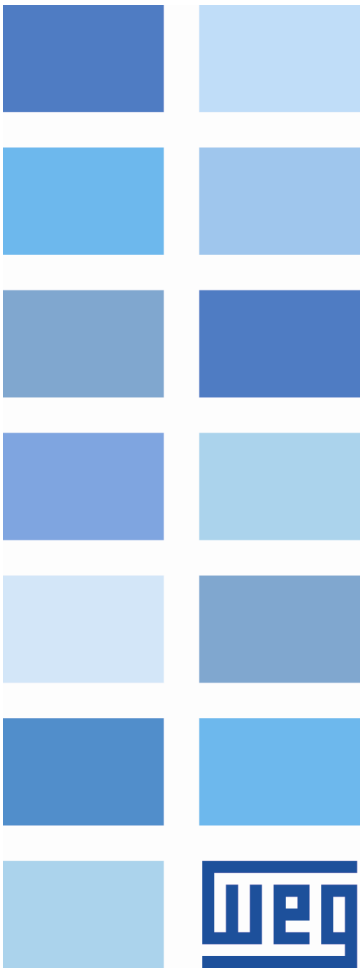
Frequency Inverter

CFW900

Programming Manual



Frequency Inverter Programming Manual

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The information below describes the reviews made in this manual.

Version	Revision	Description
1.00.XX	R00	First edition.
1.04.XX	R01	General review and addition of new parameters for new features. New features: Electronic Potentiometer (E.P.); Frequency Input (FI); Frequency Output (FO); Stop Mode via HMI keypad.
1.06.XX	R02	General review and addition of new parameters for new features. New features: Torque Control; Detailed History of Alarms and Faults; Skip Speed; Access Control.

CONTENTS

1 PARAMETER STRUCTURE

S Status

- S1 Inverter
  - S1.1 Status
  - S1.2 Software Version
    - S1.2.2 Details
  - S1.3 Inverter Data
  - S1.4 Control Accessory Data
    - S1.4.1 Backplane
    - S1.4.2 Slot A
    - S1.4.3 Slot B
    - S1.4.4 Slot C
    - S1.4.5 Slot D
    - S1.4.6 Slot E
    - S1.4.7 Slot F
    - S1.4.8 Slot G
  - S1.5 Date/Hour
  - S1.6 Control Words
- S2 Measurements
  - S2.1 Motor Speed
  - S2.2 Motor Torque
  - S2.3 Inverter Output
  - S2.4 Motor Temperatures
  - S2.5 Inverter Temperatures
    - S2.5.1 IGBT Temperature
    - S2.5.3 Internal Air Temperature
  - S2.7 DC Link
  - S2.8 Torque Current Limitation
- S3 I/Os
  - S3.1 Slot X Status
    - S3.1.1 Analog Inputs
    - S3.1.2 Analog Outputs
    - S3.1.3 Digital Inputs
    - S3.1.4 Digital Outputs
    - S3.1.5 Encoder
  - S3.2 Slot A Status
    - S3.2.1 Analog Inputs
    - S3.2.2 Analog Outputs
    - S3.2.3 Digital Inputs
    - S3.2.4 Digital Outputs
    - S3.2.5 Encoder
    - S3.2.6 Temperatures
  - S3.3 Slot B Status
  - S3.4 Slot C Status

S Status (cont.)

- S3 I/Os (cont.)
  - S3.5 Slot D Status
  - S3.6 Slot E Status
  - S3.7 Slot F Status
  - S3.8 Slot G Status
- S4 Functional Safety
- S5 Communications
  - S5.1 Status and Commands
  - S5.2 Serial RS485
  - S5.3 Ethernet
  - S5.5 Modbus TCP
  - S5.7 CAN/CANop/DNet
  - S5.9 Bluetooth
- S6 SoftPLC
  - S6.1 Program Execution
  - S6.2 Control and References
- S7 User

