see 07.38 Drive max bridge temperature set. The bridge overtemperature warning will already appear at approximately 5°C below the shutdown temperature. Check: – The value of 05.11 Bridge temperature. – The setting of 20.38 Drive fan acknowledge source. – The setting of 20.40 Drive/Motor fan delay time. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The drive fan supply voltage. – The drive fan direction of rotation. – The drive fan components. – The heatsink fins for dust pick-up. – The drive cooling air inlet (e.g. filters). – The drive cooling air outlet. – For open drive doors. – The motor power against the drive power. – Inadmissible load cycle. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.		2
A580	Power unit, communication.	Communication errors between the drive control unit and a power unit. See also 5681. Check: – The connections between the drive control unit and the power unit. – The auxiliary code (format XXXY YYZZ). XXX specifies the transmission error direction and gives a detailed warning code. 000: Rx/communication error.		4

Code	Warning/Notice	Cause and what to do	Warning level
		001: Tx/Reed-Solomon symbol error. 002: Tx/no synchronization error. 003: Tx/Reed-Solomon decoder failures. 004: Tx/Manchester coding errors. Y YY identifies the power unit. In case of a hardparallel configuration. ZZ specifies the error source. 08: Transmission errors in PSL link. Details see XXX. 09: Transmitter FIFO warning limit hit. Details see XXX.	
A581	Drive fan acknowledge. Programmable, see 31.41 Main fan fault function.	Drive cooling fan feedback at the DI is missing. See also 5080. Check: – The settings of 20.38 Drive fan acknowledge source and 20.40 Drive/Motor fan delay time. – The drive fan operation and connection. – The drive fan contactor. – The drive fan circuit. – The drive fan klixon. – The drive fan components. – The drive fan supply voltage. – The drive fan direction of rotation. – The drive door open. – The drive cooling air inlet (e.g. filter). – The drive cooling air outlet. – H7 an H8 pressure switch (setting should be 2 mbar). – The used digital inputs and outputs (groups 10 and 11).	2
A5A0	Safe torque off. Programmable, see 31.22 STO indication run/stop.	STO active, no drive problem. See safety supplement for functional safety converter DCS880 (3ADW000452). See also B5A0 and 5091.	5
A5A3	Safe off main contactor XSTOMC. Programmable, see 31.90 XSTOMC Indication.	STO monitor DC current not zero. See safety supplement for functional safety converter DCS880 (3ADW000452). See also B5A3 and 5093.	5
A5EA	Measurement circuit bridge temperature.	Problem with the internal temperature measurement of the bridge. See also 5094. Check: – The wiring of the temperature sensor. – The temperature sensor. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.	1
A5EB	Power unit, power board failure.	Power unit, SDCS-POW-H01 failure. See also 5692. Check the auxiliary code (format ZZZY YYXX). Y YY identifies the power unit. In case of a hardparallel configuration.	1
A682	Flash erase speed exceeded.	The flash memory in the memory unit has been erased too frequently. This compromises the lifetime of the memory. Avoid forcing unnecessary parameter saves by 96.16 Parameter save manually or cyclic parameter writes. E.g. user logger triggering via parameters. Check the auxiliary code (format XYYY YZZZ). X specifies the source of warning. 1: generic flash erase supervision.	1

Code	Warning/Notice	Cause and what to do		Warning level
		ZZZ specifies the flash subsector number that generated the warning.		
A683	Power unit, data saving.	An error in saving data to the power unit. Check the auxiliary code (format XXXX ZZZZ). ZZZZ indicates the problem. Actions see below.		1
	0000	An error is preventing saving from initializing.	Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	
	0001			
	0002	Write error.		
A6A4	Motor nominal value.	The motor parameters are set incorrectly or the drive is incorrectly dimensioned. Check the auxiliary code (format XXXX ZZZZ). ZZZZ indicates the problem. Actions see below.		4
	0004	Nominal motor current is outside the drive current limits.	Check: – The settings of the motor configuration parameters in group 99. – That the drive is sized correctly for the motor.	
	0005	Nominal motor voltage is outside the drive voltage limits.		
A6B0	User lock open.	The user lock is open and parameters 96.100 … 96.102 are visible. Close the user lock by entering an invalid pass code in 96.07 Pass code.		4
A6B1	User pass code not confirmed.	A new user pass code has been entered, but not confirmed yet. A new user pass code has been entered in 96.100 Change user pass code. Confirm the new pass code by entering the same code in 96.101 Confirm user pass code. To cancel, close the user lock without confirming the new code. To close the user lock, enter an invalid user pass code into 96.07 Pass code then activate 96.27 Control board boot or cycle the power.		4
A6D1	FBA A parameter conflict.	Fieldbus adapter A (FBA A): The drive does not have a functionality requested by a PLC or a requested functionality has not been activated. See also 65A1. The settings of parameter groups 50 Fieldbus adapter (FBA) and 51 FBA A settings are not set according to the fieldbus adapter or the device has not been selected. Check: – The PLC programming. – The settings of parameter groups 50 Fieldbus adapter (FBA) and 51 FBA A settings. – The configuration of the fieldbus adapter.		4
A6D2	FBA B parameter conflict.	Fieldbus adapter B (FBA B): The drive does not have a functionality requested by a PLC or a requested functionality has not been activated. See also 65A2. The settings of parameter groups 50 Fieldbus adapter (FBA) and 54 FBA B settings are not set according to the fieldbus adapter or the device has not been selected. Check: – The PLC programming. – The settings of parameter groups 50 Fieldbus adapter (FBA) and 54 FBA B settings. – The configuration of the fieldbus adapter.		4
A6DA	Reference source parametrization.	A reference source is simultaneously connected to multiple parameters with different units. See also 65B1. Check:		4

Code	Warning/Notice	Cause and what to do		Warning level
		– The reference source selection parameters. – The auxiliary code (format YYZZ). YY specifies the parameter group. ZZ specifies the parameter number.		
A6E5	AI parametrization	The current/voltage hardware setting of an analog input does not correspond to the parameter settings. Check the auxiliary code. The code identifies the analog input whose settings are in conflict. Adjust either the jumper (J1, J2) setting on the control board or parameters 12.15, 12.25. **Note:** Control board reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings.		4
A6E6	ULC configuration	User load curve configuration error. Check the auxiliary code (format XXXX ZZZZ). ZZZZ indicates the problem. Actions see below.		4
	0000	Speed points inconsistent. Check that each speed point, see parameters 37.11 … 37.15, has a higher value than the previous point.		
	0002	Underload point above overload point.	Check that each overload point, see parameters 37.31 … 37.35, has a higher value than the corresponding underload point, see parameters 37.21 … 37.25.	
	0003	Overload point below underload point.		
A780	Motor stall. Programmable, see 31.24 Stall function.	Selected motor, the motor is operating in the stall region because of excessive load or insufficient motor power. See also 7121. The motor torque exceeded 31.25 Stall torque level for a time longer than 31.28 Stall time while the speed feedback was below 31.26 Stall speed level. Check: – The motor load/mechanics (e.g. brake). – The drive ratings. – For correct field current. – The settings of 31.24 Stall function, 31.25 Stall torque level, 31.26 Stall speed level and 31.28 Stall time. – The settings for current and torque limits in group 30 Control limits.		1
A781	Motor fan acknowledge. Programmable, see 20.39 Motor fan acknowledge source.	Motor/External cooling fan feedback at the DI is missing. See also 71B1. Check: – The setting of 20.39 Motor fan acknowledge source. – The fan operation and connection. Replace the motor/external fan if faulty. – The fan contactor. – The fan supply voltage.		2
A782	Measurement circuit FEN temperature	Problem with the temperature measurement when a FEN-xx is used. Check that 35.11 Temperature 1 source and 35.21 Temperature 2 source setting corresponds to the actual installation connected to the encoder interface.		1
		Problem with the temperature measurement when a FEN-01 is used. A non-supported KTY sensor is connected to the encoder interface FEN-01. Use either a PTC sensor or another encoder interface module.		

Code	Warning/Notice	Cause and what to do	Warning level
A797	Speed feedback configuration.	The speed feedback configuration via encoder interface modules has changed. See also 73A0. Check the auxiliary code (format XXYY ZZZZ). XX specifies the encoder interface module. 01: For module 1 see parameters 91.11 and 91.12. 02: For module 2 see parameters 91.13 and 91.14. YY specifies the encoder. 01: Group 92 Encoder 1 configuration. 02: Group 93 Encoder 2 configuration. ZZZZ indicates the problem. Actions see below.	4
	0001	Adapter not found in specified slot. Check module location. See parameters 91.12 and 91.14.	
	0002	Detected type of interface module does not match parameter setting. Check the module type parameters 91.11 and 91.13 against status parameters 91.02 and 91.03.	
	0003	Logic version too old. Contact your local ABB representative.	
	0004	Firmware version too old. Contact your local ABB representative.	
	0006	Encoder type incompatible with interface module type. Check module type parameters 91.11 and 91.13 against encoder type parameters 92.01 and 93.01.	
	0007	Adapter not configured. Check module location parameters 91.12 and 91.14.	
	0008	Speed feedback configuration has changed. Use 91.10 Encoder parameter refresh to validate any changes in the settings.	
	0009	No encoders configured in the encoder module. Configure the encoder in group 92 Encoder 1 configuration or 93 Encoder 2 configuration.	
	000A	Non-existing emulation input. Check input selection parameters 91.31 and 91.41.	
	000B	Echo not supported by the selected input. E.g. resolver or absolute encoder. Check: – The input selection parameters 91.31 and 91.41. – The interface module type against the encoder type.	
	000C	Emulation in continuous mode not supported. Check: – The input selection parameters 91.31 and 91.41. – The serial link mode parameters 92.30 and 93.30.	
A798	Encoder interface communication. Programmable, see 31.35 Motor feedback fault and 31.38 Load feedback fault.	Measured motor/load feedback via an encoder interface module is lost. Check: – That the encoder interface module is properly seated in its slot. – That the encoder interface module or slot connectors are not damaged. To pinpoint the problem, try installing the module into another slot. – The auxiliary code (format XXXX YYYY). YYYY indicates the problem. Actions see below.	4
	0001	Failed answer to encoder configuration message. / Contact your local ABB representative.	

Code	Warning/Notice	Cause and what to do	Warning level
	0002	Failed answer to adapter watchdog disable message.	
	0003	Failed answer to adapter watchdog enable message.	
	0004	Failed answer to adapter configuration message.	
	0005	Too many failed answers inline to speed and position messages.	
	0006	DDCS driver failed.	
A7A1	Mechanical brake not closed. Programmable, see 44.17 M1 brake fault function.	Selected motor, the acknowledge signal for the mechanical brake closed (applied) stage at the DI is missing. See also 71A2. Check: – The mechanical brake itself. – The mechanical brake cable connections. – The mechanical brake settings in group 44 Mechanical brake control. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	4
A7A2	Mechanical brake not opened. Programmable, see 44.17 M1 brake fault function.	Selected motor, the acknowledge signal for the mechanical brake opened (applied) stage at the DI is missing. See also 71A3. Check: – The mechanical brake itself. – The mechanical brake cable connections. – The mechanical brake settings in group 44 Mechanical brake control. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	4
A7A5	Mechanical brake opening not allowed. Programmable, see 44.17 M1 brake fault function.	Selected motor, open (lift) conditions of the mechanical brake are not fulfilled. See also 71A5. The brake has been prevented from opening (lifting) by 44.11 M1 keep brake closed, 44.12 Brake close request or torque actual does not reach 44.10 M1 brake open torque, during torque proving. Check: – The mechanical brake settings in group 44 Mechanical brake control. Especially 44.11 M1 keep brake closed and 44.12 Brake close request. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	4
A7AA	Extension AI parameterization.	The hardware current/voltage and parameter settings do not match for an analog input on an I/O extension module. Check the auxiliary code (format XX00 00YY). XX specifies the number of the I/O extension module. 01: Group 14 I/O extension module 1. 02: Group 15 I/O extension module 2. 03: Group 16 I/O extension module 3. YY specifies the analog input on the module. **Example:** In case of I/O extension module 1 and analog input AI1 the auxiliary code is 0100 0001). The hardware current/voltage setting on the module is shown by 14.29 AI1 HW switch position. The corresponding parameter setting is in 14.30 AI1 unit	4

Code	Warning/Notice	Cause and what to do	Warning level
		selection. Adjust either the hardware setting on the module or the parameter to solve the mismatch. **Note:** Control board reboot, either by cycling the power or through 96.27 Control board boot, is required to validate any changes in the hardware settings.	
A7AB	I/O extension configuration.	The I/O extension module/DCSLink board (SDCS-DSL-4) types and locations specified by parameters do not match the detected configuration or do not communicate with the drive. See also 7082. Check: – The type and location settings of the modules/board. See parameters 14.01, 14.02, 15.01, 15.02, 16.01, 16.02, 70.01 and 70.02. – That the module/board is properly seated in its slot. – That the module/board and the slot connector is not damaged. – Try installing the module into another slot. – Check the auxiliary code (format XXYY YYYY). XX specifies the number of the I/O extension module. 01: Group 14 I/O extension module 1. 02: Group 15 I/O extension module 2. 03: Group 16 I/O extension module 3. 04: Group 70 DCSLink Communication. YY YYYY indicates the problem. Actions see below.	4
	00 0001	Communication with module/board failed.	
	00 0002	Module/Board not found.	
	00 0003	Configuration of module/board failed.	
	00 0004		
A7B0	Motor speed feedback. Programmable, see 31.35 Motor feedback fault.	Selected motor, no motor speed feedback is received. See also 7301. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration. YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	4
	0001	Motor gear definition invalid or outside limits. Check motor gear settings. See 90.43 Motor gear numerator and 90.44 Motor gear denominator.	
	0004	Speed feedback device not configured. Check the settings of the speed feedback device: – Encoder 1, see group 92 Encoder 1 configuration. – Encoder 2, see group 93 Encoder 2 configuration. – The OnBoard encoder, see group 94 OnBoard speed feedback configuration. – The tacho, see group 94 OnBoard speed feedback configuration.	

Code	Warning/Notice	Cause and what to do	Warning level
		Use 91.10 Encoder parameter refresh to validate any changes in the settings for an encoder.	
	0005	Speed feedback device stopped working. Check the status of the speed feedback device.	
	0006	Speed feedback device drift detected. Check for slippage between speed feedback device and motor.	
	0007	The comparison of the measured speed feedback from pulse encoder or analog tacho to measured EMF has failed. Check: – The setting of 90.41 M1 feedback selection, 31.14 Fault stop mode fault level 3, 31.35 Motor feedback fault, 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level. – At the encoder: The encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances, jumper J4 on the SDCS-CON-H01. – At the tacho: The tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances. – EMF: The armature cable connection form the drive to the motor and the polarity.	
A7B1	Load speed feedback. Programmable, see 31.38 Load feedback fault.	Selected motor, no load speed feedback is received. See also 73A1. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration. YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	4
	0001	Load gear definition invalid or outside limits. Check load gear settings. See 90.53 Load gear numerator and 90.54 Load gear denominator.	
	0002	Feed constant definition invalid or outside limits. Check feed constant settings. See 90.63 Feed constant numerator and 90.64 Feed constant denominator.	
	0003	Motor/load gear definition invalid or outside limits. Check motor/load gear settings. See 90.61 Gear numerator and 90.62 Gear denominator.	
	0004	Speed feedback device not configured. Check the settings of the speed feedback device: – Encoder 1, see group 92 Encoder 1 configuration. – Encoder 2, see group 93 Encoder 2 configuration. – The OnBoard encoder, see group 94 OnBoard speed feedback configuration. – The tacho, see group 94 OnBoard speed feedback configuration. Use 91.10 Encoder parameter refresh to validate any changes in the settings for an encoder.	

Code	Warning/Notice	Cause and what to do	Warning level
	0005	Speed feedback device stopped working. Check the status of the speed feedback device.	
	0007	The comparison of the measured speed feedback from pulse encoder or analog tacho to measured EMF has failed. Check: – The setting of 90.41 M1 feedback selection, 31.14 Fault stop mode fault level 3, 31.35 Motor feedback fault, 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level. – At the encoder: The encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances, jumper J4 on the SDCS-CON-H01. – At the tacho: The tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances. – EMF: The armature cable connection form the drive to the motor and the polarity.	
A7C1	FBA A communication. Programmable, see 50.02 FBA A comm loss func.	Fieldbus adapter A (FBA A): Cyclical communication between PLC and fieldbus adapter module A or between drive and fieldbus adapter module A is lost. See also 7510. 7510 FBA A communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7C1 FBA A communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus communication. See user documentation of the fieldbus interface. – The settings of groups 50 Fieldbus adapter (FBA), 51 FBA A settings, 52 FBA A data in and 53 FBA A data out. – The cable connections. – The fieldbus termination. – The fieldbus adapter. – That the master is able to communicate.	4
A7C2	FBA B communication. Programmable, see 50.32 FBA B comm loss func.	Fieldbus adapter B (FBA B): Cyclical communication between PLC and fieldbus adapter module B or between drive and fieldbus adapter module B is lost. See also 7520. 7520 FBA B communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7C2 FBA B communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus communication. See user documentation of the fieldbus interface. – The settings of group 50 Fieldbus adapter (FBA), 54 FBA B settings, 55 FBA B data in and 56 FBA B data out. – The cable connections. – The fieldbus termination. – The fieldbus adapter. – That the master is able to communicate.	4
A7CA	DDCS controller communication.	Cyclical communication between DDCS (fiber optic) controller and drive is lost or there is no communication at all. The drive is waiting for the very first dataset. See also 7581. Check:	4

Code	Warning/Notice	Cause and what to do	Warning level
	Programmable, see 60.59 DDCS controller comm loss function.	– The status/settings of the DDCS controller. See user documentation of the DDCS controller. – The adapters between DDCS controller and drive. – The setting of 20.01 Command location. – The settings of group 60 DDCS communication, 61 D2D and DDCS transmit data and 62 D2D and DDCS receive data. – The fiber optic cable connections.	
A7CB	Master-follower communication. Programmable, see 60.09 M/F comm loss function.	Cyclical communication between master and a follower (DDCS/D2D) is lost or there is no communication at all. The drive is waiting for the very first dataset. See also 7682. Check: – The auxiliary code. It indicates which node address on the master-follower link is affected. See 60.02 M/F node address in each drive. – The setting of 20.01 Command location. – The settings of group 60 DDCS communication. – The cable connections.	4
A7CE	EFB communication. Programmable, see 58.14 Communication loss action.	Cyclical communication to the embedded fieldbus (EFB) is lost. See also 6681. 6681 EFB communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7CE EFB communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus master (online, offline, error etc.). – The settings of group 58 FBA Embedded fieldbus. – The cable connections to connector XD2D on the control board. – The fieldbus termination.	4
A7E1	Speed feedback device. Programmable, see 31.35 Motor feedback fault.	Speed feedback device error. See also 7381. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration. YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	1
	0001	Cable fault. If the encoder was working previously, check the encoder, encoder cable and encoder interface module for damage. Check: – The conductor order at both ends of the encoder cable. – The groundings of the encoder cable. – 92.21 Encoder cable fault mode. – 94.29 OnBoard encoder cable fault mode.	
	0002	No encoder signal. Check the condition of the encoder.	

Code	Warning/Notice	Cause and what to do		Warning level
	0003	Overspeed.	Contact your local ABB representative.	
	0004	Over frequency.		
	0005	Resolver ID run failed.		
	0006	Resolver overcurrent fault.		
	0007	Speed scaling error. The parameters causing the warning can be identified in the auxiliary code (format YYZZ). YY specifies the parameter group. ZZ specifies the parameter number. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The settings of 30.11 M1 minimum speed, 30.12 M1 maximum speed, 31.30 M1 overspeed trip margin, 46.01 M1 speed scaling and 99.14 M1 nominal (base) speed.		
	0008	Absolute encoder communication error.	Contact your local ABB representative.	
	0009	Absolute encoder initialization error.		
	000A	Absolute SSI encoder configuration error.		
	000B	Encoder reported an internal error.	See the documentation of the encoder.	
	000C	Encoder reported a battery error.		
	000D	Encoder reported overspeed or decreased resolution due to overspeed.		
	000E	Encoder reported a position counter error.		
	000F	Encoder reported an internal error.		
	0010	Speed feedback device. Speed feedback was change from speed feedback device to EMF.		
	0011	Encoder speed feedback. Speed feedback was change from one encoder to the other encoder (only valid if 2 encoders are connected).		
	0012	Selected motor, wrong direction of speed feedback. The speed feedback direction of tacho and encoders is checked against the speed feedback direction of the EMF. See 90.41 M1 feedback selection. Check: – The real direction of motor rotation. – The settings of 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level. – The connection of the tacho cable. To correct, swap the two wires. – The connection of the encoder cable. To correct, swap e.g. channels A and A-. – The connection of armature and field cables.		
	0013	Selected motor, tacho range. If Tacho range comes up for longer than 10 s, there is an overflow at the tacho input.		

Code	Warning/Notice	Cause and what to do	Warning level
		Check: – That the tacho voltage at overspeed fits to the tacho input. It should not be higher than 270 V.	
	0014	Re-do the tacho fine-tuning. 31.30 M1 overspeed trip margin or 42.25 M2 overspeed trip margin have been changed. Use 99.20 Tuning request = Tacho fine-tuning.	
A7EE	Control panel/PC tool link communication. Programmable, see 49.05 Communication loss action.	Control panel/PC tool has stopped communicating. See also 7081. Check: – The setting of 49.05 Communication loss action. – The control panel/PC tool connection cable. – The control panel connector. – The mounting platform if being used. – Disconnect and reconnect the control panel/PC tool.	4
A880	Motor bearings. Programmable, see 33.14 On-time 1 warn message, 33.24 On-time 2 warn message, 33.55 Value counter 1 warn message and 33.65 Value counter 2 warn message	Warning generated by an on time timer or a value counter. See group 33 Generic timer & counter. Check the auxiliary code for the source of the warning. 0: 33.13 On-time 1 source. 1: 33.23 On-time 2 source. 4: 33.53 Value counter 1 source. 5: 33.63 Value counter 2 source.	4 (default) 1 … 5 user selectable
A881	Any relay.	Warning generated by an edge counter. See group 33 Generic timer & counter. Programmable warnings, see 33.35 Edge counter 1 warn message and 33.45 Edge counter 2 warn message. Check the auxiliary code for the source of the warning. 2: 33.33 Edge counter 1 source. 3: 33.43 Edge counter 2 source.	4 (default) 1 … 5 user selectable
A882	Motor starts.		
A883	Power ups.		
A884	Mains contactor.		
A885	DC-breaker.		
A886	On-time 1. (Editable message text) Programmable, see 33.14 On-time 1 warn message.	Warning generated by on-time timer 1. See group 33 Generic timer & counter. Check the source of the warning. See 33.13 On-time 1 source.	4 (default) 1 … 5 user selectable
A887	On-time 2. (Editable message text) Programmable, see 33.24 On-time 2 warn message.	Warning generated by on-time timer 2. See group 33 Generic timer & counter. Check the source of the warning. See 33.23 On-time 2 source.	4 (default) 1 … 5 user selectable
A888	Edge counter 1. (Editable message text) Programmable, see 33.35 Edge counter 1 warn message.	Warning generated by edge counter 1. See group 33 Generic timer & counter. Check the source of the warning. See 33.33 Edge counter 1 source.	4 (default) 1 … 5 user selectable
A889	Edge counter 2. (Editable message text) Programmable, see 33.45 Edge counter 2 warn message.	Warning generated by edge counter 2. See group 33 Generic timer & counter. Check the source of the warning. See 33.43 Edge counter 2 source.	4 (default) 1 … 5 user selectable

Code	Warning/Notice	Cause and what to do	Warning level
A88A	Value counter 1. (Editable message text) Programmable, see 33.55 Value counter 1 warn message.	Warning generated by value counter 1. See group 33 Generic timer & counter. Check the source of the warning. See 33.53 Value counter 1 source.	4 (default) 1 … 5 user selectable
A88B	Value counter 2. (Editable message text) Programmable, see 33.65 Value counter 2 warn message.	Warning generated by value counter 2. See group 33 Generic timer & counter. Check the source of the warning. See 33.63 Value counter 2 source.	4 (default) 1 … 5 user selectable
A88C	Clean device.	Warning generated by an on time timer. See group 33 Generic timer & counter. Programmable warnings, see 33.14 On-time 1 warn message and 33.24 On-time 2 warn message. Check the auxiliary code for the source of the warning. 0: 33.13 On-time 1 source. 1: 33.23 On-time 2 source. 10: 05.04 Fan on-time counter.	4 (default) 1 … 5 user selectable
A88D	Any fan.		
A88E	Cabinet fan.		
A88F	Cooling fan.		
A890	Additional cooling.		
A8A0	AI supervision. Programmable, see 12.03 AI supervision function.	An analog signal is outside the limits specified for the analog input. See also 80A0. Check: – The auxiliary code (format XYY). X specifies the location of the input. 0: Control board. 1: I/O extension module 1. 2: I/O extension module 2 3: I/O extension module 3. 4: …. YY specifies the input and limit. 01: AI1 under minimum. 02: AI1 over maximum. 03: AI2 under minimum. 04: AI2 over maximum. 05: AI3 under minimum. 06: AI3 over maximum. – The signal level at the analog input. – The wiring connected to the input. – Polarity of the connection. – The minimum and maximum limits of the input in groups 12 Standard AI, 14 I/O extension module 1, 15 I/O extension module 2 and 16 I/O extension module 3.	4
A8B0	Signal supervision 1. (Editable message text) Programmable, see 32.06 Supervision 1 action.	Warning generated by signal supervision 1. See group 32 Supervision. See also 80B0. Check the source of the warning. See 32.07 Supervision 1 signal.	4 (default) 1 … 5 user selectable
A8B1	Signal supervision 2. (Editable message text) Programmable, see 32.16 Supervision 2 action.	Warning generated by signal supervision 2. See group 32 Supervision. See also 80B1. Check the source of the warning. See 32.17 Supervision 2 signal.	4 (default) 1 … 5 user selectable

Code	Warning/Notice	Cause and what to do	Warning level
A8B2	Signal supervision 3. (Editable message text) Programmable, see 32.26 Supervision 3 action.	Warning generated by signal supervision 3. See group 32 Supervision. See also 80B2. Check the source of the warning. See 32.27 Supervision 3 signal.	4 (default) 1 … 5 user selectable
A8BE	ULC overload. Programmable, see 37.03 ULC overload actions.	Selected signal has exceeded the user overload curve. See group 37 User load curve. See also 8002. Check: – For any operating conditions increasing the monitored signal. E.g., the load of the motor if the torque or current is being monitored. – The definition of the load curve.	4 (default) 1 … 5 user selectable
A8BF	ULC underload. Programmable, see 37.04 ULC underload actions.	Selected signal has fallen below the user underload curve. See group 37 User load curve. See also 8001. Check for any operating conditions decreasing the monitored signal. E.g., the loss of load if the torque or current is being monitored. Check the definition of the load curve.	4 (default) 1 … 5 user selectable
A8C0	Fan service counter	A cooling fan has reached the end of its estimated lifetime. See 05.41 Main fan service counter and 05.42 Auxiliary fan service counter. Check the auxiliary code for the fan to be replaced. 0: Main cooling fan. 1: Auxiliary cooling fan. 2: Auxiliary cooling fan 2. 3: Cabinet cooling fan. Refer to the DCS880 Service Manual (3ADW000xxx) of the drive for fan replacement instructions.	4
A981	External warning 1. (Editable message text) Programmable, see 31.01 External event 1 source and 31.02 External event 1 type.	There is no problem with the drive itself! Warning generated by external device 1. See group 31 Fault functions and fault levels. See also 9081. Check: – External device 1. – 31.01 External event 1 source.	4 (default) 1 … 5 user selectable.
A982	External warning 2. (Editable message text) Programmable, see 31.03 External event 2 source and 31.04 External event 2 type.	There is no problem with the drive itself! Warning generated by external device 2. See group 31 Fault functions and fault levels. See also 9082. Check: – External device 2. – 31.03 External event 2 source.	4 (default) 1 … 5 user selectable
A983	External warning 3. (Editable message text) Programmable, see 31.05 External event 3 source and 31.06 External event 3 type.	There is no problem with the drive itself! Warning generated by external device 3. See group 31 Fault functions and fault levels. See also 9083. Check: – External device 3. – 31.05 External event 3 source.	4 (default) 1 … 5 user selectable
A984	External warning 4. (Editable message text) Programmable, see 31.07 External event 4 source and 31.08 External event 4 type.	There is no problem with the drive itself! Warning generated by external device 4. See group 31 Fault functions and fault levels. See also 9084. Check: – External device 4. – 31.07 External event 4 source.	4 (default) 1 … 5 user selectable
A985	External warning 5. (Editable message text)	There is no problem with the drive itself!	4 (default)

Code	Warning/Notice	Cause and what to do	Warning level
	Programmable, see 31.09 External event 5 source and 31.10 External event 5 type.	Warning generated by external device 5. See group 31 Fault functions and fault levels. See also 9085. Check: – External device 5. – 31.09 External event 5 source.	1 … 5 user selectable
AF8C	Process PID sleep mode.	The drive is entering sleep mode. Informative warning. See parameters 40.41 … 40.48.	4
AF90	Autotuning.	The autotuning or assistant did not complete successfully. Check the auxiliary code (format 00XX YYYY). XX specifies the autotuning or assistant. 01: Field current autotuning. 02: Armature current autotuning. 03: Speed feedback assistant. 04: Speed controller autotuning. 05: EMF controller autotuning. 06: Flux linearization autotuning. YYYY indicates the problem. Actions see below.	4
	0000	The drive was stopped before the autotuning finished. Repeat autotuning until successful.	
	0001	The drive was started but was not ready to follow the autotuning command. Make sure the prerequisites of the autotuning run are fulfilled.	
	0002	Required torque reference could not be reached before the drive reached base speed. Decrease torque step or increase speed step. See 25.38 Autotune torque step and 25.39 Autotune speed step.	
	0003	Motor could not accelerate to base speed. Increase torque step or decrease speed step. See 25.38 Autotune torque step and 25.39 Autotune speed step.	
	0005	Motor could not decelerate with full autotuning torque. Decrease torque step or speed step. See 25.38 Autotune torque step and 25.39 Autotune speed step.	
	0011	Autotuning aborted by fault or removing the Run command (06.09.b03 Used main control word).	
	0012	Autotuning timeout, Run command (06.09.b03 Used main control word) is not set in time.	
	0013	Motor is still turning. No speed zero indication.	
	0014	Field current not zero.	
	0015	Armature current not zero.	
	0016	Armature voltage measurement circuit open (e.g. not connected at C1/D1 or at the SDCS-PIN-H51) or interrupted. This can be checked by measuring the motor resistance at C1/D1 and the SDCS-PIN-H51. Check also current and torque limits.	
	0017	Armature circuit and/or armature voltage measurement circuit wrongly connected (e.g. at C1/D1 or at the SDCS-PIN-H51).	
	0018	No load connected to armature circuit.	
	0019	– Invalid nominal armature current setting. – Armature current 99.11 M1 nominal current is set to zero.	
	0020	Field current does not decrease when the excitation is switched off.	
	0021	– Measured field current does not reach the field current reference. – No detection of field resistance. – Field circuit open (e.g. not connected) respectively interrupted.	

Code	Warning/Notice	Cause and what to do	Warning level
	0022	No writing of control parameters of speed controller possible.	
	0023	Tacho adjustment faulty or not OK or the tacho voltage is too high during autotuning	
	0024	Tuning of speed controller, speed feedback assistant or tacho fine-tuning not possible due to speed limitation - see 30.11 M1 minimum speed and 30.12 M1 maximum speed.	
	0025	Tuning of speed controller, speed feedback assistant or tacho fine-tuning not possible due to voltage limitation. During the tuning of the speed controller, the speed feedback assistant or the tacho fine-tuning base speed, 99.14 M1 nominal (base) speed, might be reached. Thus full armature voltage, 99.12 M1 nominal voltage, is necessary. In case the mains voltage is too low to provide for the needed armature voltage the autotuning procedure is canceled. Check and adapt if needed: – Mains voltage – 99.12 M1 nominal voltage – 99.14 M1 nominal (base) speed	
	0026	Field weakening not allowed. See 90.41 M1 feedback selection and 28.41EMF/Field control mode.	
	0027	Discontinuous current limit could not be determined due to low current limitation in 30.34 M1 current limit bridge 2 or 30.35 M1 current limit bridge 1.	
	0028	Field current autotuning wrongly started in armature drive, please use the field exciter.	
	0029	No field exciter selected. See 99.07 M1 used field exciter type.	
	0031	Control panel up- or download not started.	
	0032	Control panel data not up- or downloaded in time	
	0034	Control panel up -or download checksum faulty.	
	0035	Control panel up- or download software faulty.	
	0036	Control panel up- or download verification failed.	
	0041	The flash is written to cyclic by Adaptive Program (e.g. block ParWrite) or application program. Cyclic saving of values in the flash will damage it! Do not write cyclic on the flash!	
	0090	Short circuit caused by V1 (V11).	
	0091	Short circuit caused by V2 (V12).	
	0092	Short circuit caused by V3 (V13).	
	0093	Short circuit caused by V4 (V14).	
	0094	Short circuit caused by V5 (V15).	
	0095	Short circuit caused by V6 (V16).	
	0096	Thyristor block test failed.	
	0097	Short circuit caused by V15 or V22.	
	0098	Short circuit caused by V16 or V23.	
	0099	Short circuit caused by V11 or V24.	
	0100	Short circuit caused by V12 or V25.	
	0101	Short circuit caused by V13 or V26.	
	0102	Short circuit caused by V14 or V21.	
	0103	Motor connected to ground.	
	0104	Armature winding is not connected.	
	1000	Possibly trigger pulse channels are mixed up.	
	1xdd	V1 or V11 not conducting.	
	2xdd	V2 or V12 not conducting.	

Code	Warning/Notice	Cause and what to do	Warning level
	3xdd	V3 or V13 not conducting.	
	4xdd	V4 or V14 not conducting.	
	5xdd	V5 or V15 not conducting.	
	6xdd	V6 or V16 not conducting.	
	Example	– x = 0: Only a single thyristor in bridge 1 is not conducting (e.g. 320dd means V2 respectively V12 is not conducting). – x = 1 … 6: Additionally a second thyristor in bridge 1 is no conducting (e.g. 325dd means V2 and V5 respectively V12 and V15 are not conducting). – dd = don't care: The numbers of this digits do not carry any information about the thyristors of the first bridge. Thus, 36030 means V16 in bridge 1 and V23 in bridge 2 are not conducting.	
	dd1y	V21 not conducting.	
	dd2y	V22 not conducting.	
	dd3y	V23 not conducting.	
	dd4y	V24 not conducting.	
	dd5y	V25 not conducting.	
	dd6y	V26 not conducting.	
	Example	– y = 0: Only a single thyristor in bridge 2 is not conducting (e.g. 3dd20 means V22 is not conducting). – y = 1 … 6: Additionally a second thyristor in bridge 2 is no conducting (e.g. 3dd25 means V22 and V25 are not conducting). – dd = don't care: The numbers of this digits do not carry any information about the thyristors of the second bridge. Thus, 36030 means V16 in bridge 1 and V23 in bridge 2 are not conducting.	
	XXXX	Autotuning active. An autotuning is currently running.	
AFE1	Off 2 (emergency off).	The drive has received an Off2 command (emergency off/fast current off). There is no problem with the drive itself! Check: – The auxiliary code (format 00XX YYYY). XX specifies the source of the Off2 command. 04: 20.04 Off2 source 1 (emergency off). 08: 20.08 Off2 source 2 (emergency off). 09: 06.09.b01 Used main control word. YYYY specifies the digital input or bit. 0000: Other [bit]; source selection. 0100: Off2 command; 0, emergency off/fast current off. 0101: Off2 inactive; 1, normal operation. 0103: DI1; 10.02.b00 DI delayed status. 0104: DI2; 10.02.b01 DI delayed status. 0105: DI3; 10.02.b02 DI delayed status. 0106: DI4; 10.02.b03 DI delayed status. 0107: DI5; 10.02.b04 DI delayed status. 0108: DI6; 10.02.b05 DI delayed status. 0111: DIO1; 11.02.b00 DIO delayed status. 0112: DIO2; 11.02.b01 DIO delayed status. 0119: DIL; 10.02.b15 DI delayed status. 1001: 06.09.b01 Used main control word. – That it is safe to continue operation.	1

Code	Warning/Notice	Cause and what to do	Warning level
		– That it is safe to reset the source of the Off2 command. E.g. a push button. Then restart the drive. – If necessary, invert the signal, since the signal should be low active.	
		Follower drive in a master-follower configuration. The drive has received an Off2 command from the master. Informative warning. After stopping on an Off2 command, the master sends a short, 10 ms Off2 command to the follower(s). Thus, the Off2 event is stored in the event log of the follower.	
AFE2	Off 3 (emergency stop).	The drive has received an Off3 command (emergency stop). There is no problem with the drive itself! Check: – The auxiliary code (format 00XX YYYY). XX specifies the source of the Off2 command. 05: 20.05 Emergency stop source. 09: 06.09.b02 Used main control word. YYYY specifies the digital input or bit. 0000: Other [bit]; source selection. 0100: Off2 command; 0, emergency off/fast current off. 0101: Off2 inactive; 1, normal operation. 0103: DI1; 10.02.b00 DI delayed status. 0104: DI2; 10.02.b01 DI delayed status. 0105: DI3; 10.02.b02 DI delayed status. 0106: DI4; 10.02.b03 DI delayed status. 0107: DI5; 10.02.b04 DI delayed status. 0108: DI6; 10.02.b05 DI delayed status. 0111: DIO1; 11.02.b00 DIO delayed status. 0112: DIO2; 11.02.b01 DIO delayed status. 0119: DIL; 10.02.b15 DI delayed status. 1002: 06.09.b02 Used main control word. – That it is safe to continue operation. – That it is safe to reset the source of the Off2 command. E.g. a push button. Then restart the drive. – If necessary, invert the signal, since the signal should be low active.	1
		Follower drive in a master-follower configuration. The drive has received an Off3 command from the master. Informative warning. After stopping on an Off3 command, the master sends a short, 10 ms Off3 command to the follower(s). Thus, the Off3 event is stored in the event log of the follower.	
AFE7	Follower.	A follower drive has tripped. Check the auxiliary code. Add 2 to the code to find out the node address of the faulted follower. Then correct its fault.	1
AFEB	Run enable command. (Editable message text)	No run enable command received. Check: – The setting of 20.12 Enable run command source. – That the signal of the selected source is enabled. – The wiring of selected source.	1
B5A0	Safe torque off. Programmable, see 31.22 STO indication run/stop.	STO active, no drive problem. See safety supplement for functional safety converter DCS880 (3ADW000452). See also A5A0 and 5091.	4
B5A3	Safe off main contactor XSTOMC.	STO monitor DC current not zero. See safety supplement for functional safety converter DCS880 (3ADW000452). See also A5A3 and 5093.	4

Code	Warning/Notice	Cause and what to do	Warning level
	Programmable, see 31.90 XSTOMC Indication.		
B5A4	Firmware internal diagnostics.	Drive control unit rebooted unexpectedly. Notice.	4

Faults

In case a fault occurs, it stays active until the cause is eliminated and a Reset is given. All fault signals are resetable except of:

- 50FE Type code.
- 6000 Internal firmware.
- F501 Auxiliary undervoltage.
- F547 Drive hardware.

To reset a fault following steps are required:

- The above-mentioned faults can only be reset by cycling the power.
- Remove the Run and On commands.
- Eliminate the faults.
- Acknowledge the fault with Reset via digital input, overriding control system or with Control panel/PC tool.
- Depending on the systems condition, generate Run and On commands again.

Fault levels

The fault signals will switch the drive off completely or partly depending on its fault level.
The fault handling provides 6 fault levels.

Fault level 1

- The main contactor is switched off immediately.
- The field contactor is switched off immediately.
- The fan contactor is switched off immediately.

Fault level 2

- The main contactor is switched off immediately.
- The field contactor is switched off immediately.
- The fan contactor stays on as long as the fault is pending or as long as 20.40 Drive/Motor fan delay time is running.

Fault level 3

The drive is stopping via 31.14 Fault stop mode fault level 3, thus:

- The main contactor is switched off immediately.
- The field contactor is switched off immediately in case of 31.14 Fault stop mode fault level 3 = Coast stop, but it stays on in case of field heating or SpeedFbFltMode (30.36) = Dynamic braking (this is valid for all level 3 faults).
- The fan contactor stays on.

At standstill:

- The main contactor cannot be switched on again.
- The field contactor stays on in case of field heating.
- The fan contactor stays on as long as 20.40 Drive/Motor fan delay time is running.

Fault level 4

The drive is stopping via 31.15 Fault stop mode fault level 4, thus:

- The main contactor is switched off immediately in case of 31.15 Fault stop mode fault level 4 = Coast stop or Dynamic braking, but it stays on in case of 31.15 Fault stop mode fault level 4 = Ramp stop or Torque limit.
- The field contactor is switched off immediately in case of 31.15 Fault stop mode fault level 4 = Coast stop, but it stays on in case of field heating or 31.15 Fault stop mode fault level 4 = Ramp stop, Torque limit or Dynamic braking.
- The fan contactor is switched off immediately in case of 31.15 Fault stop mode fault level 4 = Coast stop, but stays on in case of 31.15 Fault stop mode fault level 4 = Ramp stop, Torque limit or Dynamic braking.

At standstill:

- The main contactor is switched off immediately.
- The field contactor stays on in case of field heating.
- The fan contactor stays on as long as 20.40 Drive/Motor fan delay time is running.

Fault level 5
The drive is stopping via any communication loss action - see 49.05 Communication loss action, 50.02 FBA A comm loss func, 50.32 FBA B comm loss func, 58.14 Communication loss action, 60.09 M/F comm loss function, 60.59 DDCS controller comm loss function and 70.07 DCSLink comm loss function - thus:
- The main contactor is switched off immediately or stays on depending on the selected communication loss action.
- The field contactor is switched off immediately or stays on depending on the selected communication loss action, but it stays on in case of field heating.
- The fan contactor is switched off immediately or stays on depending on the selected communication loss action.

At standstill:
- The main contactor is switched off immediately.
- The field contactor stays on in case of field heating.
- The fan contactor stays on as long as 20.40 Drive/Motor fan delay time is running.

Fault level 6
- Used for STO related faults. See safety supplement for functional safety converter DCS880 (3ADW000452).

Fault messages

The list contains the fault code in hex, its name, the cause and hints what to do.