D Diagnostics

- D1 Fault
  - D1.1 Actual
  - D1.2 Historic
- D2 Alarms
  - D2.1 Actual
  - D2.2 Historic
- D3 Hours control
- D4 Inverter and Control Access.
  - D4.1 Inverter
    - D4.1.1 Fans Speeds
    - D4.1.2 Temperatures
    - D4.1.3 DC Link
    - D4.1.4 Control Voltage
    - D4.1.5 Motor Overl. Protection
    - D4.1.6 Thermal Management
  - D4.2 Control Accessories
    - D4.2.1 Diag. Slot A
    - D4.2.2 Diag. Slot B
    - D4.2.3 Diag. Slot C
    - D4.2.4 Diag. Slot D
    - D4.2.5 Diag. Slot E
    - D4.2.6 Diag. Slot F
    - D4.2.7 Diag. Slot G

C Configuration

- C1 Inverter and Power Supply
  - C1.1 Power Supply
  - C1.2 Inverter Use
  - C1.3 Switching Frequency
  - C1.4 PWM Modulation
  - C1.5 Fans Configuration
  - C1.6 General Config.
- C2 Motor
  - C2.1 Motor Data
  - C2.2 Motor Model Parameters
- C3 Control
  - C3.1 Configuration
  - C3.2 VVW+ and Scalar Control
    - C3.2.1 V/F Curve
    - C3.2.2 VVW+ Optimization
      - C3.2.2.1 VVW+ Induction Motor
      - C3.2.2.2 VVW+ PM Motor
    - C3.2.3 Current Stabilization
    - C3.2.4 Pré-Magnetization
  - C3.3 Vector Control
    - C3.3.1 Configuration
    - C3.3.2 Regulators
      - C3.3.2.1 Speed Regulator
      - C3.3.2.2 Torque Regulator
      - C3.3.2.3 Flux Regulator
      - C3.3.2.4 Current Regulator
    - C3.3.3 Output Voltage Limiter
    - C3.3.4 Torque Mode
      - C3.3.4.1 Speed Limiter
    - C3.3.5 Speed Mode
      - C3.3.5.1 Torque Limiter
    - C3.3.7 Speed Steady State Estimator
    - C3.3.9 Online Parameter Estimation
  - C3.4 Current Limiter
  - C3.5 DC Link Limiter
    - C3.5.1 Configuration
    - C3.5.2 VVW+ and Scalar Control
    - C3.5.3 Vector Control
  - C3.6 Dynamic Braking
  - C3.7 DC Braking

C Configuration (cont.)

- C3 Control (cont.)
  - C3.8 Flying Start
    - C3.8.1 Flying Start Config.
    - C3.8.2 VVW+ and Scalar Control
    - C3.8.3 Vector Control
  - C3.9 Ride-Through
    - C3.9.1 Ride-Through Config.
    - C3.9.2 VVW+ and Scalar Control
    - C3.9.3 Vector Control
  - C3.10 Advanced Energy Saving
- C4 Commands and References
  - C4.1 Config. LOC/REM Mode
  - C4.2 Commands
    - C4.2.1 R1 Config. Commands
    - C4.2.2 R2 Config. Commands
    - C4.2.3 DIs Config. for Commands
    - C4.2.4 HMI Config. for Commands
  - C4.3 References
    - C4.3.1 Speed
      - C4.3.1.1 Speed Ref. Range
      - C4.3.1.2 Speed Ref. Source
      - C4.3.1.3 Ref. HMI, AIs and FIs
      - C4.3.1.4 Ref. E.P.-DIs Config.
      - C4.3.1.5 Ref. Multispeed
      - C4.3.1.6 Skip Speed
    - C4.3.2 JOG Speed
    - C4.3.3 Torque
- C5 I/Os
  - C5.1 Slot X
    - C5.1.1 Slot X - Analog Inputs
    - C5.1.2 Slot X - Analog Outputs
    - C5.1.3 Slot X - Digital Inputs
    - C5.1.4 Slot X - Digital Outputs
    - C5.1.5 Slot X - Encoder
  - C5.2 Slot A
    - C5.2.1 Slot A - Analog Inputs
    - C5.2.2 Slot A - Analog Outputs
    - C5.2.4 Slot A - Digital Outputs
    - C5.2.5 Slot A - Encoder
    - C5.2.6 Slot A - Temperatures
  - C5.3 Slot B

C Configuration (cont.)