Code	Fault	Cause and what to do	Fault level
1412	Fault reset		
2310	Armature overcurrent.	The armature current has exceeded either 07.36 Drive DC overcurrent level or 31.44 Armature overcurrent level. Check: – That the start-up data in group 99 corresponds to the motor rating plate and that the drive is matching the motor. – The setting of 07.36 Drive DC overcurrent level and 31.44 Armature overcurrent level. – The settings of the current controller in group 27 Armature current control. – The settings of current and torque limits in group 30 Control limits. – The motor and motor cables. – All connections in the armature circuit. – The incoming voltage for synchronizing. If the synchronizing voltage is not taken from the mains directly, but via a synchronizing transformer or the 230 VAC/115 VAC network, check that there is no phase shift between the same phases. Use an oscilloscope to verify. – The mains/branch fuses. – The thyristors. – That there are no contactors opening and closing in the motor cables. – That there are no power factor correction capacitors or surge absorbers between line reactor and drive. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration. In case of a rebuild kit: Check: – For proper connection of the firing pulses. – For proper connection of the CTs. – That 95.25 Set: Type code = None. The setting of 95.27 Set: Drive DC current scaling, because 07.36 Drive DC overcurrent level = 2.3 • 95.27 Set: Drive DC current scaling.	3

Code	Fault	Cause and what to do	Fault level
2330	Residual current detected. Programmable, see 31.18 Residual current detection type.	The drive has detected an unbalance typically due to a residual current in the motor or the motor cables. Sum of IL1, IL2, IL3 ≠ zero. See also A2B3. Check: – The settings of 31.17 Residual current detection source, 31.18 Residual current detection type, 31.19 Residual current detection level and 31.20 Residual current detection delay. – The residual current transformer, if necessary change transformer or connected drive hardware. – The insulation resistances of motor and motor cables. Disconnect the mains, verify safe isolation from supply in armature and field circuits and make insulation tests for the complete installation.	1
2391	DC current difference.	DC current difference between hardparallel connected power units is excessive. Check: – That the mains and motor cable routing is according to the specification for hardparallel configurations. – The branch fuses. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.	4
3130	Mains phase loss. Programmable, see 31.21 Mains phase loss.	One or several mains voltage phase(s) are missing. See also A130. Check: – The condition of the mains (voltage, cabling, fuses, switchgear). – That all 3 phases are present directly at the drive. – H1 … H5: measure the fuses F100 … F102 on the SDCS-PIN-H01. – H6 … H8: check and measure the connections XU1/XU2, XV1/XV2 and XW1/XW2 on the SDCS-PIN-H51. – For mains supply imbalance. – For loose mains cable connections. – That the mains contactor closes and opens.	3
3280	Mains low voltage.	Mains low (under-) voltage (AC side). See also A111. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The setting of 31.51.Mains loss mode, 31.52 Mains loss down time, 31.53 Mains loss low level 1 and 31.54 Mains loss low level 2. – That the mains voltage scaling is correct. See 99.10 Nominal mains voltage. – The cutting of the voltage coding resistors on the SDCS-PIN-H51. – The condition of the mains (voltage, cabling, fuses, switchgear). – That all 3 phases are present directly at the drive. – H1 … H5: measure the fuses F100 … F102 on the SDCS-PIN-H01. – H6 … H8: check and measure the connections XU1/XU2, XV1/XV2 and XW1/XW2 on the SDCS-PIN-H51.	3

Code	Fault	Cause and what to do	Fault level
		– That the mains voltage is within the set tolerance. – For mains supply imbalance. – For loose mains cable connections. – That the mains contactor closes and opens. – For H1 … H4, that the field circuit has no short circuit or ground fault. – In case an On command is given and the measured mains voltage is too low for longer than 500 ms A111 Mains low voltage is set. If the problem persist for longer than 10 s 3280 Mains low voltage is generated.	
3291	Mains voltage difference.	Mains voltage difference between hardparallel connected power units is excessive. Check: – That the mains and motor cable routing is according to the specification for hardparallel configurations. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.	4
4310	Bridge temperature measured.	Excessive bridge temperature. See also A4B0. Wait until the bridge is cooled down. The fan contactor stays on as long as the fault is pending. Temperature fault level, see 07.38 Drive max bridge temperature set. The bridge overtemperature warning will already appear at approximately 5°C below the temperature fault level. Check: – The value of 05.11 Bridge temperature. – The setting of 20.38 Drive fan acknowledge source. – The setting of 20.40 Drive/Motor fan delay time. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The drive fan supply voltage. – The drive fan direction of rotation. – The drive fan components. – The heatsink fins for dust pick-up. – The drive cooling air inlet (e.g. filters). – The drive cooling air outlet. – For open drive doors. – The motor power against the drive power. – Inadmissible load cycle. – When 95.25 Set: Type code = None, that 95.29 Set: Drive max bridge temperature is set properly. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.	2
4981	Motor temperature 1 measured/estimated. (Editable message text)	Measured/Estimated motor temperature 1 has exceeded the fault level. See also A491. Wait until the motor/motor model is cooled down under the warning level. The fan contactor stays on as long as the fault is pending. It is not possible to reset the fault as long as the motor remains too hot. Check: – The value of 35.02 Measured temperature 1. – The real motor temperature. Let motor cool down and restart. – The value of 35.12 Temperature 1 fault level.	2

Code	Fault	Cause and what to do		Fault level
		– The setting of 35.15 Supervision 1 klixon source, if klixons are used. – The cooling of the motor or other temperature measured equipment. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The motor fan supply voltage. – The motor fan direction of rotation. – The motor fan components. – The motor cooling air inlet (e.g. filters). – The motor cooling air outlet. – The motor load and drive ratings. – Inadmissible load cycle. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it. Hint: – The measured/estimated motor temperature is blocked, if 35.11 Temperature 1 source = Disable.		
4982	Motor temperature 2 measured/estimated. (Editable message text)	Measured/Estimated motor temperature 2 has exceeded the fault level. See also A492. Wait until the motor/motor model is cooled down under the warning level. The fan contactor stays on as long as the fault is pending. It is not possible to reset the fault as long as the motor remains too hot. Check: – The value of 35.03 Measured temperature 2. – The real motor temperature. Let motor cool down and restart. – The value of 35.22 Temperature 2 fault level. – The setting of 35.25 Supervision 2 klixon source, if klixons are used. – The cooling of the motor or other temperature measured equipment. – The ambient conditions (e.g. ambient temperature). – The airflow and fan operation. – The motor fan supply voltage. – The motor fan direction of rotation. – The motor fan components. – The motor cooling air inlet (e.g. filters). – The motor cooling air outlet. – The motor load and drive ratings. – Inadmissible load cycle. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it. Hint: – The measured/estimated motor temperature is blocked, if 35.21 Temperature 2 source = Disable.		2
4990	FPTC-xx module not found.	A thermistor protection module (FPTC-xx) was activated in 35.30 FPTC configuration word, but it is not detected. Power down the drive control unit and make sure that the module is properly inserted in the correct slot. The last digit of the auxiliary code identifies the slot.		4
4991	Motor temperature slot1 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-xx) installed in slot1 indicates overtemperature.	Depending on the used module, a PTC and/or KTY temperature sensor can be attached. See also A497 … A499.	2

Code	Fault	Cause and what to do		Fault level
4992	Motor temperature slot2 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-xx) installed in slot2 indicates overtemperature.	Check: – The cooling of the motor or other temperature measured equipment. – The motor load and drive ratings. – The wiring of the temperature sensor. – The resistance of the temperature sensor by measuring it.	2
4993	Motor temperature slot3 measured. (Editable message text)	The thermistor protection module (FEN-xx or FPTC-xx) installed in slot3 indicates overtemperature.		2
5080	Drive fan acknowledge. Programmable, see 31.41 Main fan fault function.	Drive cooling fan feedback at the DI is missing. See also A581. Check: – The settings of 20.38 Drive fan acknowledge source and 20.40 Drive/Motor fan delay time. – The drive fan operation and connection. – The drive fan contactor. – The drive fan circuit. – The drive fan klixon. – The drive fan components. – The drive fan supply voltage. – The drive fan direction of rotation. – The drive door open. – The drive cooling air inlet (e.g. filter). – The drive cooling air outlet. – H7 an H8 pressure switch (setting should be 2 mbar). – The used digital inputs and outputs (groups 10 and 11).		4
5090	STO hardware fault.	STO redundancy circuit control board fault. See safety supplement for functional safety converter DCS880 (3ADW000452).		6
5091	Safe torque off. Programmable, see 31.22 STO indication run/stop.	STO active, no drive problem. See safety supplement for functional safety converter DCS880 (3ADW000452). See also A5A0 and B5A0.		6
5092	STO overall fault.	Or function 5090, 5093, FA81, FA82. See safety supplement for functional safety converter DCS880 (3ADW000452). It becomes active when any of the following faults is detected in the STO related circuits: – 5090 STO hardware fault. – 5093 Safe off main contactor XSTOMC. – FA81 Safe torque off 1 loss fault. – FA82 Safe torque off 2 loss fault.		6
5093	Safe off main contactor XSTOMC. Programmable, see 31.90 XSTOMC Indication.	STO monitor DC current not zero. See safety supplement for functional safety converter DCS880 (3ADW000452). See also A5A3 and B5A3.		6
5094	Measurement circuit bridge temperature.	Problem with the internal temperature measurement of the bridge. See also A5EA. Check: – The wiring of the temperature sensor. – The temperature sensor. – The auxiliary code (format XXXY YYZZ). Y YY identifies the power unit. In case of a hardparallel configuration.		4

Code	Fault	Cause and what to do	Fault level
50FE	Type code.	The hardware of the drive does not match the information stored in the memory unit. This may occur e.g. after a firmware update or memory unit replacement. To reset, cycle the auxiliary power of the drive. Check: – The settings of 95.25 Set: Type code, 95.27 Set: Drive DC current scaling and 95.28 Set: Drive AC voltage scaling. – The auxiliary code (format 0X0Y). Y indicates the auxiliary code category. 1 = Drive control unit and power unit ratings do not match. 2 = Hardparallel connection rating ID has changed. 3 = Power unit types not the same in all power units. 4 = Hardparallel connection rating ID is active in a single power unit setup. 5 = It is not possible to implement the selected rating with the current power units. 6 = Power unit rating ID = 0. 7 = Reading power unit rating ID or power unit type failed on power unit connection. 8 = Power unit not supported (illegal rating ID). 9 = Type code inconsistencies after a firmware update or memory unit replacement. Please set the type code anew. 10 = Type code out of range. For module sizes H1 … H5 the current and voltage range of the type code setting is limited to max 1190 ADC and max 600 VAC. X identifies the first faulty power unit in hexadecimal (1 … C). In case of a hardparallel configuration.	1
5681	Power unit, communication.	Communication errors between the drive control unit and a power unit. See also A580. Check: – The connections between the drive control unit and the power unit. – The auxiliary code (format XXXY YYZZ). XXX specifies the transmitter FIFO error code. 001: Internal error [invalid call parameter]. 002: Internal error [configuration not supported]. 003: Transmission buffer full. Y YY identifies the power unit. In case of a hardparallel configuration. 0 00: Broadcast. ZZ specifies the error source. 01: Transmitter side [link error]. 02: Transmitter side [no communication]. 03: Receiver side [link error]. 04: Receiver side [no communication] 05: Transmitter FIFO error, see XX. 06: SDCS-OPL-H not found.	5
5682	Power unit, connection lost.	Connection between the drive control unit and the power unit is lost. Check the connection between the drive control unit and the power unit.	1
5692	Power unit, power board failure.	Power unit, SDCS-POW-H01 failure. See also A5EB. Check the auxiliary code (format ZZZY YYXX). Y YY identifies the power unit. In case of a hardparallel configuration.	1

Code	Fault	Cause and what to do	Fault level
5694	Power unit, communication configuration.	Version check cannot find a matching power unit FPGA logic. Contact your local ABB representative.	1
5696	Power unit, state feedback.	State feedback from the output does not match the control signals. Contact your local ABB representative, quoting the auxiliary code.	1
5698	Power unit, unknown fault.	Unidentified power unit logic fault. Check power unit logic and firmware compatibility. Contact your local ABB representative.	1
6000	Internal firmware.	Internal firmware error. To reset, cycle the auxiliary power of the drive. If the problem persist, contact your local ABB representative, quoting the auxiliary code. Check the auxiliary code (format YYYY). YYYY indicates the problem. Actions see below.	1
	0001	Default setting of parameters wrong.	
	0002	Parameter flash image too small for all parameters.	
	0004	Illegal write attempt on a signal or write-protected parameter, e.g. writing on 06.01 Main control word or 06.09 Used main control word.	
	0006	Wrong type code.	
	0007	An un-initialized interrupted has occurred.	
	0010	Wrong parameter value.	
	0101 … 9999	The read only parameter, which is being written to by means of a pointer parameter, e.g. 62.51 Data set 10 data 1 selection, Adaptive Program or application program, can be identified by means of the last 4 digits.	
6181	FPGA version incompatible.	Firmware and FPGA file version in the power unit are incompatible. Cycle the power on both the drive control and power unit. If the problem persists, contact your local ABB representative.	1
6306	FBA A mapping file.	Fieldbus adapter A mapping file read error. Contact your local ABB representative.	5
6307	FBA B mapping file.	Fieldbus adapter B mapping file read error. Contact your local ABB representative.	5
6481	Internal task overload.	Internal fault. Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
6487	Internal stack overflow.	Internal fault. Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
64A1	Internal file load.	File read error. Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
64A2	Internal record load.	Internal record load error. Contact your local ABB representative.	1
64A3	Application loading.	Application file incompatible or corrupted. Check the auxiliary code. Actions see below.	1
	8006	Not enough memory for the application.	
	8007	The application contains the wrong library version.	
	800A	The application contains an unknown target (system) library function.	
	800B … XXXX	The application load failed.	

Code	Fault	Cause and what to do	Fault level
		For more details, check 05.22 Diagnostic.	
64A5	Licensing.	Running the control program is prevented either because a restrictive license exists, or because a required license is missing. Record the auxiliary codes of all active licensing faults and contact your product vendor for further instructions.	1
64A6	Adaptive program.	Error running the adaptive program. Check the auxiliary code (format XXXX YYYY). XXXX specifies the number of the function block. 0000 = generic error. YYYY indicates the problem. Actions see below.	1
	000A	Program corrupted or block non-existent. Restore the template program or download the program to the drive.	
	000E	Program corrupted or block non-existent. Restore the template program or download the program to the drive.	
	0011	Program too large. Remove blocks until the error stops.	
	001C	A nonexistent parameter or block is used in the program. Edit the program to correct the parameter reference, or to use an existing block.	
	001E	Output to parameter failed because the parameter was write-protected. Check: The parameter reference in the program. For other sources affecting the target parameter.	
	0023	Program file incompatible with current firmware version. Adapt the program to current block library and firmware version.	
	0024		
	Other	Contact your local ABB representative, quoting the auxiliary code.	
64B0	Memory unit detached.	The memory unit was detached while the drive control unit is powered. Switch off the power to the drive control unit and reinstall the memory unit. In case the memory unit was not actually removed when the fault occurred, check that the memory unit is properly inserted into its connector and its mounting screw is tight. Then cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
64B1	Internal firmware.	Internal firmware fault. Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
64B2	User set fault.	Loading of user parameter set failed. Ensure that a valid user parameter set exists. Reload if uncertain. Check: – That the requested set does exists. See 96.14 Macro select. – That the set is compatible with the control program. – If the drive was switched off during loading. – The memory unit.	1
64E1	Kernel overload.	Operating system error. Cycle the power to the drive or use 96.27 Control board boot. If the problem persists, contact your local ABB representative.	1
6581	Parameter system.	Parameter load or save failed.	3

Code	Fault	Cause and what to do		Fault level
		Try forcing a save using 96.16 Parameter save manually.		
65A1	FBA A parameter conflict.	Fieldbus adapter A (FBA A): The drive does not have a functionality requested by a PLC or a requested functionality has not been activated. See also A6D1. The settings of parameter groups 50 Fieldbus adapter (FBA) and 51 FBA A settings are not set according to the fieldbus adapter or the device has not been selected. Check: – The PLC programming. – The settings of parameter groups 50 Fieldbus adapter (FBA) and 51 FBA A settings. – The configuration of the fieldbus adapter.		5
65A2	FBA B parameter conflict.	Fieldbus adapter B (FBA B): The drive does not have a functionality requested by a PLC or a requested functionality has not been activated. See also A6D2. The settings of parameter groups 50 Fieldbus adapter (FBA) and 54 FBA B settings are not set according to the fieldbus adapter or the device has not been selected. Check: – The PLC programming. – The settings of parameter groups 50 Fieldbus adapter (FBA) and 54 FBA B settings. – The configuration of the fieldbus adapter.		5
65B1	Reference source parametrization.	A reference source is simultaneously connected to multiple parameters with different units. See also A6DA. Check: – The reference source selection parameters. – The auxiliary code (format YYZZ). YY specifies the parameter group. ZZ specifies the parameter number.		3
6681	EFB communication. Programmable, see 58.14 Communication loss action.	Cyclical communication to the embedded fieldbus (EFB) is lost. See also A7CE. 6681 EFB communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7CE EFB communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus master (online, offline, error etc.). – The settings of group 58 FBA Embedded fieldbus. – The cable connections to connector XD2D on the control board. – The fieldbus termination.		5
6682	EFB configuration file.	Embedded fieldbus (EFB) configuration file could not be read. Contact your local ABB representative.		5
6683	EFB invalid parameterization.	Embedded fieldbus (EFB) parameter settings are inconsistent or not compatible with the selected protocol. Check the settings of group 58 FBA Embedded fieldbus.		5
6684	EFB load fault	Embedded fieldbus (EFB) protocol firmware could not be loaded.	Contact your local ABB representative.	5
		Version mismatch between embedded fieldbus (EFB) protocol firmware and drive firmware.		
6881	Text data overflow.	Internal fault.		5

Code	Fault	Cause and what to do	Fault level
6882	Text 32-bit table overflow.	Reset the fault. Contact your local ABB representative if the fault persists.	5
6883	Text 64-bit table overflow.		5
6885	Text file overflow.		5
7081	Control panel/PC tool link communication. Programmable, see 49.05 Communication loss action.	Control panel/PC tool has stopped communicating. See also A7EE. Check: – The setting of 49.05 Communication loss action. – The control panel/PC tool connection cable. – The control panel connector. – The mounting platform if being used. – Disconnect and reconnect the control panel/PC tool. – Check the auxiliary code. The code specifies the I/O port used as follows: 0: Panel/PC tool. 1: Fieldbus interface A. 2: Fieldbus interface B. 3: Ethernet. 4: D2D/EFB port.	5
7082	I/O extension communication.	The I/O extension module/DCSLink board (SDCS-DSL-4) types and location specified by parameters do not match the detected configuration or do not communicate with the drive. See also A7AB. Check: – The type and location settings of the modules/board. See parameters 14.01, 14.02, 15.01, 15.02, 16.01, 16.02, 70.01 and 70.02. – That the module/board is properly seated in its slot. – That the module/board and the slot connector is not damaged. – Try installing the module into another slot. – Check the auxiliary code (format XXYY YYYY). XX specifies the number of the I/O extension module/board. 01: Group 14 I/O extension module 1. 02: Group 15 I/O extension module 2. 03: Group 16 I/O extension module 3. 04: Group 70 DCSLink Communication. YY YYYY indicates the problem. Actions see below.	1
	00 0001	Communication with module/board failed.	
	00 0002	Module/Board not found.	
	00 0003	Configuration of module/board failed.	
	00 0004		
7083	Panel reference conflict.	Use of saved control panel reference in multiple control modes attempted. The control panel reference can only be saved for one reference type at a time. Consider the possibility of using a copied reference instead of saved reference (see the reference selection parameter).	3
7084	Control panel/PC tool version conflict.	The current version of the control panel/PC tool does not support a function. E.g. older control panel versions cannot be used as a source of external references. Update the control panel/PC tool. Contact your local ABB representative if necessary.	4
7085	Incompatible option Module.	Option module not supported. E.g. type Fxxx-xx-M fieldbus adapters are not supported.	4

Code	Fault	Cause and what to do	Fault level
		Replace the module with a supported type. Check the auxiliary code. It specifies the interface to which the unsupported module is connected: 1: Fieldbus interface A. 2: Fieldbus interface B.	
7121	Motor stall. Programmable, see 31.24 Stall function.	Selected motor, the motor is operating in the stall region because of excessive load or insufficient motor power. See also A780. The motor torque exceeded 31.25 Stall torque level for a time longer than 31.28 Stall time while the speed feedback was below 31.26 Stall speed level. Check: – The motor load/mechanics (e.g. brake). – The drive ratings. – For correct field current. – The settings of 31.24 Stall function, 31.25 Stall torque level, 31.26 Stall speed level and 31.28 Stall time. – The settings for current and torque limits in group 30 Control limits.	4
71A2	Mechanical brake not closed. Programmable, see 44.17 M1 brake fault function.	Selected motor, the acknowledge signal at the DI for the mechanical brake closed (applied) stage is missing. See also A7A1. Check: – The mechanical brake itself. – The mechanical brake cable connections. – The mechanical brake settings in group 44 Mechanical brake control. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	3
71A3	Mechanical brake not opened. Programmable, see 44.17 M1 brake fault function.	Selected motor, the acknowledge signal at the DI for the mechanical brake opened (applied) stage is missing. See also A7A2. Check: – The mechanical brake itself. – The mechanical brake cable connections. – The mechanical brake settings in group 44 Mechanical brake control. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	3
71A5	Mechanical brake opening not allowed. Programmable, see 44.17 M1 brake fault function.	Selected motor, open (lift) conditions of the mechanical brake are not fulfilled. See also A7A5. The brake has been prevented from opening (lifting) by 44.11 M1 keep brake closed, 44.12 Brake close request or torque actual does not reach 44.10 M1 brake open torque, during torque proving. Check: – The mechanical brake settings in group 44 Mechanical brake control. Especially 44.11 M1 keep brake closed and 44.12 Brake close request. – That the acknowledgement signal, if used, matches actual status of brake. – The used digital inputs and outputs (groups 10 and 11).	3
		Selected motor, open (lift) conditions of the mechanical brake are not fulfilled.	

Code	Fault	Cause and what to do	Fault level
		The brake has been prevented from opening (lifting) by an FSO-xx safety functions module. Check the safety circuits connected to the FSO-xx safety functions module.	
71B1	Motor fan acknowledge. Programmable, see 20.39 Motor fan acknowledge source.	Motor/External cooling fan feedback at the DI is missing. See also A781. Check: – The setting of 20.39 Motor fan acknowledge source. – The fan operation and connection. Replace the motor/external fan if faulty. – The fan contactor. – The fan supply voltage.	4
7301	Motor speed feedback. Programmable, see 31.35 Motor feedback fault.	Selected motor, no motor speed feedback is received. See also A7B0. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration. YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	3
	0001	Motor gear definition invalid or outside limits. Check motor gear settings. See 90.43 Motor gear numerator and 90.44 Motor gear denominator.	
	0004	Speed feedback device not configured. Check the settings of the speed feedback device: – Encoder 1, see group 92 Encoder 1 configuration. – Encoder 2, see group 93 Encoder 2 configuration. – The OnBoard encoder, see group 94 OnBoard speed feedback configuration. – The tacho, see group 94 OnBoard speed feedback configuration. Use 91.10 Encoder parameter refresh to validate any changes in the settings for an encoder.	
	0005	Speed feedback device stopped working. Check the status of the speed feedback device.	
	0006	Speed feedback device drift detected. Check for slippage between speed feedback device and motor.	
	0007	The comparison of measured speed feedback from pulse encoder or analog tacho to measured EMF has failed. Check: – The setting of 90.41 M1 feedback selection, 31.14 Fault stop mode fault level 3, 31.35 Motor feedback fault, 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level.	

Code	Fault	Cause and what to do	Fault level
		– At the encoder: The encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances, jumper J4 on the SDCS-CON-H01. – At the tacho: The tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances. – EMF: The armature cable connection form the drive to the motor and the polarity.	
7310	Overspeed.	Selected motor, the motor is turning faster than highest allowed speed due to incorrectly set minimum/maximum speed, insufficient braking torque or changes in load when in torque control. Check: – The settings of 30.11 M1 minimum speed, 30.12 M1 maximum speed and 31.30 M1 overspeed trip margin. – The settings of the speed controller in group 25 Speed control. – The setting of 46.02 M1 speed scaling actual. – The torque control settings. – For correct speed feedback when using an encoder or a tacho. Thus, compare the value of 90.01 Motor speed for control vs. the measured motor speed (hand held tacho). – For proper connection of the speed feedback measurement. – For correct field current. – If the motor was accelerated by the load. – If the DC-voltage measurement (C1, D1) might be swapped when EMF speed feedback is used. – If the armature circuit is open (e.g. DC-fuses, DC-breaker, …) when EMF speed feedback is used.	3
7380	Encoder internal.	Internal encoder fault. See the documentation of the encoder. Contact your local ABB representative.	3
7381	Speed feedback device. Programmable, see 31.35 Motor feedback fault.	Speed feedback device error. See also A7E1. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration. YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	3
	0001	Cable fault. If the encoder was working previously, check the encoder, encoder cable and encoder interface module for damage. Check: – The conductor order at both ends of the encoder cable. – The groundings of the encoder cable.	

Code	Fault	Cause and what to do		Fault level
		– 92.21 Encoder cable fault mode. – 94.29 OnBoard encoder cable fault mode.		
	0002	No encoder signal. Check the condition of the encoder.		
	0003	Overspeed.	Contact your local ABB representative.	
	0004	Over frequency.		
	0005	Resolver ID run failed.		
	0006	Resolver overcurrent fault.		
	0007	Speed scaling error. The parameters causing the warning can be identified in the auxiliary code (format YYZZ). YY specifies the parameter group. ZZ specifies the parameter number. The firing angle is forced to 150° and single firing pulses to suppress the DC current are given. Check: – The settings of 30.11 M1 minimum speed, 30.12 M1 maximum speed, 31.30 M1 overspeed trip margin, 46.01 M1 speed scaling and 99.14 M1 nominal (base) speed.		
	0008	Absolute encoder communication error.	Contact your local ABB representative.	
	0009	Absolute encoder initialization error.		
	000A	Absolute SSI encoder configuration error.		
	000B	Encoder reported an internal error.	See the documentation of the encoder.	
	000C	Encoder reported a battery error.		
	000D	Encoder reported overspeed or decreased resolution due to overspeed.		
	000E	Encoder reported a position counter error.		
	000F	Encoder reported an internal error.		
	0010	Speed feedback device. Speed feedback was change from speed feedback device to EMF.		
	0011	Encoder speed feedback. Speed feedback was change from one encoder to the other encoder (only valid if 2 encoders are connected).		
	0012	Selected motor, wrong direction of speed feedback. The speed feedback direction of tacho and encoders is checked against the speed feedback direction of the EMF. See 90.41 M1 feedback selection. Check: – The real direction of motor rotation. – The settings of 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level. – The connection of the tacho cable. To correct, swap the two wires. – The connection of the encoder cable. To correct, swap e.g. channels A and A-. – The connection of armature and field cables.		
	0013	Selected motor, tacho range. If Tacho range comes up for longer than 10 s, there is an overflow at the tacho input. Check: – That the tacho voltage at overspeed fits to the tacho input. It should not be higher than 270 V.		
	0014	Re-do the tacho fine-tuning.		

Code	Fault	Cause and what to do	Fault level
		31.30 M1 overspeed trip margin or 42.25 M2 overspeed trip margin have been changed. Use 99.20 Tuning request = Tacho fine-tuning.	
73A0	Speed feedback configuration.	The speed feedback configuration via encoder interface modules has changed. See also A797. Check the auxiliary code (format XXYY ZZZZ). XX specifies the encoder interface module. 01: For module 1 see parameters 91.11 and 91.12. 02: For module 2 see parameters 91.13 and 91.14. YY specifies the encoder. 01: Group 92 Encoder 1 configuration. 02: Group 93 Encoder 2 configuration. ZZZZ indicates the problem. Actions see below.	3
	0001	Adapter not found in specified slot. Check module location. See parameters 91.12 and 91.14.	
	0002	Detected type of interface module does not match parameter setting. Check the module type parameters 91.11 and 91.13 against status parameters 91.02 and 91.03.	
	0003	Logic version too old. Contact your local ABB representative.	
	0004	Firmware version too old. Contact your local ABB representative.	
	0006	Encoder type incompatible with interface module type. Check module type parameters 91.11 and 91.13 against encoder type parameters 92.01 and 93.01.	
	0007	Adapter not configured. Check module location parameters 91.12 and 91.14.	
	0008	Speed feedback configuration has changed. Use 91.10 Encoder parameter refresh to validate any changes in the settings.	
	0009	No encoders configured in the encoder module. Configure the encoder in group 92 Encoder 1 configuration or 93 Encoder 2 configuration.	
	000A	Non-existing emulation input. Check input selection parameters 91.31 and 91.41.	
	000B	Echo not supported by the selected input. E.g. resolver or absolute encoder. Check: – The input selection parameters 91.31 and 91.41. – The interface module type against the encoder type.	
	000C	Emulation in continuous mode not supported. Check: – The input selection parameters 91.31 and 91.41. – The serial link mode parameters 92.30 and 93.30.	
73A1	Load speed feedback. Programmable, see 31.38 Load feedback fault.	Selected motor, no load speed feedback is received. See also A7B1. Check the auxiliary code (format XXYY ZZZZ). XX specifies the location of the speed feedback device. Either an encoder interface module or the control board. 01: Encoder interface module 1, see parameters 91.11 and 91.12. 02: Encoder interface module 2, see parameters 91.13 and 91.14. 03: Control board, see group 94 OnBoard speed feedback configuration.	3

Code	Fault	Cause and what to do	Fault level
		YY specifies the speed feedback device. 01: Encoder 1, see group 92 Encoder 1 configuration. 02: Encoder 2, see group 93 Encoder 2 configuration. 03: OnBoard encoder, see group 94 OnBoard speed feedback configuration. 04: Tacho, see group 94 OnBoard speed feedback configuration. ZZZZ indicates the problem. Actions see below.	
	0001	Load gear definition invalid or outside limits. Check load gear settings. See 90.53 Load gear numerator and 90.54 Load gear denominator.	
	0002	Feed constant definition invalid or outside limits. Check feed constant settings. See 90.63 Feed constant numerator and 90.64 Feed constant denominator.	
	0003	Motor/load gear definition invalid or outside limits. Check motor/load gear settings. See 90.61 Gear numerator and 90.62 Gear denominator.	
	0004	Speed feedback device not configured. Check the settings of the speed feedback device: – Encoder 1, see group 92 Encoder 1 configuration. – Encoder 2, see group 93 Encoder 2 configuration. – The OnBoard encoder, see group 94 OnBoard speed feedback configuration. – The tacho, see group 94 OnBoard speed feedback configuration. Use 91.10 Encoder parameter refresh to validate any changes in the settings for an encoder.	
	0005	Speed feedback device stopped working. Check the status of the speed feedback device.	
	0007	The comparison of the measured speed feedback from pulse encoder or analog tacho to measured EMF has failed. Check: – The setting of 90.41 M1 feedback selection, 31.14 Fault stop mode fault level 3, 31.35 Motor feedback fault, 31.36 Speed feedback monitor level and 31.37 EMF feedback monitor level. – At the encoder: The encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances, jumper J4 on the SDCS-CON-H01. – At the tacho: The tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances. – EMF: The armature cable connection form the drive to the motor and the polarity.	
73B0	Emergency ramp stop	Emergency stop did not finish within the expected time. Check: – The settings of 31.31 Emergency ramp supervision and 31.32 Emergency ramp supervision delay. – The settings of parameters 23.11 … 23.19 for Off3 stop mode 1 (21.03 Emergency stop mode = Ramp stop). – The setting of 23.23 Emergency stop time for Off3 stop mode 2 (21.03 Emergency stop mode = Emergency ramp stop). – The current and torque limits in group 30 Control limits.	3
73B1	Normal ramp stop	Normal (non-emergency) ramp stop did not finish within the expected time.	3

Code	Fault	Cause and what to do	Fault level
		Check: – The settings of 31.33 Ramp stop supervision and 31.34 Ramp stop supervision delay. – The settings of parameters 23.11 … 23.19.	
7510	FBA A communication. Programmable, see 50.02 FBA A comm loss func.	Fieldbus adapter A (FBA A): Cyclical communication between PLC and fieldbus adapter module A or between drive and fieldbus adapter module A is lost. See also A7C1. 7510 FBA A communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7C1 FBA A communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus communication. See user documentation of the fieldbus interface. – The settings of groups 50 Fieldbus adapter (FBA), 51 FBA A settings, 52 FBA A data in and 53 FBA A data out. – The cable connections. – The fieldbus termination. – The fieldbus adapter. – That the master is able to communicate.	5
7520	FBA B communication. Programmable, see 50.32 FBA B comm loss func.	Fieldbus adapter B (FBA B): Cyclical communication between PLC and fieldbus adapter module B or between drive and fieldbus adapter module B is lost. See also A7C2. 7520 FBA B communication is only activated after the first data set from the overriding control is received by the drive. Before the first data set is received, only A7C2 FBA B communication is active. The reason is to suppress unnecessary faults (the startup of the overriding control is usually slower than the one of the drive). Check: – The status of the fieldbus communication. See user documentation of the fieldbus interface. – The settings of group 50 Fieldbus adapter (FBA), 54 FBA B settings, 55 FBA B data in and 56 FBA B data out. – The cable connections. – The fieldbus termination. – The fieldbus adapter. – That the master is able to communicate.	5
7581	DDCS controller communication. Programmable, see 60.59 DDCS controller comm loss function.	Cyclical communication between DDCS (fiber optic) controller and drive is lost or there is no communication at all. The drive is waiting for the very first dataset. See also A7CA. Check: – The status/settings of the DDCS controller. See user documentation of the DDCS controller. – The adapters between DDCS controller and drive. – The setting of 20.01 Command location. – The settings of group 60 DDCS communication, 61 D2D and DDCS transmit data and 62 D2D and DDCS receive data. – The fiber optic cable connections.	5
7582	Master-follower communication. Programmable, see 60.09 M/F comm loss function.	Cyclical communication between master and a follower (DDCS/D2D) is lost or there is no communication at all. The drive is waiting for the very first dataset. See also A7CB. Check:	5

Code	Fault	Cause and what to do	Fault level
		– The auxiliary code. It indicates which node address on the master-follower link is affected. See 60.02 M/F node address in each drive. – The setting of 20.01 Command location. – The settings of group 60 DDCS communication. – The cable connections.	
8001	ULC underload. Programmable, see 37.04 ULC underload actions.	Selected signal has fallen below the user underload curve. See group 37 User load curve. See also A8BF. Check for any operating conditions decreasing the monitored signal. E.g., the loss of load if the torque or current is being monitored. Check the definition of the load curve.	1 (default) 1 … 6 user selectable
8002	ULC overload. Programmable, see 37.03 ULC overload actions.	Selected signal has exceeded the user overload curve. See group 37 User load curve. See also A8BE. Check: – For any operating conditions increasing the monitored signal. E.g., the load of the motor if the torque or current is being monitored. – The definition of the load curve.	1 (default) 1 … 6 user selectable
80A0	AI supervision. Programmable, see 12.03 AI supervision function.	An analog signal is outside the limits specified for the analog input. See also A8A0. Check: – The auxiliary code (format XYY). X specifies the location of the input. 0: Control board. 1: I/O extension module 1. 2: I/O extension module 2 3: I/O extension module 3. 4: …. YY specifies the input and limit. 01: AI1 under minimum. 02: AI1 over maximum. 03: AI2 under minimum. 04: AI2 over maximum. 05: AI3 under minimum. 06: AI3 over maximum. – The signal level at the analog input. – The wiring connected to the input. – Polarity of the connection. – The minimum and maximum limits of the input in groups 12 Standard AI, 14 I/O extension module 1, 15 I/O extension module 2 and 16 I/O extension module 3.	4
80B0	Signal supervision 1. (Editable message text) Programmable, see 32.06 Supervision 1 action.	Fault generated by signal supervision 1. See group 32 Supervision. See also A8B0. Check the source of the warning. See 32.07 Supervision 1 signal.	1 (default) 1 … 6 user selectable
80B1	Signal supervision 2. (Editable message text) Programmable, see 32.16 Supervision 2 action.	Fault generated by signal supervision 2. See group 32 Supervision. See also A8B1. Check the source of the warning. See 32.17 Supervision 2 signal.	1 (default) 1 … 6 user selectable
80B2	Signal supervision 3.	Fault generated by signal supervision 3. See group 32 Supervision. See also A8B2.	1 (default)

<table>
<tr><th>Code</th><th>Fault</th><th>Cause and what to do</th><th>Fault level</th></tr>
<tr><td></td><td>(Editable message text)
Programmable, see 32.26 Supervision 3 action.</td><td>Check the source of the warning. See 32.27 Supervision 3 signal.</td><td>1 … 6 user selectable</td></tr>
<tr><td>9081</td><td>External fault 1.
(Editable message text)
Programmable, see 31.01 External event 1 source and 31.02 External event 1 type.</td><td>There is no problem with the drive itself!
Fault generated by external device 1. See group 31 Fault functions and fault levels. See also A981.
Check:
– External device 1.
– 31.01 External event 1 source.</td><td>1 (default)
1 … 6 user selectable</td></tr>
<tr><td>9082</td><td>External fault 2.
(Editable message text)
Programmable, see 31.03 External event 2 source and 31.04 External event 2 type.</td><td>There is no problem with the drive itself!
Fault generated by external device 2. See group 31 Fault functions and fault levels. See also A982.
Check:
– External device 2.
– 31.03 External event 2 source.</td><td>1 (default)
1 … 6 user selectable</td></tr>
<tr><td>9083</td><td>External fault 3.
(Editable message text)
Programmable, see 31.05 External event 3 source and 31.06 External event 3 type.</td><td>There is no problem with the drive itself!
Fault generated by external device 3. See group 31 Fault functions and fault levels. See also A983.
Check:
– External device 3.
– 31.05 External event 3 source.</td><td>1 (default)
1 … 6 user selectable</td></tr>
<tr><td>9084</td><td>External fault 4.
(Editable message text)
Programmable, see 31.07 External event 4 source and 31.08 External event 4 type.</td><td>There is no problem with the drive itself!
Fault generated by external device 4. See group 31 Fault functions and fault levels. See also A984.
Check:
– External device 4.
– 31.07 External event 4 source.</td><td>1 (default)
1 … 6 user selectable</td></tr>
<tr><td>9085</td><td>External fault 5.
(Editable message text)
Programmable, see 31.09 External event 5 source and 31.10 External event 5 type.</td><td>There is no problem with the drive itself!
Fault generated by external device 5. See group 31 Fault functions and fault levels. See also A985.
Check:
– External device 5.
– 31.09 External event 5 source.</td><td>1 (default)
1 … 6 user selectable</td></tr>
<tr><td>F501</td><td>Auxiliary undervoltage.</td><td>The auxiliary voltage is too low, e.g. short dip, while the drive is in operation.
To reset, cycle the auxiliary power of the drive.
Check:
– The auxiliary voltage itself.
– The internal auxiliary voltages on the SDCS-CON-H01.
– If the problem persist, change SDCS-CON-H01 and/or SDCS-PIN-H01 or SDCS-POW-H01 respectively.
<table><tr><th>Auxiliary supply voltage</th><th>Trip level</th></tr><tr><td>230 VAC</td><td>< 185 VAC</td></tr><tr><td>115 VAC</td><td>< 96 VAC</td></tr></table></td><td>1</td></tr>
<tr><td>F503</td><td>Armature overvoltage.</td><td>Too high voltage on the armature/DC side.
Check:</td><td>1</td></tr>
</table>

Code	Fault	Cause and what to do	Fault level
		– If the setting of 31.50 Overvoltage level is suitable for the system. – The settings of the field current controller, EMF controller, flux linearization in group 28 EMF and field current control. E.g. field weakening is not activated. – For too high field current (e.g. problems with field weakening). – If the motor was accelerated by the load. – For overspeed. – For proper speed scaling. See 46.02 M1 speed scaling actual. – For proper armature voltage feedback. – The cutting of the voltage coding resistors on the SDCS-PIN-H51.	
F513	Mains overvoltage.	Too high voltage on the mains/AC side. The actual mains voltage is > 1.3 * 99.10 Nominal mains voltage for longer than 10 s while Ready run = 1. Check: – If the mains voltage is within the set tolerance. – If the mains voltage scaling is correct. See 99.10 Nominal mains voltage. – The cutting of the voltage coding resistors on the SDCS-PIN-H51.	1
F514	Mains synchronization lost.	The synchronization with the mains has been lost. Check: – The condition of the mains (voltage, cabling, fuses, switchgear). – The mains frequency (50 Hz ±5 Hz; 60 Hz ±5 Hz) and stability (df/dt = 17 %/s) see 95.39 PLL input deviation and 95.40 PLL output, internal mains frequency.	3
F515	M1 field exciter overcurrent.	Motor 1 field exciter overcurrent. Check: – In case this fault happens during field exciter autotuning, deactivate the supervision by setting 31.59 M1 field overcurrent level = 325 %. – The setting of 31.59 M1 field overcurrent level. – The settings of the field current controller in group 28 EMF and field current control. – The connections of the field exciter. – The insulation of cables and field winding. – The resistance of the field winding. – For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	1
F516	M1 field exciter communication.	Motor 1 field exciter loss of communication. Check: – The settings of 99.07 M1 used field exciter type and 70.12 Field exciter timeout. – The auxiliary voltage for integrated and external field exciter. – The DCSLink cable connections. – The DCSLink termination set dipswitch S1100:1 = ON (DCF803-0016, DCF803-0035 and DCF803-0025). – The DCSLink node ID settings. See 70.05 DCSLink node ID and 70.13 M1 field exciter node ID or switches S800 and S801 on DCF803-0016, DCF803-0035 and DCF803-0025 respectively.	1

Code	Fault	Cause and what to do	Fault level
		– For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	
F517	Armature current ripple.	One or several thyristors may carry no current. See also A117. Check: – The values of 01.50 Current ripple and 01.51 Current ripple filtered1. – The setting of 31.46 Current ripple function and 31.47 Current ripple level. – For too high gain of current controller. See 27.29 M1 current proportional gain. – The positive/negative current feedback with an oscilloscope (6 pulses within one cycle visible?). – The thyristor gate-cathode resistance. – The thyristor gate connection. – The current transformers (T51, T52). – The condition of the mains (voltage, cabling, fuses, switchgear).	3
F518	M2 field exciter overcurrent.	Motor 2 field exciter overcurrent. Check: – In case this fault happens during field exciter autotuning, deactivate the supervision by setting 42.63 M2 field overcurrent level = 325 %. – The setting of 42.63 M2 field overcurrent level. – The settings of the field current controller in group 42 Shared motion (2nd motor). – The connections of the field exciter. – The insulation of cables and field winding. – The resistance of the field winding. – For fault messages at the field exciter itself (flashing LEDs), 04.27 M2 field exciter fault word and 04.37 M2 field exciter warning word.	1
F519	M2 field exciter communication.	Motor 2 field exciter loss of communication. Check: – The settings of 42.49 M2 used field exciter type and 70.12 Field exciter timeout. – The auxiliary voltage for integrated and external field exciter. – The DCSLink cable connections. – The DCSLink termination set dipswitch S1100:1 = ON (DCF803-0016, DCF803-0035 and DCF803-0025). – The DCSLink node ID settings. See 70.05 DCSLink node ID and 70.14 M2 field exciter node ID or switches S800 and S801 on DCF803-0016, DCF803-0035 and DCF803-0025 respectively. – For fault messages at the field exciter itself (flashing LEDs), 04.27 M2 field exciter fault word and 04.37 M2 field exciter warning word.	1
F521	Field acknowledge missing.	Selected motor, field acknowledge at the DI is missing. Check: – The setting of 99.07 M1 used field exciter type. The selection must match the connected field exciter type. – The settings of 06.26 M1 field exciter status word. – For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	1