- C5 I/Os (cont.)
  - C5.3 Slot B (cont.)
    - C5.3.1 Slot B - Analog Inputs
    - C5.3.2 Slot B - Analog Outputs
    - C5.3.4 Slot B - Digital Outputs
    - C5.3.5 Slot B - Encoder
    - C5.3.6 Slot B - Temperatures
  - C5.4 Slot C
    - C5.4.1 Slot C - Analog Inputs
    - C5.4.2 Slot C - Analog Outputs
    - C5.4.4 Slot C - Digital Otputs
    - C5.4.5 Slot C - Encoder
    - C5.4.6 Slot C - Temperatures
  - C5.5 Slot D
    - C5.5.1 Slot D - Analog Inputs
    - C5.5.2 Slot D - Analog Outputs
    - C5.5.4 Slot D - Digital Outputs
    - C5.5.5 Slot D - Encoder
    - C5.5.6 Slot D - Temperatures
  - C5.6 Slot E
    - C5.6.1 Slot E - Analog Inputs
    - C5.6.2 Slot E - Analog Outputs
    - C5.6.4 Slot E - Digital Outputs
    - C5.6.5 Slot E - Encoder
    - C5.6.6 Slot E - Temperatures
  - C5.7 Slot F
    - C5.7.1 Slot F - Analog Inputs
    - C5.7.2 Slot F - Analog Outputs
    - C5.7.4 Slot F - Digital Outputs
    - C5.7.5 Slot F - Encoder
    - C5.7.6 Slot F - Temperatures
  - C5.8 Slot G
    - C5.8.1 Slot G - Analog Inputs
    - C5.8.2 Slot G - Analog Outputs
    - C5.8.4 Slot G - Digital Outputs
    - C5.8.5 Slot G - Encoder
    - C5.8.6 Slot G-Temperatures
  - C5.9 Levels Operation DOs
- C6 Ramps
  - C6.1 Speed Control Ramps
  - C6.2 Torque Control Ramps
- C7 Protections

C Configuration (cont.)

- C7 Protections (cont.)
  - C7.1 Missing Phase Pow.Supply
  - C7.2 Ground Fault
  - C7.4 Motor Overload Protection
  - C7.5 Over/Undertemp. Protection
  - C7.6 Fan Speed Protection
  - C7.7 Motor Overspeed
  - C7.8 Pre-charge
  - C7.9 Auto-Reset
  - C7.10 External Fault/Alarm
  - C7.11 Thermal Management
- C8 Functional Safety
- C9 Communication
  - C9.1 Communication Error
    - C9.1.1 Master Offline
    - C9.1.2 Master Idle/Prog
  - C9.2 I/O Data
    - C9.2.1 Data Read
    - C9.2.2 Data Write
  - C9.3 RS485 Serial
  - C9.4 Ethernet
  - C9.6 Modbus TCP
  - C9.8 CAN/CANop/DNet
  - C9.10 Bluetooth
- C10 SoftPLC
  - C10.1 Configuration
  - C10.2 Engineering Unit
  - C10.3 User's Parameters
- C11 HMI
  - C11.1 Configuration
  - C11.2 Main Screen
  - C11.3 User
    - C11.3.1 Login
    - C11.3.2 Change password
- C12 Backup

A Assistants

2 PROTECTIONS, FAULTS AND ALARMS

Protections, Faults and Alarms are a functionality of the CFW900 that allows viewing events, helping troubleshoot or identify improvements in the settings of the inverter parameters.

Operation of Protections, Faults and Alarms:

- The protections and faults act by disabling the motor and indicating the reason for their occurrence on the HMI, in the CFW900 status word (S1.1.1) and in the actual protection diagnosis (D1.1) the reason for its occurrence. They are only removed after resetting or de-energizing the inverter.

- The alarms act by indicating the event on the HMI, in the CFW900 status word (S1.1.1) and in the actual alarm diagnosis (D2.1). They are automatically reset when the alarm condition ceases existing.

Protections, Faults and Alarms are presented to the user through codes. The codes are formed by three or four numbers preceded by the letters F (for protection and fault) and A (for alarm), as shown in the Table 2.1. In this table you can also see more details about the causes and possible solutions.

NOTE!
You can see and solve the cause of actuation for most protections, faults and alarms via the instructions contained in this chapter; otherwise, contact WEG representative or technical support.