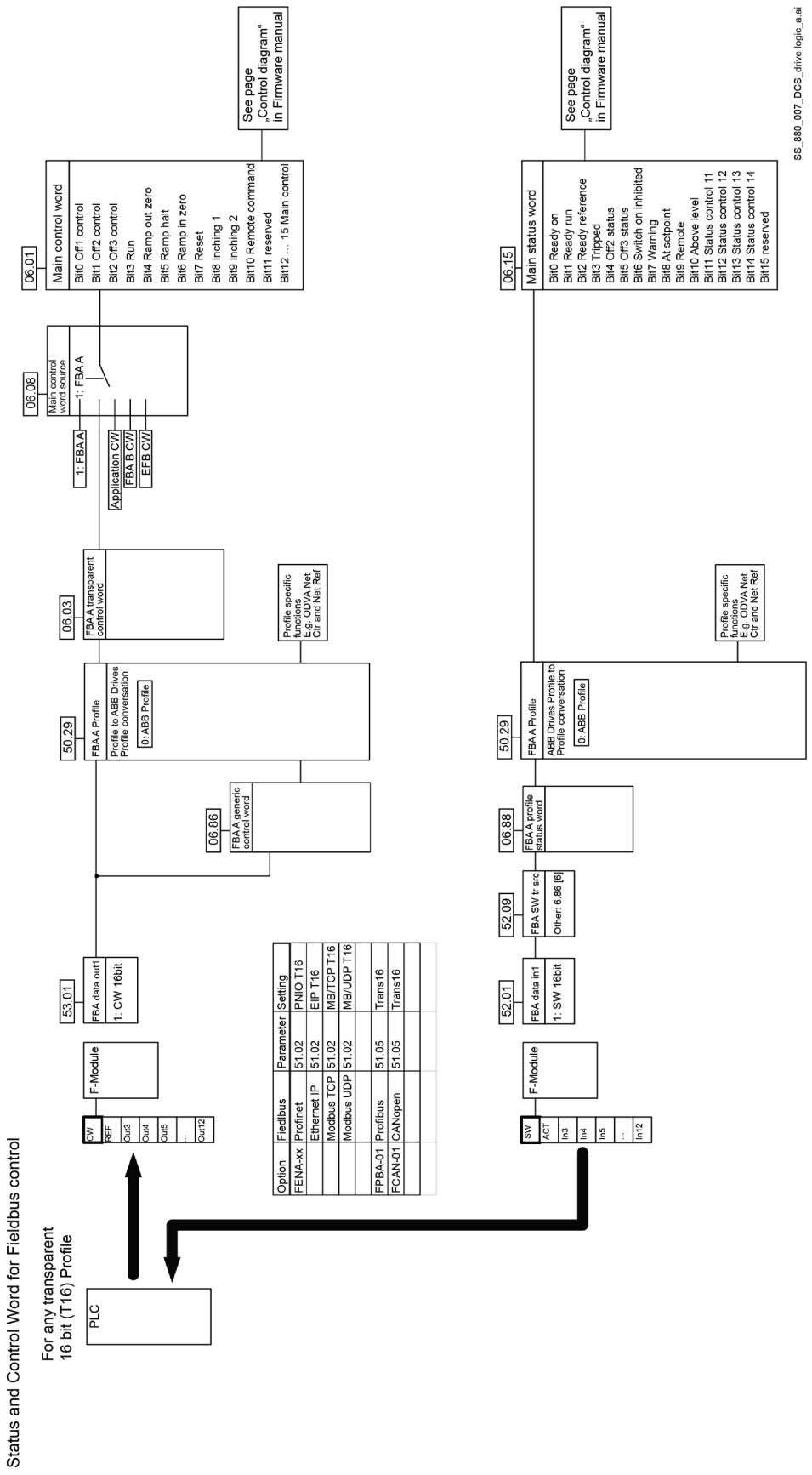
Code	Fault	Cause and what to do	Fault level
		F521 Field acknowledge missing is the sum fault for all field related faults like: – F515 M1 field exciter overcurrent. – F516 M1 field exciter communication. – F529 M1 field exciter not OK. – F537 M1 field exciter ready lost. – F541 M1 field exciter low current.	
F524	Main contactor acknowledge.	Main contactor acknowledge at the DI is missing. Check: – The settings of 20.33 Main contactor control mode and 20.34 Main contactor acknowledge source. – The switch on/off sequence. – The auxiliary contactor/relay switching the main contactor after an On/Off command. – The safety relays if existing. – The used digital inputs and outputs (groups 10 and 11).	4
F529	M1 field exciter not OK.	Motor 1 field exciter is not okay. A fault was found during self-diagnosis of the field exciter or a power failure happened in the field exciter. Check: – The field exciter operation. E.g. the field contactor or mains contactor (in case of an OnBoard field exciter) is not closed or closing too late. – For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	1
F530	M2 field exciter not OK.	Motor 2 field exciter is not okay. A fault was found during self-diagnosis of the field exciter or a power failure happened in the field exciter. Check: – The field exciter operation. E.g. the field contactor or mains contactor (in case of an OnBoard field exciter) is not closed or closing too late. – For fault messages at the field exciter itself (flashing LEDs), 04.27 M2 field exciter fault word and 04.37 M2 field exciter warning word.	1
F533	12-pulse reversal timeout.	The current direction is not changed before 29.14 12-pulse reversal timeout is elapsed. Check: – For high inductive motor and increase the timeout. – Too high motor voltage compared to mains voltage.	3
F534	12-pulse current difference.	The current of difference of a 12-pulse parallel configuration exceeded the current difference level. Check: – The settings of 29.17 12-pulse parallel current difference level and 29.18 12-pulse parallel current difference delay. – The settings of the current controller in group 27 Armature current control.	3
F535	12-pulse communication.	12-pulse communication is disturbed: Check: – The settings of 70.05 DCSLink node ID, 70.07 DCSLink comm loss function, 70.08 12-pulse timeout and 70.09 12-pulse slave node ID. – DCSLink cable connections. – DCSLink termination.	3

Code	Fault	Cause and what to do	Fault level
F536	12-pulse slave.	The 12-pulse slave has tripped. 12-pulse master is tripped by a fault of the 12-pulse slave. Correct the fault in the 12-pulse slave.	4
F537	M1 field exciter ready lost.	Motor 1 field exciter lost the ready-for-operation message while working. The mains voltage of the field exciter is missing or not in synchronism. Check: – If all mains phases are present. – If the mains voltage is within the set tolerance. – For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	1
F538	M2 field exciter ready lost.	Motor 2 field exciter lost the ready-for-operation message while working. The mains voltage of the field exciter is missing or not in synchronism. Check: – If all mains phases are present. – If the mains voltage is within the set tolerance. – For fault messages at the field exciter itself (flashing LEDs), 04.27 M2 field exciter fault word and 04.37 M2 field exciter warning word.	1
F539	Fast current rise.	The rise of the current (di/dt) is too fast. This indicates a short circuit. Check: – The setting of 31.45 Maximum current rise level.	1
F541	M1 field exciter low current.	Motor 1 field exciter low (under-) current. Check: – The settings of 31.57 Minimum field current trip delay and 31.58 M1 field current low level. – The settings of the EMF controller, flux linearization and field current controller in group 28 EMF and field current control. – The motor nameplate for minimum current at maximum field weakening ≡ maximum speed. – The field circuit fuses. – The field auxiliary supply voltage. – The field contactor is not closed. – If the field current oscillates. – If the motor is not compensated and has a high armature reaction. – For fault messages at the field exciter itself (flashing LEDs), 04.26 M1 field exciter fault word and 04.36 M1 field exciter warning word.	1
F542	M2 field exciter low current.	Motor 2 field exciter low (under-) current. Check: – The settings of 31.57 Minimum field current trip delay and 42.62 M2 field current low level. – The settings of the EMF controller, flux linearization and field current controller in group 42 Shared motion (2nd motor). – The motor nameplate for minimum current at maximum field weakening ≡ maximum speed. – The field circuit fuses. – The field auxiliary supply voltage. – The field contactor is not closed. – If the field current oscillates. – If the motor is not compensated and has a high armature reaction.	1

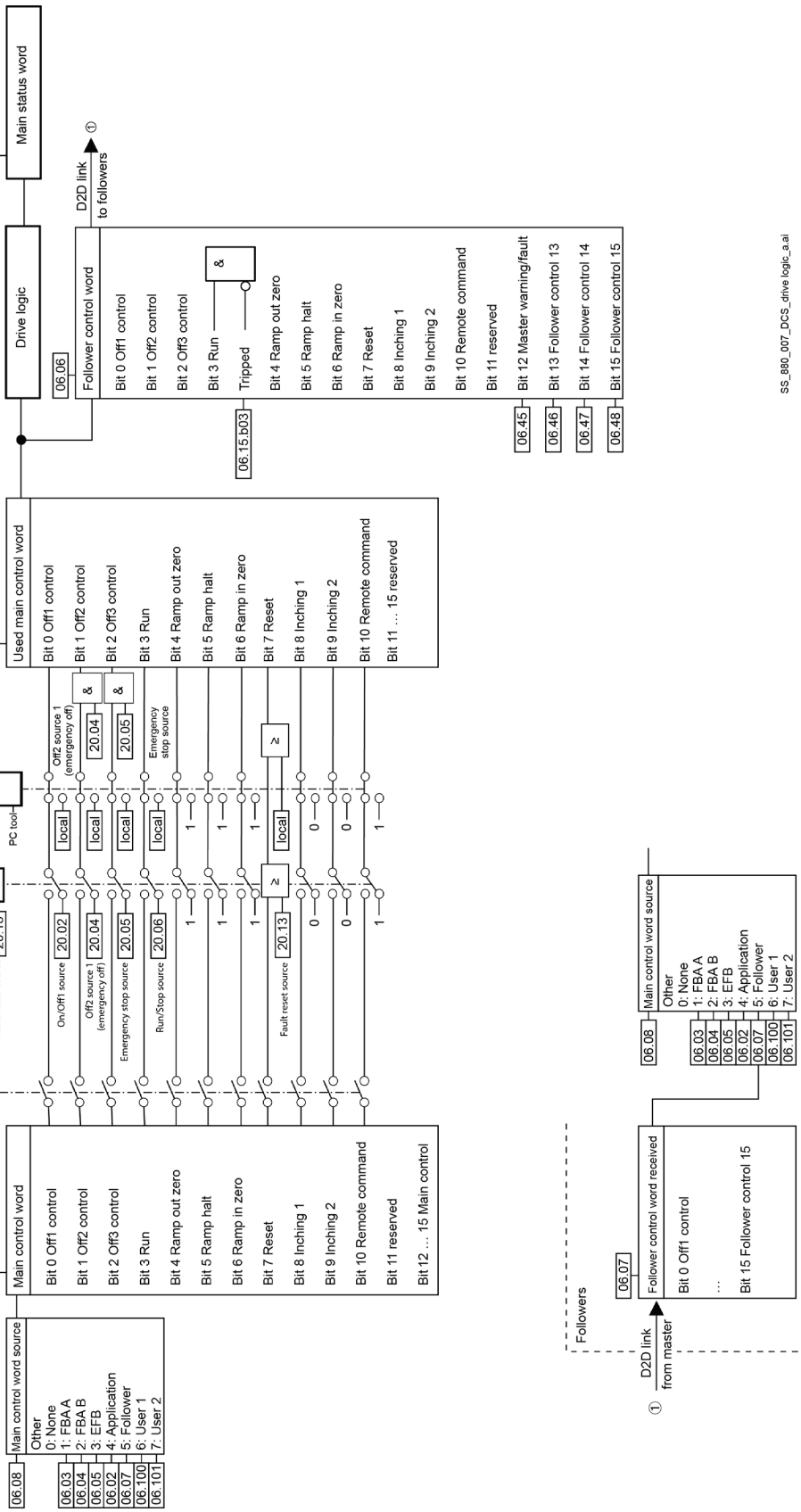
<table>
<tr><th>Code</th><th>Fault</th><th>Cause and what to do</th><th>Fault level</th></tr>
<tr><td></td><td></td><td>– For fault messages at the field exciter itself (flashing LEDs), 04.27 M2 field exciter fault word and 04.37 M2 field exciter warning word.</td><td></td></tr>
<tr><td>F544</td><td>P2P and M/F communication.</td><td>Peer to peer and master-follower communication loss. See also A112.
Check:
– DCSLink node ID settings. See 70.05 DCSLink node ID.
– The setting of 31.13 Fault stop mode communication and 70.07 DCSLink comm loss function.
– The setting of 70.17 Mailbox 1 node ID, 70.23 Mailbox 2 node ID, 70.29 Mailbox 3 node ID and 70.35 Mailbox 4 node ID.
– The setting of 70.18 Mailbox 1 cycle time/timeout, 70.24 Mailbox 2 cycle time/timeout, 70.30 Mailbox 3 cycle time/timeout and 70.36 Mailbox 4 cycle time/timeout.
– The DCSLink cable connections.
– The DCSLink terminations.</td><td>5</td></tr>
<tr><td>F547</td><td>Drive hardware.</td><td>Drive hardware failure.
To reset, cycle the auxiliary power of the drive. If the problem persists, check the auxiliary code (format YYYY).
YYYY indicates the problem. Actions see below.</td><td>1</td></tr>
<tr><td></td><td>0050</td><td>Parameter flash faulty (erase).</td><td></td></tr>
<tr><td></td><td>0051</td><td>Parameter flash faulty (program).</td><td></td></tr>
<tr><td></td><td>0052</td><td>Check connector X12 on SDCS-CON-H01 and connector X12 and X22 on SDCS-PIN-H01/H51.</td><td></td></tr>
<tr><td>F556</td><td>Torque proving.</td><td>Selected motor, torque proving. The acknowledge signal for torque proving is missing.
Check:
– The setting of 44.19 M1 brake torque proving time.
– The Adaptive Program, application program or overriding control providing the torque proving OK signal. See 06.11.b04 Auxiliary control word 2.</td><td>3</td></tr>
<tr><td>F557</td><td>Reversal time.</td><td>The current direction not changed before 27.40 Zero current timeout is elapsed.
Check:
– For high inductive motor and increase the timeout.
– Too high motor voltage compared to mains voltage.
– If possible lower 27.38 Reversal delay and increase 27.40 Zero current timeout.
– The following table:</td><td>3</td></tr>
<tr><td></td><td colspan="3">
<table>
<tr><th></th><th>27.31 M1 discontinuous current limit</th><th>27.38 Reversal delay</th><th>Delta</th><th>27.40 Zero current timeout</th></tr>
<tr><td>Default</td><td>50 %</td><td>5 ms</td><td>15</td><td>20 ms</td></tr>
<tr><td></td><td>≤ 35 %</td><td>10 ms</td><td>25</td><td>35 ms</td></tr>
<tr><td></td><td>≤ 20 %</td><td>15 ms</td><td>35</td><td>50 ms</td></tr>
<tr><td></td><td>≤ 10 %</td><td>20 ms</td><td>50</td><td>70 ms</td></tr>
</table>
</td></tr>
<tr><td>FA81</td><td>Safe torque off 1 loss fault.</td><td>XSTO:IN1 is not equal to XSTO:IN2 or the time delay between the two signals is greater than 20 ms. See safety supplement for functional safety converter DCS880 (3ADW000452).</td><td>6</td></tr>
</table>

Code	Fault	Cause and what to do	Fault level
FA82	Safe torque off 2 loss fault.		6
FB11	Memory unit missing.	No memory unit is attached to the drive control unit. Power down the drive control unit. Check that the memory unit is properly inserted into the drive control unit.	1
		The memory unit attached to the drive control unit is empty. Power down the drive control unit. Attach a memory unit with the appropriate firmware to the drive control unit.	
FB12	Memory unit incompatible.	The memory unit attached to the drive control unit is incompatible. Power down the drive control unit. Attach a compatible memory unit.	1
FB13	Memory unit, firmware incompatible.	The firmware on the attached memory unit is incompatible with the drive control unit. Power down the drive control unit. Attach a memory unit with a compatible firmware.	1
FB14	Memory unit, firmware load failed.	The firmware on the attached memory unit could not be loaded to the drive control unit. Power down the drive control unit. Check that the memory unit is properly inserted into the drive control unit. If the problem persists, replace the memory unit.	1
FF7E	Follower	A follower has tripped. Check the auxiliary code and add 2 for its node address. See 60.02 M/F node address. Correct the fault in the follower.	4
FF81	FBA A force fault.	A fault has been forced through fieldbus adapter A. Check the fault information provided by the PLC.	1 (default) 1 … 6 user selectable
FF82	FBA B force fault.	A fault has been forced through fieldbus adapter B. Check the fault information provided by the PLC.	1 (default) 1 … 6 user selectable
FF8E	EFB force fault.	A fault has been forced through the embedded fieldbus (EFB) interface. Check the fault information provided by the Modbus controller.	1 (default) 1 … 6 user selectable

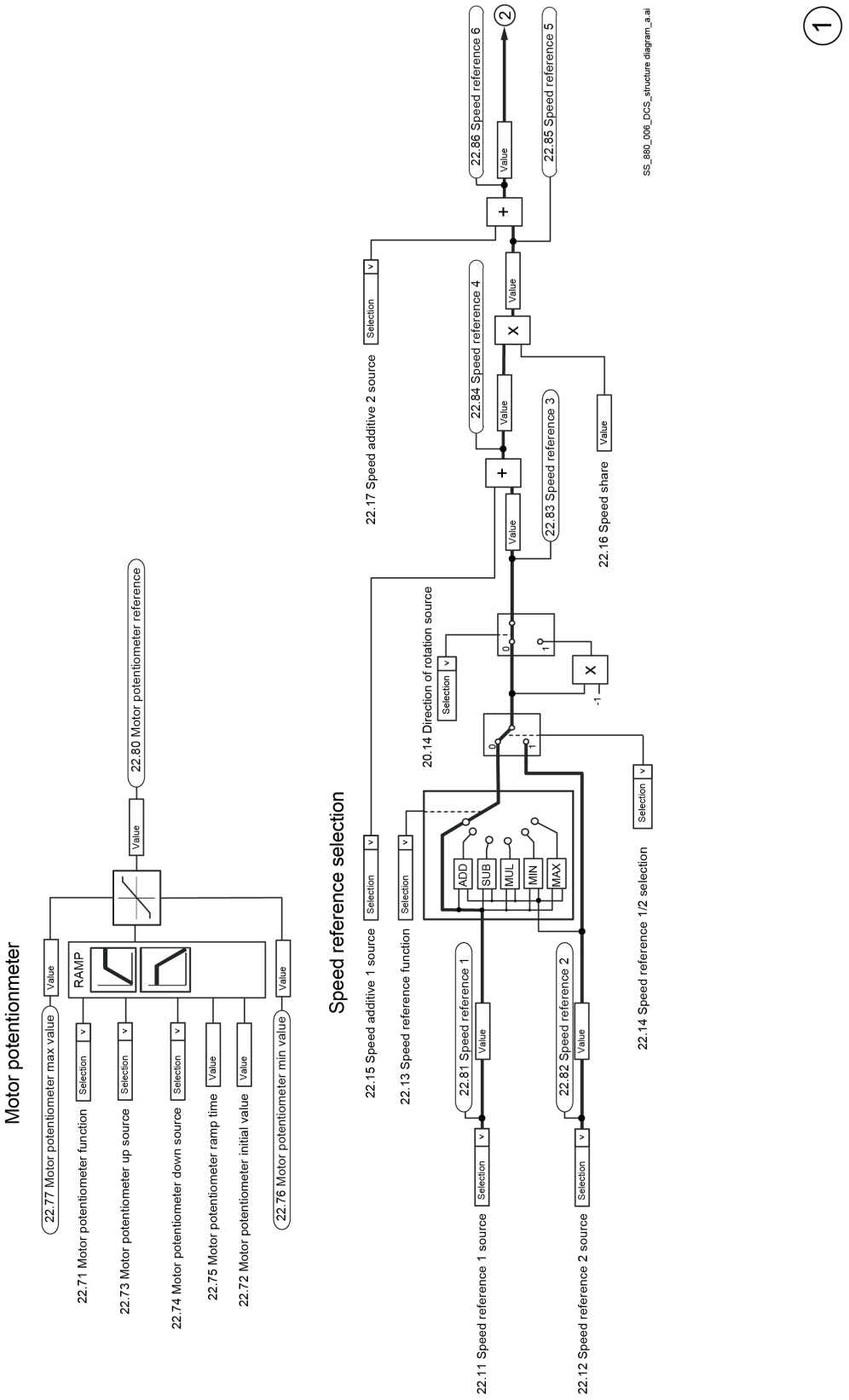
Fieldbus control

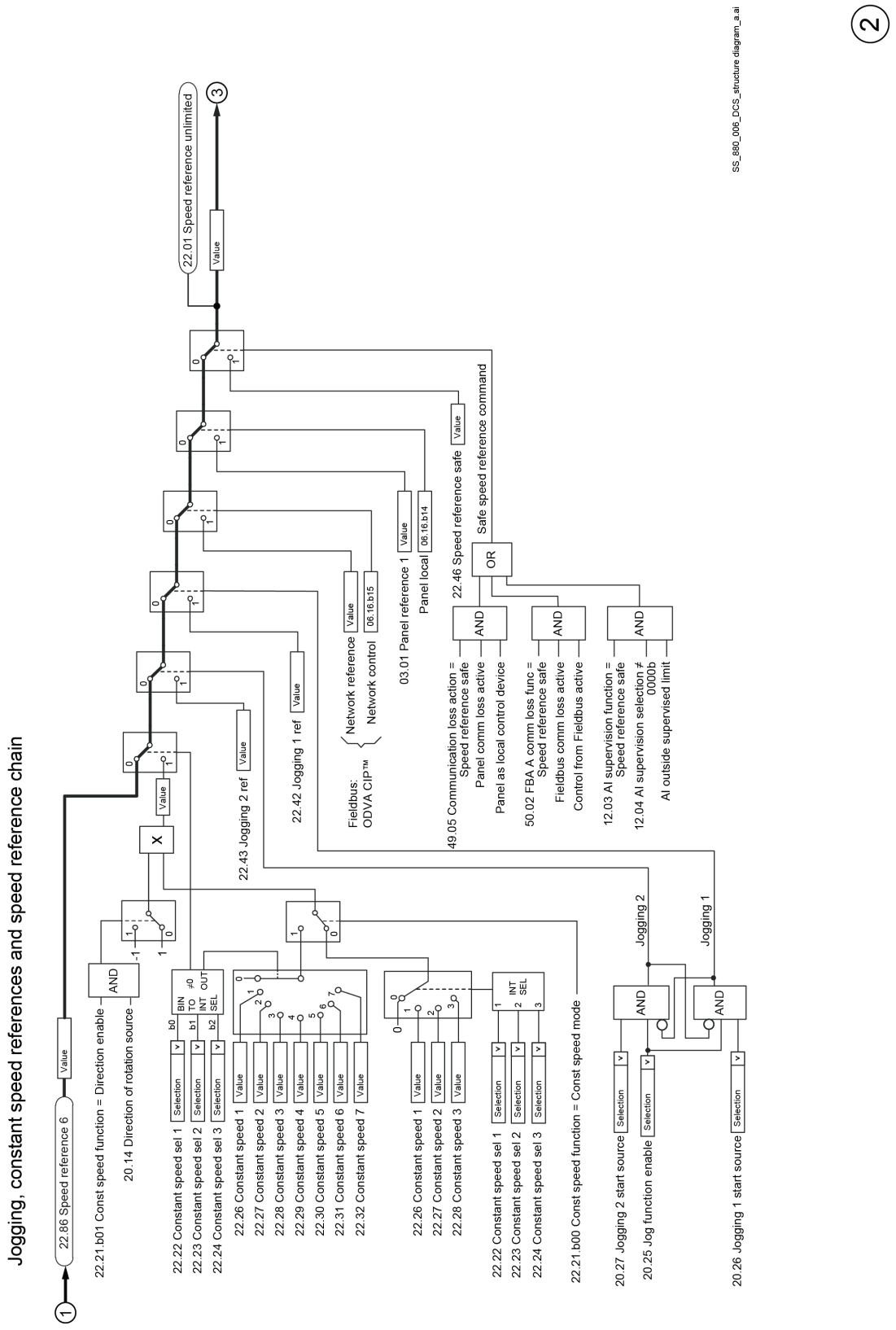


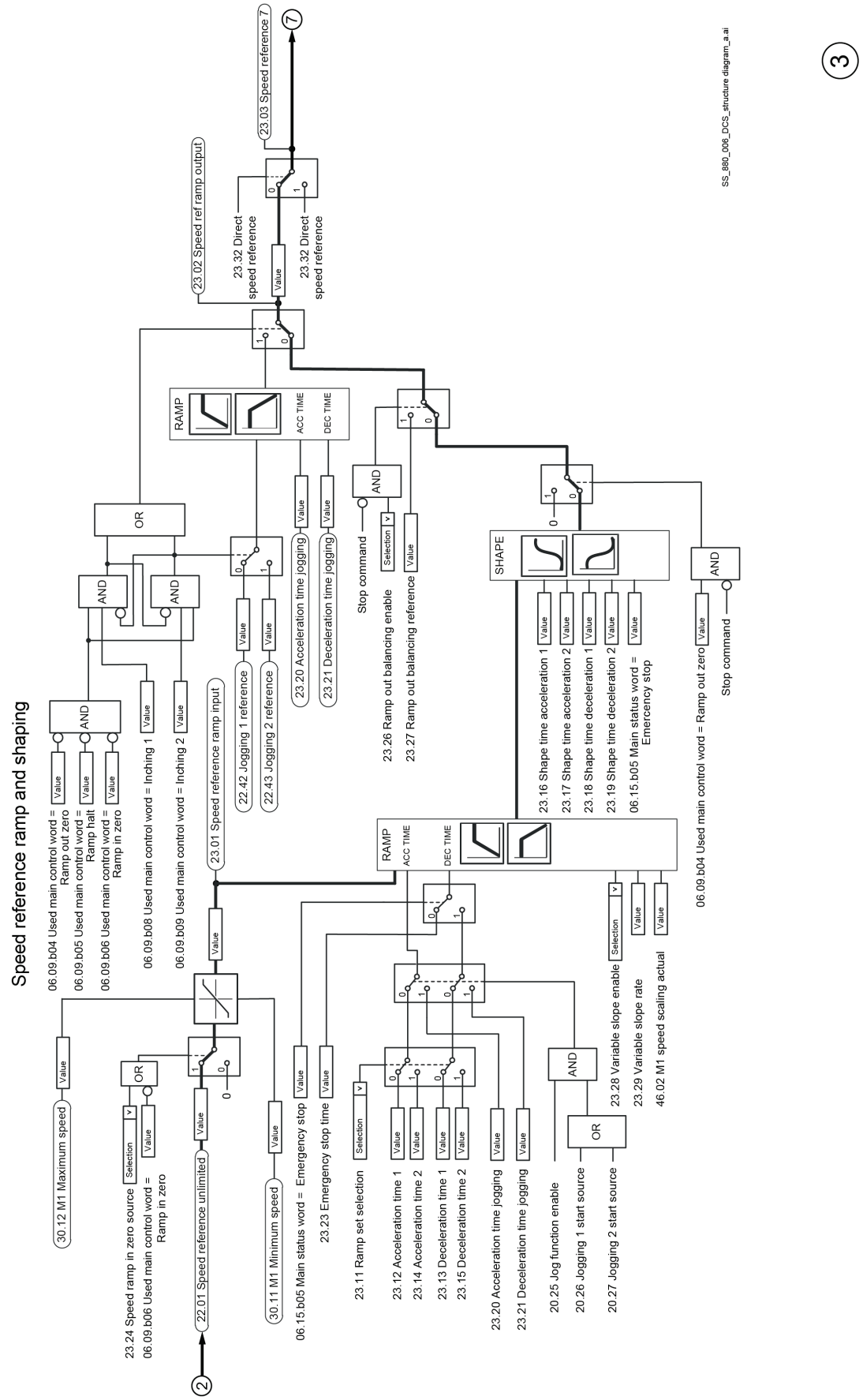
Drive logic

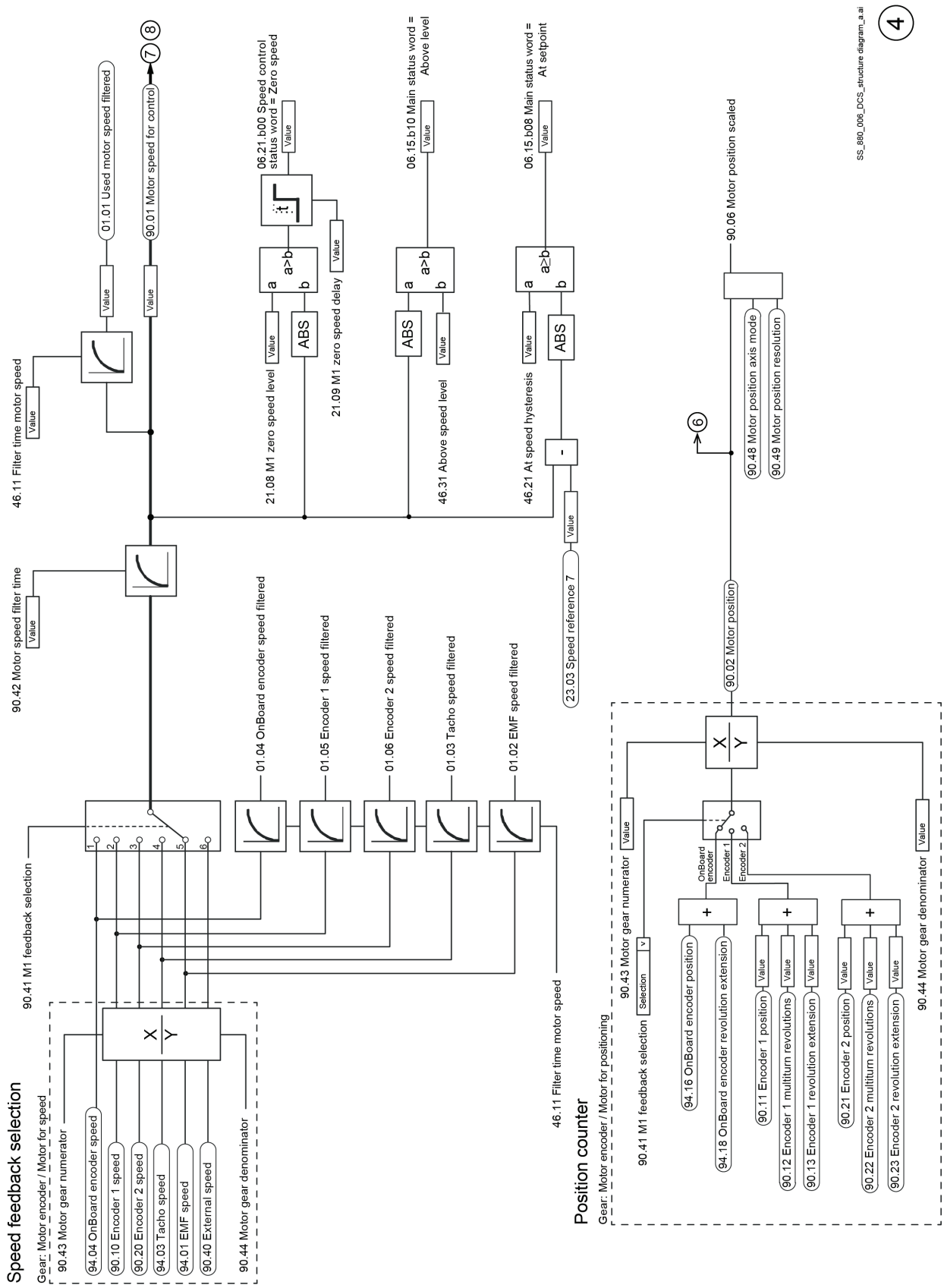

06.15
Main status word
Drive logic
D2D link to followers ①
06.06
Follower control word
Bit 0 Off1 control
Bit 1 Off2 control
Bit 2 Off3 control
Bit 3 Run
Tripped
Bit 4 Ramp out zero
Bit 5 Ramp halt
Bit 6 Ramp in zero
Bit 7 Reset
Bit 8 Inching 1
Bit 9 Inching 2
Bit 10 Remote command
Bit 11 reserved
Bit 12 Master warning/fault
Bit 13 Follower control 13
Bit 14 Follower control 14
Bit 15 Follower control 15
06.15.b03
06.45
06.46
06.47
06.48
&
06.09
Used main control word
Bit 11 ... 15 reserved
Off2 source 1 (emergency off)
Emergency stop source
20.04
20.05
local
Control panel
PC tool
Command location 20.01
Hand/Auto source 20.15
06.01.b10
On/Off1 source 20.02
Run/Stop source 20.06
Fault reset source 20.13
≥
1
0
06.01
Main control word
Bit 12 ... 15 Main control
06.08
Main control word source
Other
0: None
1: FBA A
2: FBA B
3: EFB
4: Application
5: Follower
6: User 1
7: User 2
06.03
06.04
06.05
06.02
06.07
06.100
06.101
Followers
D2D link from master ①
06.07
Follower control word received
Bit 0 Off1 control
...
Bit 15 Follower control 15
SS_880_007_DCS_drive logic_a.ai

Firmware structure diagrams




Jogging, constant speed references and speed reference chain
22.86 Speed reference 6
Value
22.21.b01 Const speed function = Direction enable
20.14 Direction of rotation source
AND
X
Value
22.22 Constant speed sel 1
22.23 Constant speed sel 2
22.24 Constant speed sel 3
Selection
b0
b1
b2
BIN TO INT
≠0
OUT
SEL
22.26 Constant speed 1
22.27 Constant speed 2
22.28 Constant speed 3
22.29 Constant speed 4
22.30 Constant speed 5
22.31 Constant speed 6
22.32 Constant speed 7
22.43 Jogging 2 ref
22.42 Jogging 1 ref
Fieldbus:
ODVA CIP™
Network reference
Network control
06.16.b15
03.01 Panel reference 1
Panel local
06.16.b14
22.46 Speed reference safe
Safe speed reference command
OR
49.05 Communication loss action =
Speed reference safe
Panel comm loss active
Panel as local control device
50.02 FBA A comm loss func =
Speed reference safe
Fieldbus comm loss active
Control from Fieldbus active
12.03 AI supervision function =
Speed reference safe
12.04 AI supervision selection ≠
0000b
AI outside supervised limit
22.21.b00 Const speed function = Const speed mode
Jogging 2
Jogging 1
20.27 Jogging 2 start source
20.25 Jog function enable
20.26 Jogging 1 start source
22.01 Speed reference unlimited
SS_880_006_DCS_structure diagram_a.ai


Speed reference ramp and shaping
06.09.b04 Used main control word = Ramp out zero
06.09.b05 Used main control word = Ramp halt
06.09.b06 Used main control word = Ramp in zero
06.09.b08 Used main control word = Inching 1
06.09.b09 Used main control word = Inching 2
AND
OR
23.01 Speed reference ramp input
22.42 Jogging 1 reference
22.43 Jogging 2 reference
23.20 Acceleration time jogging
23.21 Deceleration time jogging
RAMP
ACC TIME
DEC TIME
23.02 Speed ref ramp output
23.32 Direct speed reference
23.03 Speed reference 7
Stop command
23.26 Ramp out balancing enable
23.27 Ramp out balancing reference
SHAPE
23.16 Shape time acceleration 1
23.17 Shape time acceleration 2
23.18 Shape time deceleration 1
23.19 Shape time deceleration 2
06.15.b05 Main status word = Emergency stop
06.09.b04 Used main control word = Ramp out zero
Stop command
30.12 M1 Maximum speed
23.24 Speed ramp in zero source
06.09.b06 Used main control word = Ramp in zero
22.01 Speed reference unlimited
30.11 M1 Minimum speed
06.15.b05 Main status word = Emergency stop
23.23 Emergency stop time
23.11 Ramp set selection
23.12 Acceleration time 1
23.14 Acceleration time 2
23.13 Deceleration time 1
23.15 Deceleration time 2
23.20 Acceleration time jogging
23.21 Deceleration time jogging
20.25 Jog function enable
20.26 Jogging 1 start source
20.27 Jogging 2 start source
23.28 Variable slope enable
23.29 Variable slope rate
46.02 M1 speed scaling actual
SS_880_006_DCS_structure diagram_a.ai
2
7
3


Speed feedback selection
Gear: Motor encoder / Motor for speed
90.43 Motor gear numerator
94.04 OnBoard encoder speed
90.10 Encoder 1 speed
90.20 Encoder 2 speed
94.03 Tacho speed
94.01 EMF speed
90.40 External speed
90.44 Motor gear denominator
90.41 M1 feedback selection
90.42 Motor speed filter time
Value
46.11 Filter time motor speed
01.04 OnBoard encoder speed filtered
01.05 Encoder 1 speed filtered
01.06 Encoder 2 speed filtered
01.03 Tacho speed filtered
01.02 EMF speed filtered
01.01 Used motor speed filtered
90.01 Motor speed for control
21.08 M1 zero speed level
21.09 M1 zero speed delay
06.21.b00 Speed control status word = Zero speed
46.31 Above speed level
06.15.b10 Main status word = Above level
46.21 At speed hysteresis
06.15.b08 Main status word = At setpoint
ABS
a>b
23.03 Speed reference 7
46.11 Filter time motor speed
Position counter
Gear: Motor encoder / Motor for positioning
90.43 Motor gear numerator
90.41 M1 feedback selection
Selection
OnBoard encoder
Encoder 1
Encoder 2
94.16 OnBoard encoder position
94.18 OnBoard encoder revolution extension
90.11 Encoder 1 position
90.12 Encoder 1 multiturn revolutions
90.13 Encoder 1 revolution extension
90.21 Encoder 2 position
90.22 Encoder 2 multiturn revolutions
90.23 Encoder 2 revolution extension
90.44 Motor gear denominator
90.02 Motor position
90.06 Motor position scaled
90.48 Motor position axis mode
90.49 Motor position resolution
SS_880_006_DCS_structure diagram_a.ai
4
6
7
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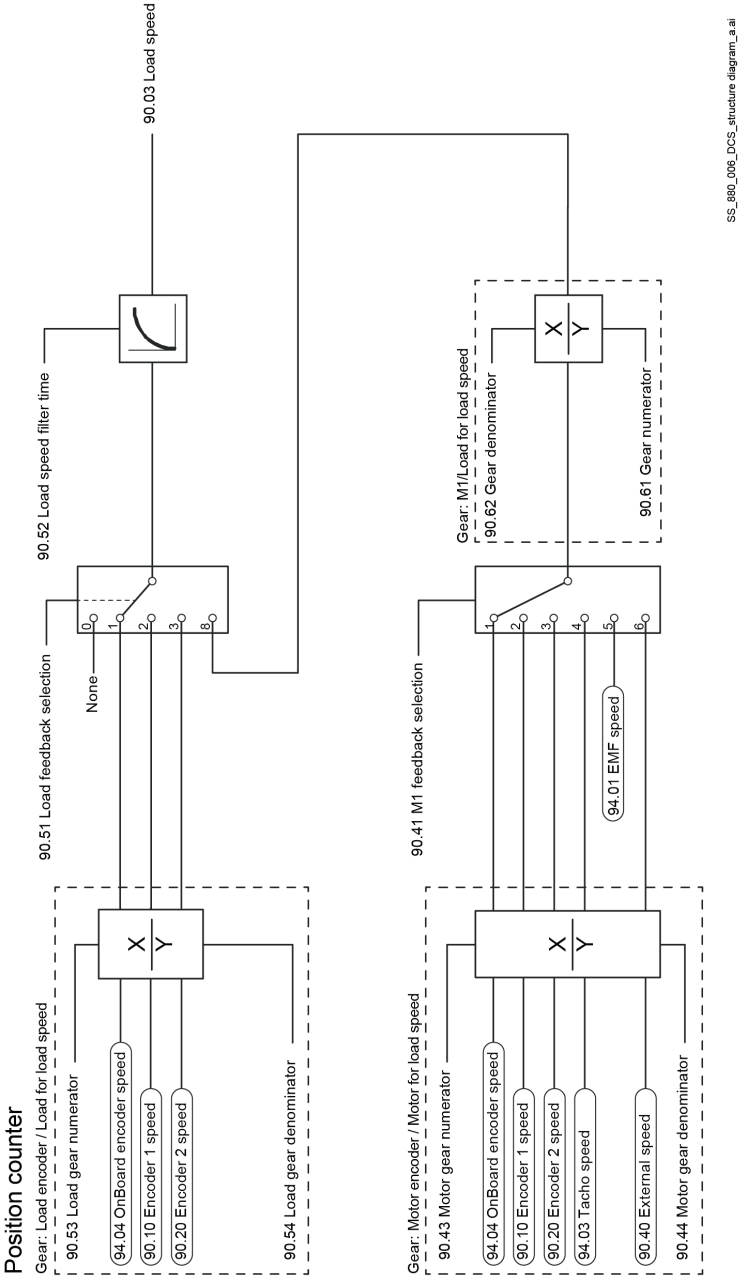
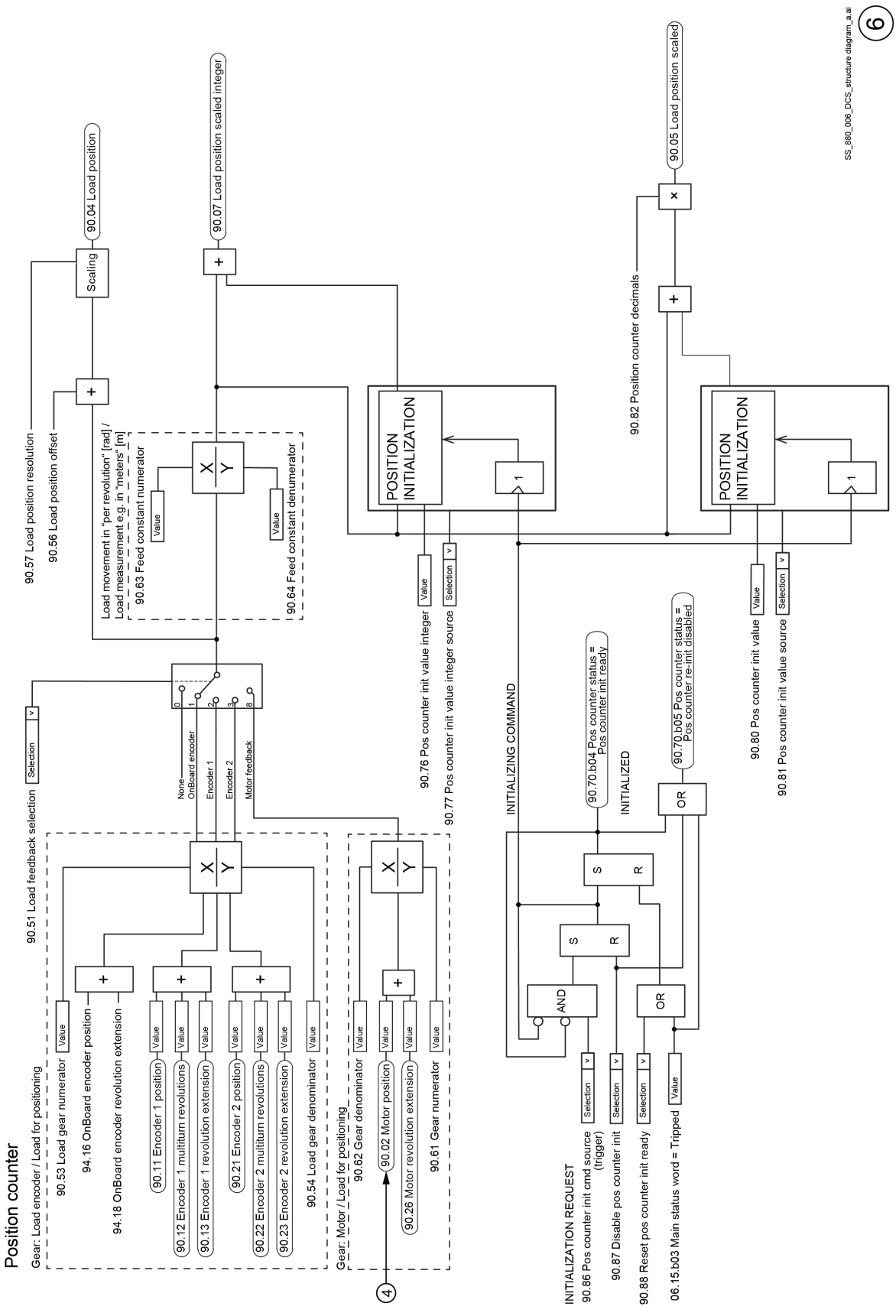