2.1 PROTECTIONS, FAULTS AND ALARMS TABLE

Protection/Alarm	Description	Possible Causes
F006: Grid Unbal./Phase Loss	Unbalance or phase loss in the power supply. **Note:** - In case the motor has no load on the shaft or the load is low, this fault may not occur. - Actuation time set to C7.1.1. When C7.1.1=0, the fault is disabled.	- Phase loss at the inverter input. - Input voltage unbalance >5 %. - Loss of one phase in the power supply.
A010: Rectifier Overtemp.	Alarm of high temperature measured in the temperature sensors (NTC) of the rectifier modules. **Note:** - It can be disabled by changing the IGBT Overtemp. setting to fault only, in parameter C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F011: Rectifier Overtemp.	Fault of overtemperature measured in the temperature sensors (NTC) of the rectifier modules.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A018: Low Battery Voltage	Low battery voltage alarm.	- Replace the battery.
A019: 24 Vdc Power Supply Overvoltage	24Vdc power supply overvoltage fault.	- Voltage of the 24 Vdc power supply that feeds the control above the maximum value of 26.4 V cc.
A020: 24 Vdc Power Supply Undervoltage	24 Vdc power supply undervoltage fault.	- Voltage of the 24 Vdc power supply that feeds the control below the minimum value of 21.6 Vdc.

Protection/Alarm	Description	Possible Causes
F021: DC Link Undervoltage	DC link undervoltage fault.	- Supply voltage too low, producing voltage on the DC link (S2.7.1) below the minimum value: Ud < 203 V - Supply voltage 200 V. Ud < 210 V - Supply voltage 208-240 V. Ud < 385 V - Supply voltage 380 V. Ud < 405 V - Supply voltage 400-415 V. Ud < 446 V - Supply voltage 440-460 V. Ud < 487 V - Supply voltage 480 V. Ud < 507 V - Supply voltage 500-525 V. Ud < 557 V - Supply voltage 550-600 V. Ud < 669 V - Supply voltage 660-690 V. - Phase loss at the input. - Fault on the pre-charge circuit. - Parameter C1.1.2 with a value above the rated line voltage.
F022: DC Link Overvoltage	DC link overvoltage fault.	- Supply voltage too high, producing voltage on the DC link (S2.7.1) above the maximum value: Ud > 400 V - Models 200-240 V. Ud > 800 V - Models 380-480 V. Ud > 1000 V - Models 500-600 V. Ud > 1200 V - Models 660-690 V. - Driven load inertia too high or deceleration ramp too fast. - C3.5.2.1 or C3.5.3.2 or C3.6.1 setting is too high.
F025: Pulse Feedback Error	Failure to compare the PWM pulses generated by the control and the output voltages measured by the inverter. **Note:** - Reset the inverter and try again.	- Motor is disconnected or the rated current of the motor connected at the output is less than 1/3 of the rated current of the inverter. - Possible defect on the inverter internal circuits. - Problems in the circuit of the STO safety inputs (XC2).
F030: IGBT U Desat.	Fault of desaturation on the IGBTs of arm U.	- Short circuit between the motor phases U and V or U and W.
F034: IGBT V Desat.	Fault of desaturation on the IGBTs of arm V.	- Short circuit between the motor phases V and U or V and W.
F038: IGBT W Desat.	Fault of desaturation on the IGBTs of arm W.	- Short circuit between the motor phases W and U or W and V.
F042: Brake IGBT Desat.	Fault of desaturation on the Dynamic Braking IGBT.	- Short circuit on the connecting cables of the Dynamic Braking.
A046: High Load on the Motor	Motor overload alarm. **Note:** - It can be disabled by setting C7.4.1 = 0 or 2.	- C7.4.3, C7.4.4 and C7.4.5 setting is low, for the motor used. - Overload on the motor shaft.
A047: High Load on the IGBTs	IGBT overload alarm.	- High current at the inverter output:
F048: Overload on the IGBTs	IGBT overload fault.	- Current at the inverter output is high.
A050: IGBT1 U Overtemp.	Alarm of high temperature measured in the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A051: IGBT1 V Overtemp.	Alarm of high temperature measured in the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.

Protection/Alarm	Description	Possible Causes
A052: IGBT1 W Overtemp.	Alarm of high temperature measured in the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F053: IGBT1 U Overtemp.	Fault of overtemperature measured in the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F054: IGBT1 V Overtemp.	Fault of overtemperature measured in the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F055: IGBT1 W Overtemp.	Fault of overtemperature measured in the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A060: IGBT/DRL Junction Overtemp.	High temperature at the junction of the IGBTs or diodes alarm.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F061: IGBT/DRL Junction Overtemp.	Overtemperature at the junction of the IGBTs or diodes fault.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F062: Thermal Imbalance	Power module temperature unbalance fault.	- The temperature difference between IGBT modules of the same phase (U, V, W) is above 15 °C. - The temperature difference between IGBT modules of different phases (U and V, U and W, V and W) is above 20 °C. - The temperature difference between rectifier modules of different phases (R and S, R and T, S and T) is above 20 °C.
F070: DC Link Short Circuit	Fault of short circuit at the output, DC link or braking resistor.	- Short circuit between two motor phases. - Short circuit on the connecting cables of the Dynamic Braking. - Short-circuited IGBT modules.
F071: Overcur. at the Output	Output overcurrent fault.	- Load inertia too high or acceleration ramp too fast. - C3.4.1 or C3.3.5.1.1 setting is too high.
F072: Motor Overload	Motor overload fault. **Note:** - The fault can be disabled by setting C7.4.1 = 0 or 3.	- C7.4.3, C7.4.4 and C7.4.5 setting too low for the motor. - Load on the motor shaft is too high.
F074: Ground Fault	Overcurrent to ground fault. **Note:** - The fault can be disabled by setting C7.2.1 = 0 or 3.	- Short circuit to the ground at one or more output phases. - Motor cable capacitance too high, causing current peaks at the output.
F078: Motor Overtemp.	Fault related to the PTC temperature sensor installed on the motor. **Note:** - The fault can be disabled by setting C7.5.2 = 2 or 3. - It is necessary to program Slot X analog input and output for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. Motor thermistor not installed. - Motor shaft locked.

Protection/Alarm	Description	Possible Causes
F080: CPU Fault (Watchdog)	Inverter control watchdog fault.	- Electrical noise.
F084: Self-Diagnostics. Error	Self-Diagnostics Fault.	- Defect on the inverter internal circuits.
A090: External Alarm	External alarm via DI. **Note:** - Necessary to set the DI in C7.10.1.	- DI input wiring (set in C7.10.1 to generate external alarm) open.
F091: External Protection	External fault via DI. **Note:** - Necessary to set the DI in C7.10.2.	- DI input wiring (set in C7.10.2 to generate external fault) open.
F099: Invalid Curr. Offset	Current measurement circuit has a value out of the standards for zero current.	- Defect on the inverter internal circuits.
F104: A/D Converter Error	Fault reading the A/D converter that measures the inverter currents and voltages.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level the inverter withstands.
A110: High Motor Temperature	Alarm related to the PTC temperature sensor installed on the motor. **Note:** - The alarm can be disabled by setting C7.5.2. - It is necessary to program Slot X analog input and output for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. Motor thermistor not installed. - Motor shaft locked.
A128: Serial Communication Timeout	It indicates that the CFW900 stopped receiving telegrams on the serial interface for a period longer than the setting programmed in C9.3.5. **Note:** - Make sure the master always sends telegrams to the equipment within a period shorter than the setting in C9.3.5. - It can be disabled by setting C9.3.5=0.0 s.	- Check network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
A133: No Power Supply on the CAN Interface	It actuates when the CAN interface is powered and lack of power supply to the interface is detected. **Note:** Measure if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables switched or reversed. - Poor contact on the CAN interface cable or connector.
A134: Bus Off	The bus off error in the CAN interface has been detected. If the number of reception or transmission errors detected by the CAN interface is too high, the CAN controller can be taken to the bus off state, where it interrupts the communication and disables the CAN interface. In order that the communication be reestablished, it will be necessary to cycle the power of the product, or remove the power supply from the CAN interface and apply it again, so that the communication be reinitiated.	- Verify if there is any short-circuit between the CAN circuit transmission cables. - Verify if the cables have not been changed or inverted. - Verify if all the network devices use the same baud rate. - Verify if termination resistors with the correct values were installed only at the extremes of the main bus. - Verify if the CAN network installation was carried out in proper manner.
A135: CANopen Off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.