Position counter
Gear: Load encoder / Load for load speed
90.53 Load gear numerator
94.04 OnBoard encoder speed
90.10 Encoder 1 speed
90.20 Encoder 2 speed
90.54 Load gear denominator
90.51 Load feedback selection
None
90.52 Load speed filter time
90.03 Load speed
Gear: Motor encoder / Motor for load speed
90.43 Motor gear numerator
94.04 OnBoard encoder speed
90.10 Encoder 1 speed
90.20 Encoder 2 speed
94.03 Tacho speed
90.40 External speed
90.44 Motor gear denominator
90.41 M1 feedback selection
94.01 EMF speed
Gear: M1/Load for load speed
90.62 Gear denominator
90.61 Gear numerator
SS_880_006_DCS_structure diagram_a.ai


Position counter
Gear: Load encoder / Load for positioning
90.51 Load feedback selection
Selection
90.53 Load gear numerator
94.16 OnBoard encoder position
94.18 OnBoard encoder revolution extension
90.11 Encoder 1 position
90.12 Encoder 1 multiturn revolutions
90.13 Encoder 1 revolution extension
90.21 Encoder 2 position
90.22 Encoder 2 multiturn revolutions
90.23 Encoder 2 revolution extension
90.54 Load gear denominator
Gear: Motor / Load for positioning
90.62 Gear denominator
90.02 Motor position
90.26 Motor revolution extension
90.61 Gear numerator
None
OnBoard encoder
Encoder 1
Encoder 2
Motor feedback
90.57 Load position resolution
90.56 Load position offset
Scaling
90.04 Load position
Load movement in "per revolution" [rad] / Load measurement e.g. in "meters" [m]
90.63 Feed constant numerator
90.64 Feed constant denumerator
90.07 Load position scaled integer
90.76 Pos counter init value integer
90.77 Pos counter init value integer source
POSITION INITIALIZATION
INITIALIZING COMMAND
INITIALIZED
INITIALIZATION REQUEST
90.86 Pos counter init cmd source (trigger)
90.87 Disable pos counter init
90.88 Reset pos counter init ready
06.15.b03 Main status word = Tripped
90.70.b04 Pos counter status = Pos counter init ready
90.70.b05 Pos counter status = Pos counter re-init disabled
AND
OR
90.82 Position counter decimals
90.05 Load position scaled
90.80 Pos counter init value
90.81 Pos counter init value source
SS_880_006_DCS_structure diagram_a.ai
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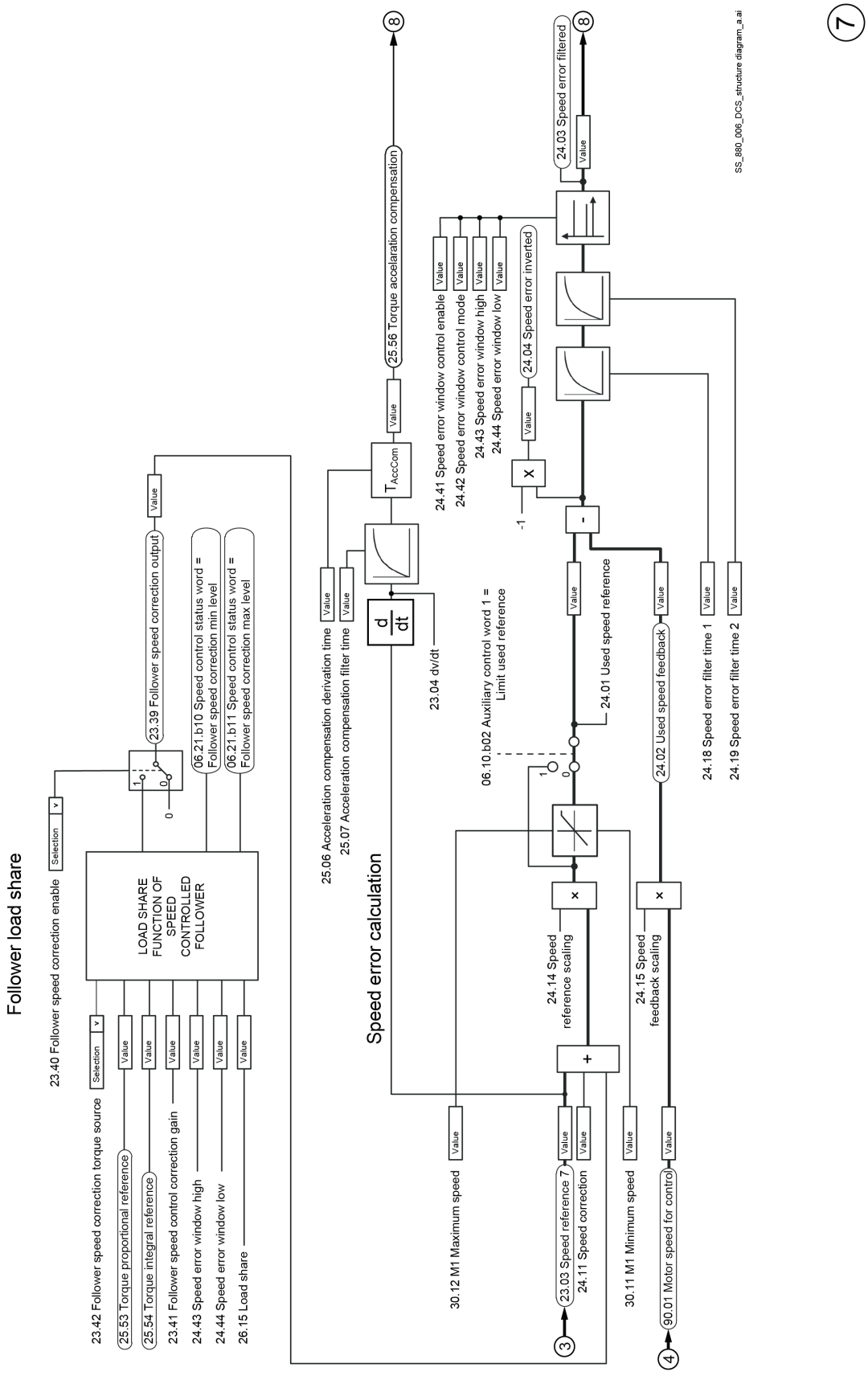
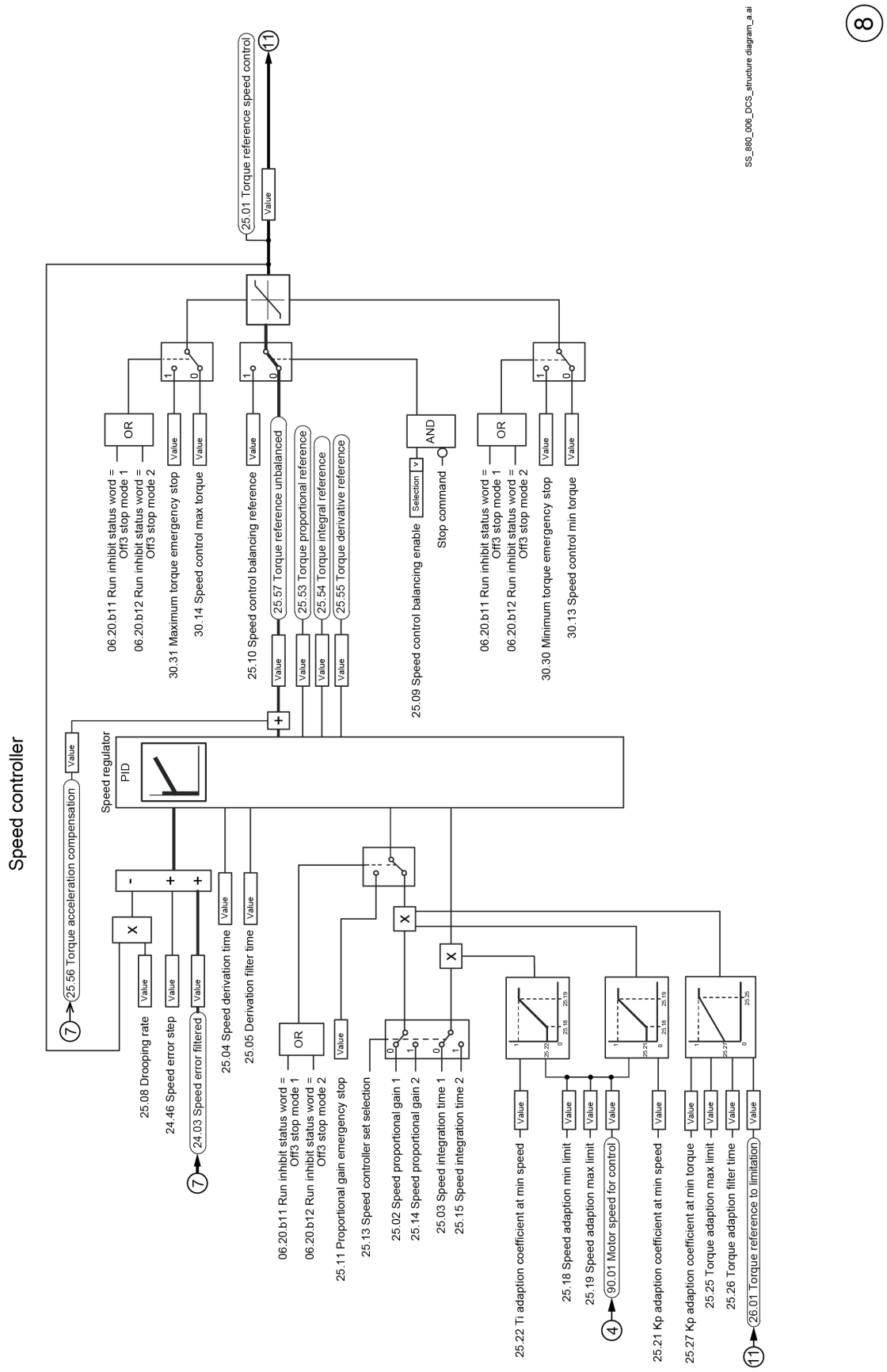
4


Follower load share
23.40 Follower speed correction enable
Selection
LOAD SHARE FUNCTION OF SPEED CONTROLLED FOLLOWER
23.42 Follower speed correction torque source
25.53 Torque proportional reference
25.54 Torque integral reference
23.41 Follower speed control correction gain
24.43 Speed error window high
24.44 Speed error window low
26.15 Load share
23.39 Follower speed correction output
06.21.b10 Speed control status word = Follower speed correction min level
06.21.b11 Speed control status word = Follower speed correction max level
Speed error calculation
25.06 Acceleration compensation derivation time
25.07 Acceleration compensation filter time
d/dt
23.04 dv/dt
TAccCom
25.56 Torque accelaration compensation
24.41 Speed error window control enable
24.42 Speed error window control mode
24.43 Speed error window high
24.44 Speed error window low
24.04 Speed error inverted
24.03 Speed error filtered
06.10.b02 Auxiliary control word 1 = Limit used reference
24.01 Used speed reference
24.02 Used speed feedback
24.18 Speed error filter time 1
24.19 Speed error filter time 2
30.12 M1 Maximum speed
30.11 M1 Minimum speed
24.14 Speed reference scaling
24.15 Speed feedback scaling
23.03 Speed reference 7
24.11 Speed correction
90.01 Motor speed for control
SS_880_006_DCS_structure diagram_a.ai


Speed controller
25.56 Torque acceleration compensation
Value
Speed regulator
PID
25.08 Drooping rate
24.46 Speed error step
24.03 Speed error filtered
25.04 Speed derivation time
25.05 Derivation filter time
06.20.b11 Run inhibit status word = Off3 stop mode 1
06.20.b12 Run inhibit status word = Off3 stop mode 2
OR
25.11 Proportional gain emergency stop
25.13 Speed controller set selection
25.02 Speed proportional gain 1
25.14 Speed proportional gain 2
25.03 Speed integration time 1
25.15 Speed integration time 2
25.22 Ti adaption coefficient at min speed
25.18 Speed adaption min limit
25.19 Speed adaption max limit
90.01 Motor speed for control
25.21 Kp adaption coefficient at min speed
25.27 Kp adaption coefficient at min torque
25.25 Torque adaption max limit
25.26 Torque adaption filter time
26.01 Torque reference to limitation
30.31 Maximum torque emergency stop
30.14 Speed control max torque
25.10 Speed control balancing reference
25.57 Torque reference unbalanced
25.53 Torque proportional reference
25.54 Torque integral reference
25.55 Torque derivative reference
25.09 Speed control balancing enable
Selection
Stop command
AND
30.30 Minimum torque emergency stop
30.13 Speed control min torque
25.01 Torque reference speed control
SS_880_006_DCS_structure diagram_a.ai
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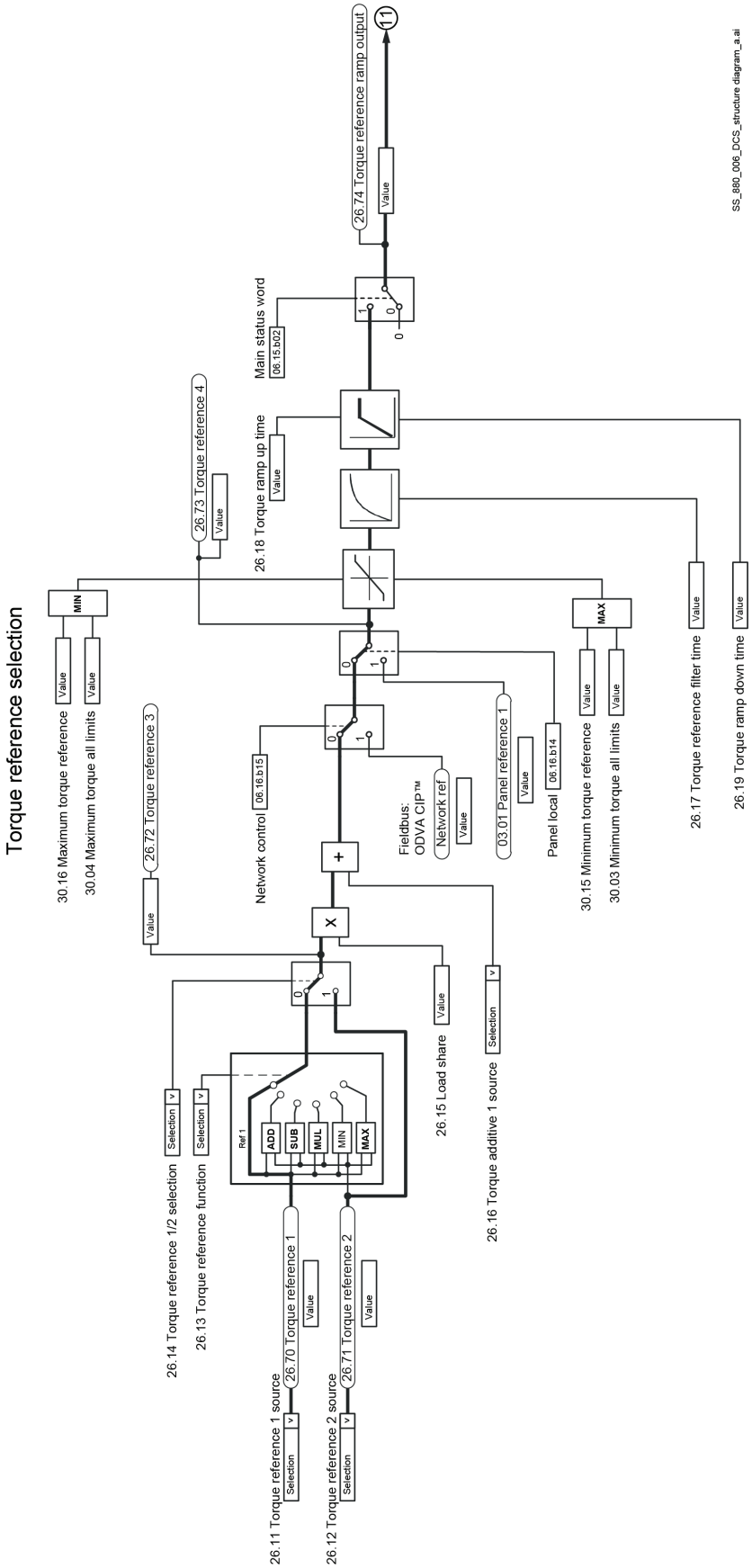
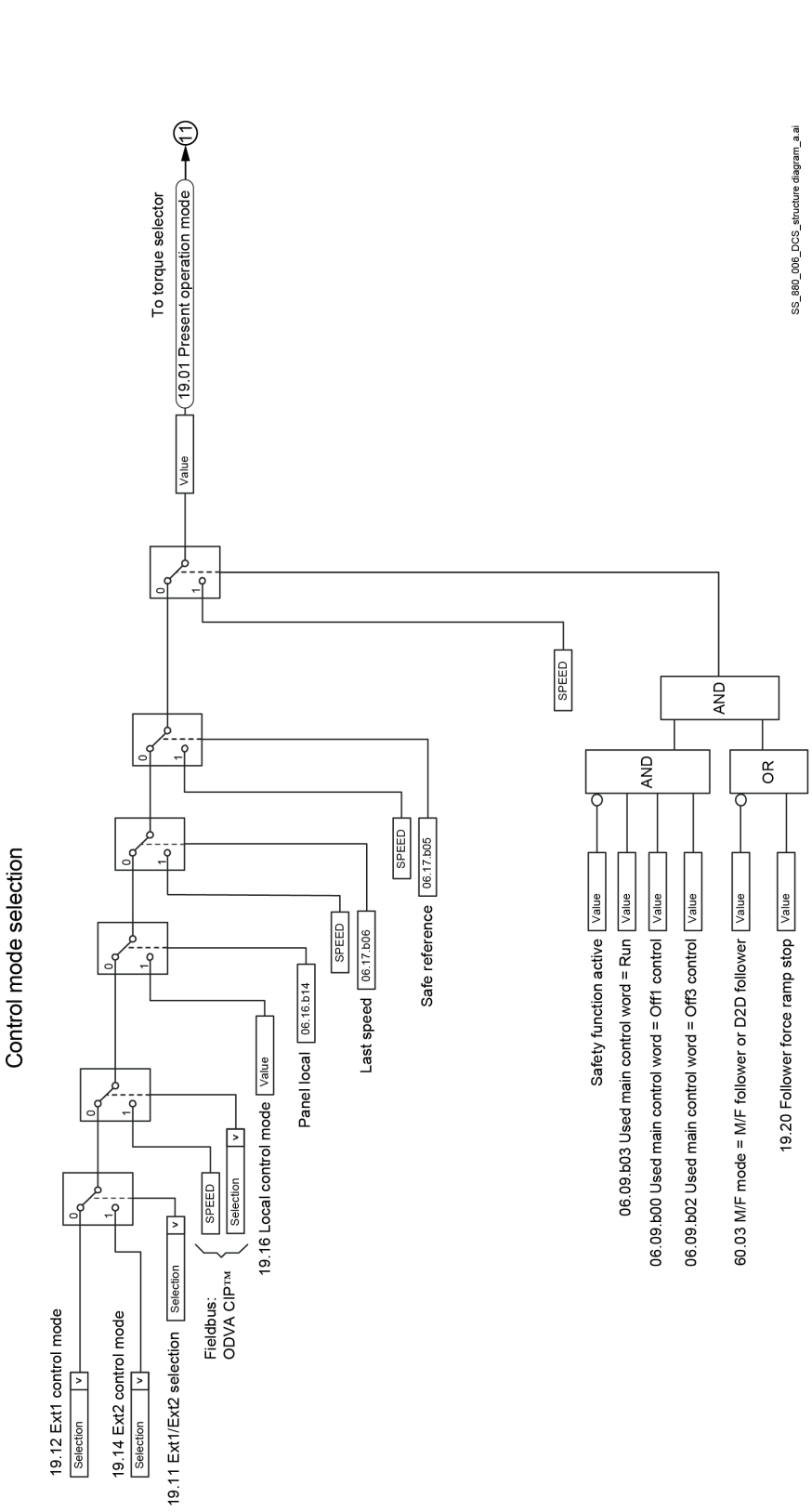
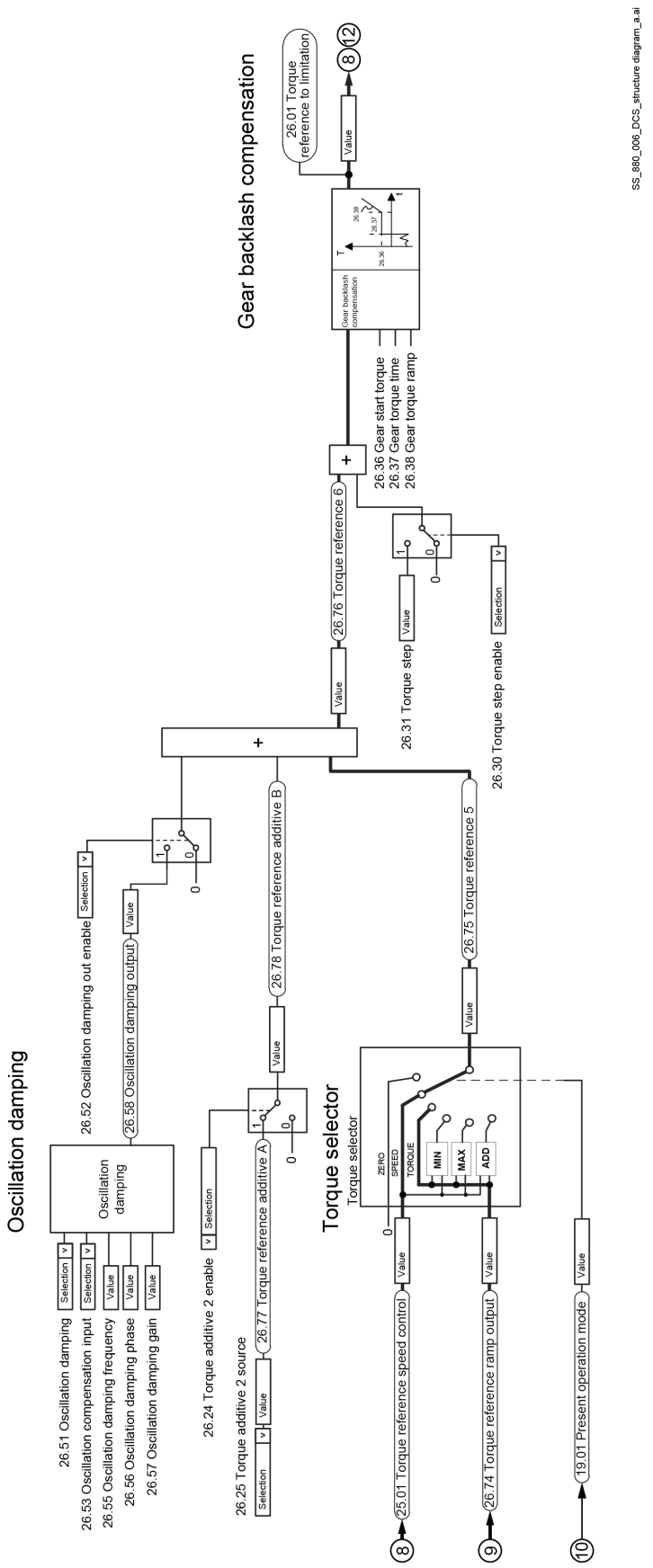
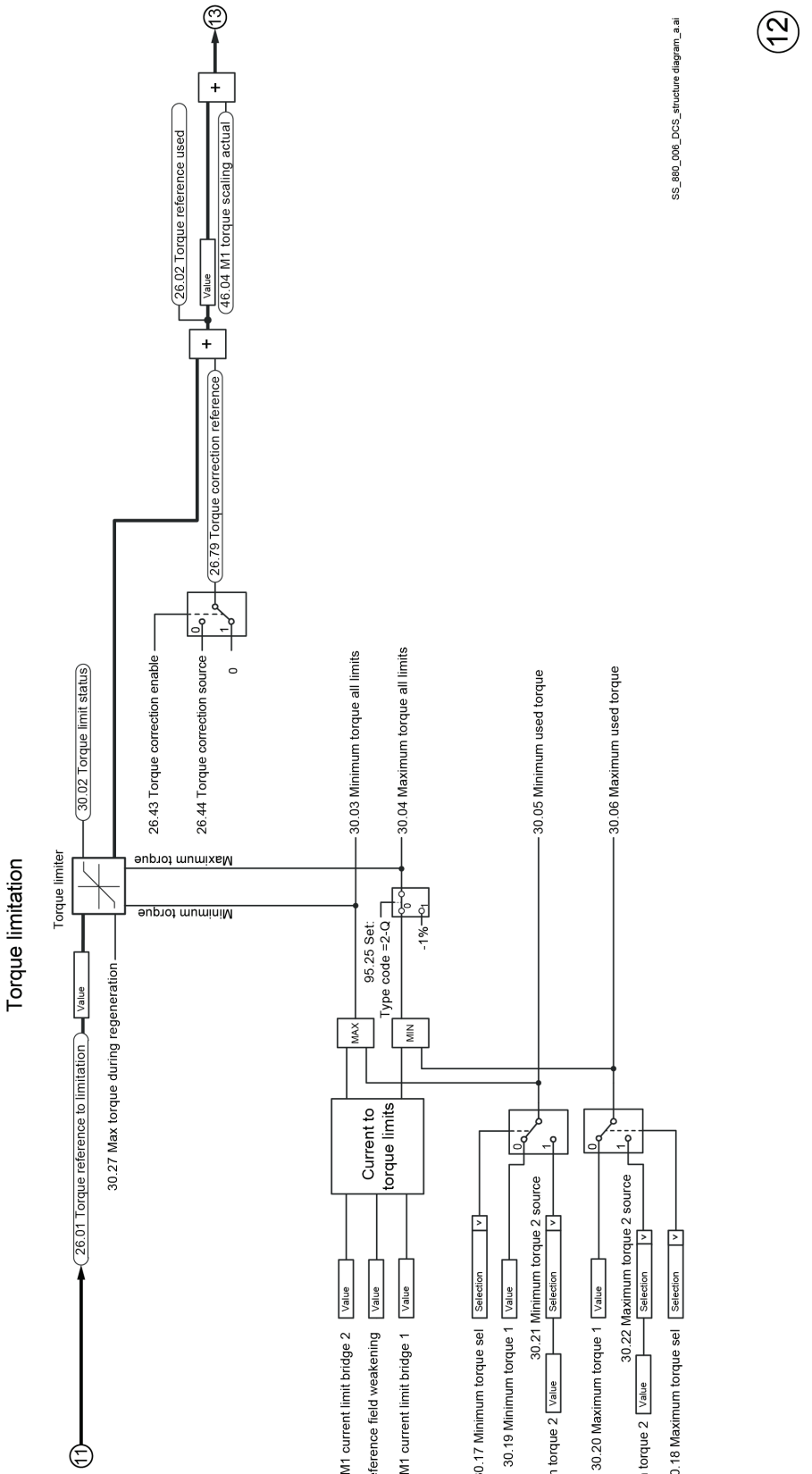
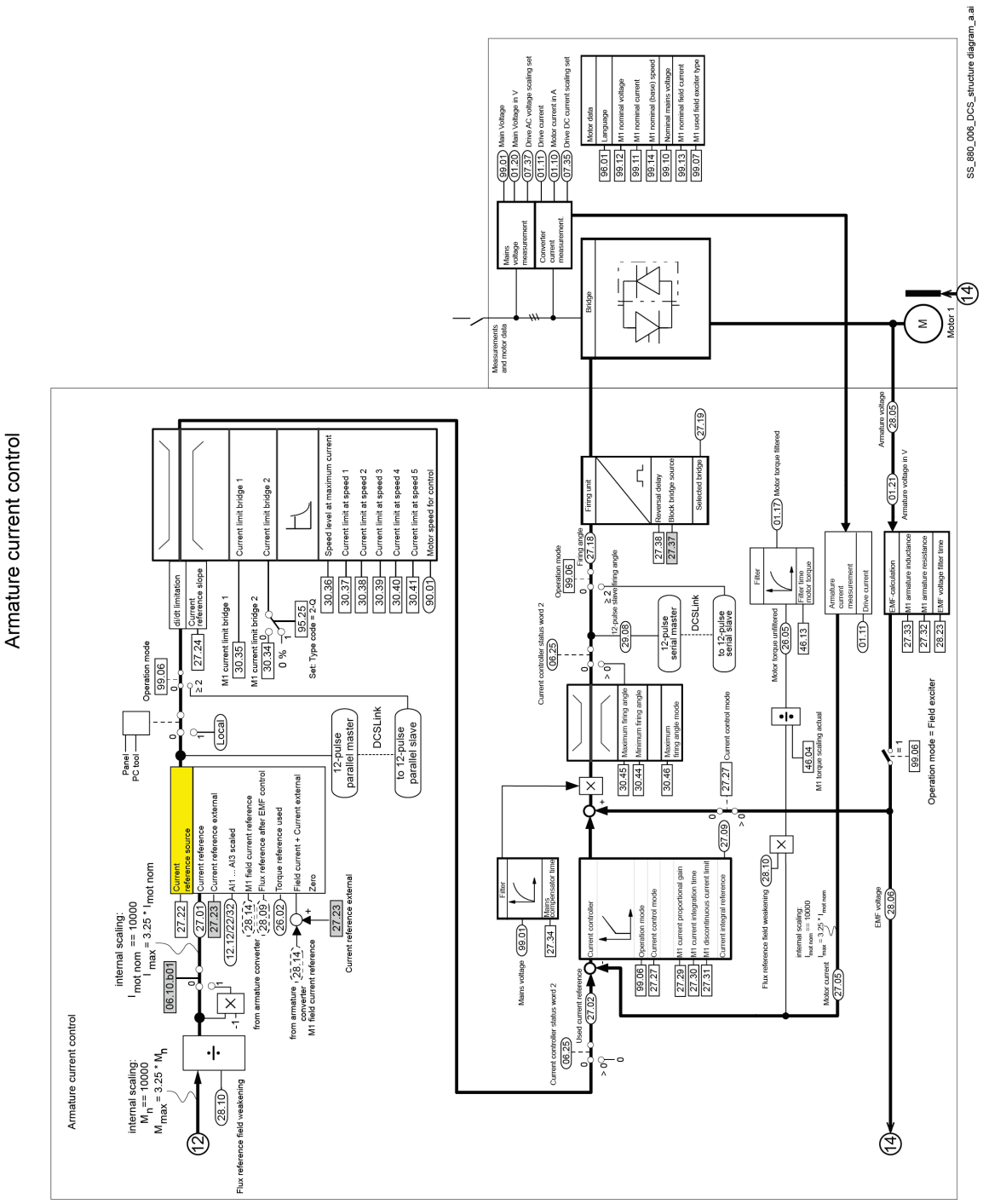

Torque reference selection
9
SS_880_006_DCS_structure diagram_a.ai
26.74 Torque reference ramp output
11
Value
Main status word
06.15.b02
26.18 Torque ramp up time
Value
26.73 Torque reference 4
Value
MIN
30.16 Maximum torque reference
30.04 Maximum torque all limits
Value
Value
26.72 Torque reference 3
Value
Network control
06.16.b15
Fieldbus:
ODVA CIP™
Network ref
Value
03.01 Panel reference 1
Value
Panel local
06.16.b14
MAX
30.15 Minimum torque reference
30.03 Minimum torque all limits
Value
Value
26.17 Torque reference filter time
Value
26.19 Torque ramp down time
Value
X
+
26.15 Load share
Value
26.16 Torque additive 1 source
Selection
26.14 Torque reference 1/2 selection
Selection
26.13 Torque reference function
Selection
Ref 1
ADD
SUB
MUL
MIN
MAX
26.11 Torque reference 1 source
Selection
26.70 Torque reference 1
Value
26.12 Torque reference 2 source
Selection
26.71 Torque reference 2
Value


Control mode selection
19.12 Ext1 control mode
19.14 Ext2 control mode
19.11 Ext1/Ext2 selection
Selection
Fieldbus:
ODVA CIP™
SPEED
Selection
19.16 Local control mode
Value
Panel local
06.16.b14
Last speed
SPEED
06.17.b06
Safe reference
SPEED
06.17.b05
SPEED
Safety function active
06.09.b03 Used main control word = Run
06.09.b00 Used main control word = Off1 control
06.09.b02 Used main control word = Off3 control
AND
AND
60.03 M/F mode = M/F follower or D2D follower
19.20 Follower force ramp stop
OR
Value
To torque selector
19.01 Present operation mode
11
10
SS_880_006_DCS_structure diagram_a.ai


Oscillation damping
26.51 Oscillation damping
26.53 Oscillation compensation input
26.55 Oscillation damping frequency
26.56 Oscillation damping phase
26.57 Oscillation damping gain
Oscillation damping
26.52 Oscillation damping out enable
26.58 Oscillation damping output
26.24 Torque additive 2 enable
26.25 Torque additive 2 source
26.77 Torque reference additive A
26.78 Torque reference additive B
Torque selector
Torque selector
ZERO
SPEED
TORQUE
MIN
MAX
ADD
26.75 Torque reference 5
26.30 Torque step enable
26.31 Torque step
26.76 Torque reference 6
Gear backlash compensation
26.36 Gear start torque
26.37 Gear torque time
26.38 Gear torque ramp
26.01 Torque reference to limitation
25.01 Torque reference speed control
26.74 Torque reference ramp output
19.01 Present operation mode
SS_880_006_DCS_structure diagram_a.ai


Torque limitation
Torque limiter
Maximum torque
Minimum torque
26.01 Torque reference to limitation
Value
30.27 Max torque during regeneration
30.02 Torque limit status
26.43 Torque correction enable
26.44 Torque correction source
26.79 Torque correction reference
26.02 Torque reference used
Value
46.04 M1 torque scaling actual
30.03 Minimum torque all limits
30.04 Maximum torque all limits
95.25 Set Type code =2-Q
-1%
MAX
MIN
Current to torque limits
30.34 M1 current limit bridge 2
28.10 Flux reference field weakening
30.35 M1 current limit bridge 1
30.17 Minimum torque sel
30.19 Minimum torque 1
30.21 Minimum torque 2 source
30.23 Minimum torque 2
30.05 Minimum used torque
30.20 Maximum torque 1
30.22 Maximum torque 2 source
30.24 Maximum torque 2
30.18 Maximum torque sel
30.06 Maximum used torque
SS_880_006_DCS_structure diagram_a.ai
11
12
13


Armature current control
Armature current control
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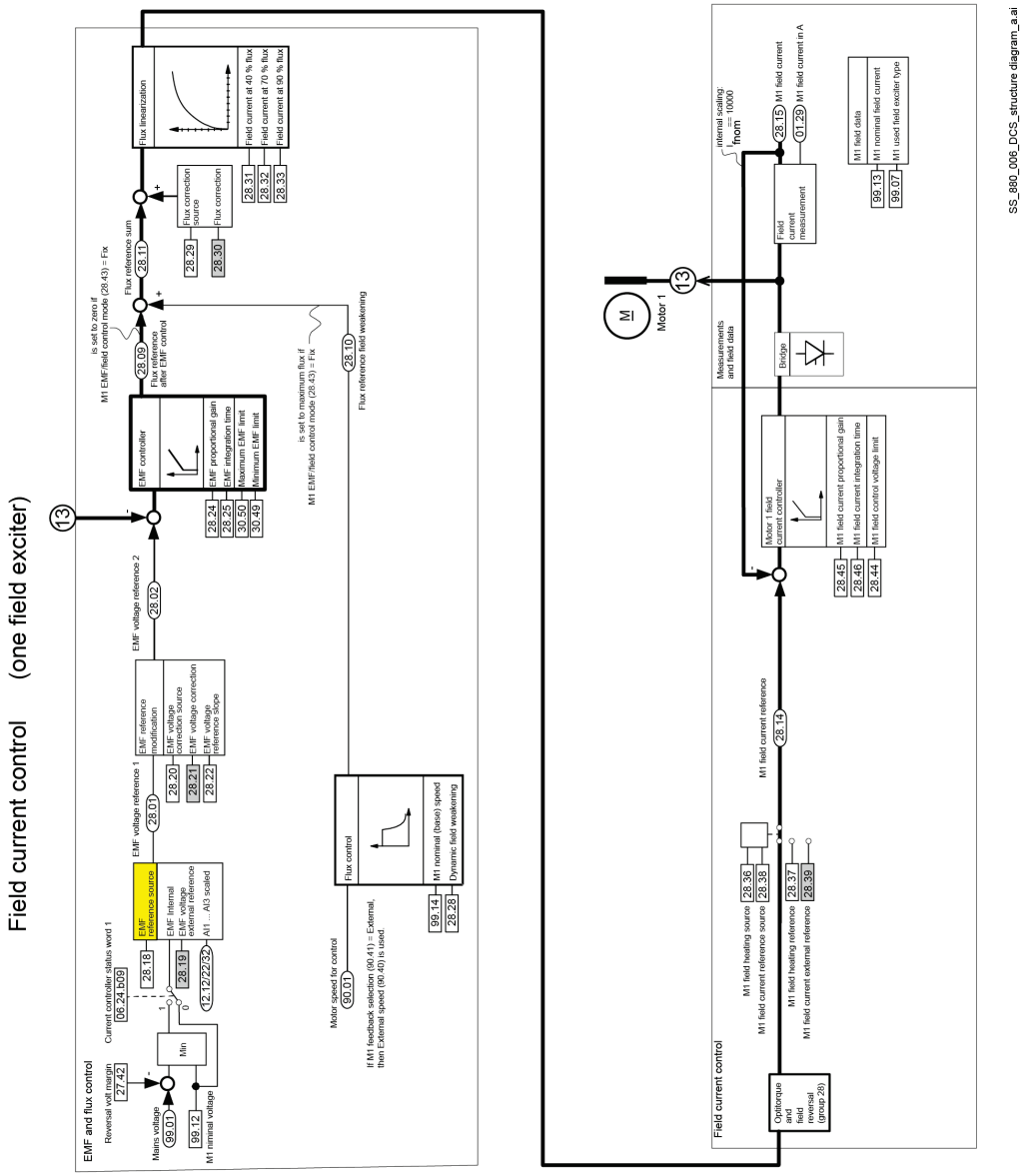
Measurements and motor data
Mains voltage measurement
Converter current measurement
Bridge
Motor 1
Motor data
Language
M1 nominal voltage
M1 nominal current
M1 nominal (base) speed
Nominal mains voltage
M1 nominal field current
M1 used field exciter type
Main Voltage
Main Voltage in V
Drive AC voltage scaling set
Drive current
Motor current in A
Drive DC current scaling set
Operation mode
Panel
PC tool
Local
Current reference source
Current reference
Current reference external
AI1 ... AI3 scaled
M1 field current reference
Flux reference after EMF control
Torque reference used
Field current + Current external
Zero
Current reference external
12-pulse parallel master
DCSLink
to 12-pulse parallel slave
dI/dt limitation
Current reference slope
Current limit bridge 1
Current limit bridge 2
Speed level at maximum current
Current limit at speed 1
Current limit at speed 2
Current limit at speed 3
Current limit at speed 4
Current limit at speed 5
Motor speed for control
Set: Type code = 2-0
internal scaling:
I mot nom == 10000
I max = 3.25 * I mot nom
internal scaling:
M n == 10000
M max = 3.25 * M n
Flux reference field weakening
from armature converter: M1 field current reference
Current reference external
Current controller status word 2
Used current reference
Current controller
Operation mode
Current control mode
M1 current proportional gain
M1 current integration time
M1 discontinuous current limit
Current integral reference
Mains compensation time
Mains voltage
Flux reference field weakening
internal scaling:
I fwd nom == 10000
I fwd = 3.25 * I mot nom
Motor current
Current control mode
Maximum firing angle
Minimum firing angle
Maximum firing angle mode
Firing angle
Firing unit
Reversal delay
Block bridge source
Selected bridge
12-pulse slave firing angle
12-pulse serial master
DCSLink
to 12-pulse serial slave
Motor torque unfiltered
Motor torque filtered
Filter
Filter time motor torque
M1 torque scaling actual
Armature current measurement
Drive current
Armature voltage
Armature voltage in V
EMF voltage
EMF calculation
M1 armature inductance
M1 armature resistance
EMF voltage filter time
Operation mode = Field exciter


Field current control (one field exciter)
EMF and flux control
Field current control
Motor 1
Measurements and field data
Bridge
Field current measurement
Motor 1 field current controller
EMF controller
Flux linearization
Flux reference sum
Flux correction source
Flux correction
EMF reference source
EMF voltage reference 1
EMF voltage reference 2
Flux control
Dynamic field weakening
Mains voltage
M1 nominal voltage
Reversal volt margin
Current controller status word 1
M1 field heating source
M1 field current reference source
M1 field heating reference
M1 field current external reference
M1 field current reference
Optiltorque and field terminal (group 28)
internal scaling I_dc = 10000
M1 field current
M1 field current in A
M1 field data
M1 nominal field current
M1 used field exciter type
M1 field current proportional gain
M1 field current integration time
M1 field control voltage limit
EMF proportional gain
EMF integration time
Maximum EMF limit
Minimum EMF limit
Flux reference field weakening
Field current at 40 % flux
Field current at 70 % flux
Field current at 95 % flux
Motor speed for control
M1 nominal (base) speed
SS_880_006_DCS_structure diagram_a.ai

DCS family

DCS550-S modules
The compact drive for machinery application

20 ... 1,000 A_{DC}
0 ... 610 V_{DC}
230 ... 525 V_{AC}
IP00

- Compact
- Robust design
- Adaptive and winder program
- High field exciter current

DCS800-S modules
The versatile drive for processindustry

20 ... 5,200 A_{DC}
0 ... 1,160 V_{DC}
230 ... 1,000 V_{AC}
IP00

- Compact
- Highest power ability
- Simple operation
- Comfortable assistants, e.g. for commissioning or fault tracing
- Scalable to all applications
- Free programmable by means of integrated IEC61131-PLC

DCS800-A enclosed converters
Complete drive solutions

20 ... 20,000 A_{DC}
0 ... 1,500 V_{DC}
230 ... 1,200 V_{AC}
IP21 – IP54

- Individually adaptable to customer requirements
- User-defined accessories like external PLC or automation systems can be included
- High power solutions in 6- and 12-pulse up to 20,000 A, 1,500 V
- In accordance to usual standards
- Individually factory load tested
- Detailed documentation

DCS800-E series
Pre-assembled drive-kits

20 ... 2,000 A_{DC}
0 ... 700 V_{DC}
230 ... 600 V_{AC}
IP00

- DCS800 module with all necessary accessories mounted and fully cabled on a panel
- Very fast installation and commissioning
- Squeezes shut-down-times in revamp projects to a minimum
- Fits into Rittal cabinets
- Compact version up to 450 A and Vario version up to 2,000 A

DCS800-R Rebuild Kit
Digital control-kit for existing powerstacks

20 ... 20,000 A_{DC}
0 ... 1,160 V_{DC}
230 ... 1,200 V_{AC}
IP00

- Proven long life components are re-used, such as power stacks, (main) contactors, cabinets and cabling / busbars, cooling systems
- Use of up-to-date communication facilities
- Increase of production and quality
- Very cost-effective solution
- Open Rebuild Kits for nearly all existing DC drives
- tailor-made solutions for…
  - BBC PxD
  - BBC SZxD
  - ASEA TYRAK
  - other manufacturers

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www.abb.com/dc-drives

Ident. No.: 3ADW000474R0101 Rev A
12.2016

474R0101A6390000