Protection/Alarm	Description	Possible Causes
A136: Master in Idle	It actuates when communicating with the DeviceNet network master in Run mode, and transition to Idle mode is detected.	- Set the switch that controls the master operation of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.
A137: DeviceNet connection timeout	It indicates that one or more DeviceNet I/O connections has expired. It occurs when the cyclical communication between the master and the product is interrupted.	- Check the status of the network master. - Check the network installation, broken cable or poor contact on the connections with the network.
A145: SNTP Connection Timeout	It indicates that the inverter tried to connect to the NTP server and got no response. It occurs after starting connection with the NTP server and the server did not return the response requested by the inverter.	▪ Check configuration and IP address. ▪ Check if the NTP server is active.
A149: Timeout Modbus TCP	It indicates that the device stopped receiving valid telegrams for a period longer than the setting in C9.6.3. The time counting starts as soon as it receives the first valid telegram.	▪ Check the network installation, broken cable or poor contact on the connections with the network, grounding. ▪ Ensure the Modbus TCP client always sends telegrams to the equipment in a time shorter than the setting in C9.6.3. ▪ Disable the Timeout function in C9.6.3.
F150: Motor Overspeed	Overspeed fault. **Note:** - Activated when the actual speed exceeds the value of C4.3.1.1.2 x (100 % + C7.7.1) for more than 20 ms.	- Incorrect setting of C3.3.2.1.2 and/or C3.3.2.1.3. - Crane-type load trips.
A152: Pow.Int. Air Overtemp.	High internal air temperature alarm. **Note:** - The alarm can be disabled by setting C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Defective internal fan (when applicable).
F153: Pow.Int. Air Overtemp.	Internal air overtemperature fault.	- High ambient temperature around the inverter (>50 °C) and high output current. - Defective internal fan (when applicable).
A154: Cont.Int.Air Overtemp.	Control circuit high temperature alarm. **Note:** - The alarm can be disabled by setting C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F155: Cont.Int. Air Overtemp.	Control circuit overtemperature fault.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A156: Inverter Undertemperature	Alarm of undertemperature measured by the sensors in the IGBTs, rectifier, power and/or control below -30 °C. **Note:** - The alarm can be disabled by setting C7.5.1.	- Ambient temperature around the inverter ≤ -30 °C.
F157: Inverter Undertemperature	Fault of undertemperature measured by the sensors in the IGBTs, rectifier, power and/or control below -30 °C.	- Ambient temperature around the inverter ≤ -30 °C.
F158: Corrupted Settings	Inverter settings are invalid. **Note:** - Restore the settings from a backup.	- Parameter settings file cannot be restored correctly.

Protection/Alarm	Description	Possible Causes
F160: STO90 Fault	It indicates to the user that STO90 is in a fault state.	- Incorrect installation of the safety inputs circuit (STO1 and STO2). - Actuation time between the safety inputs (STO1 and STO2) greater than 1 s. - Incorrect setting of the safety input type (dry contact or OSSD) on DIP switches S1. - DIP switches S2 activated in a state other than the STO state. - Incorrect programming of the safety function or programming timeout (2 min). - Damage in the electronic circuit of STO90.
F161: STO90 Offline	It indicates to the user that CFW900 central control has lost communication with STO90.	- Poor contact between STO90 and CFW900 central control. - Damage in the electronic circuit of STO90 or CFW900 central control.
F171: Pow. Fan 1 Speed	Heatsink fan 1 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F172: Pow. Fan 2 Speed	Heatsink fan 2 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F173: Pow. Fan 3 Speed	Heatsink fan 3 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F174: Pow. Fan 4 Speed	Heatsink fan 4 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F175: Int. Fan 1 Speed	Internal fan 1 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F176: Int. Fan 2 Speed	Internal fan 2 speed fault.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
A181: Clock with Invalid Value	Clock with wrong time.	- Set the date and time in C11.1.2. - Battery low, defective or not installed.
F185: Pre-charge Protection	It indicates pre-charge contactor fault.	- Defective pre-charge contactor. - Command fuse open. - Phase loss at input L1/R or L2/S.
A186: Pow. Fan 1 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
A187: Pow. Fan 2 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
A188: Pow. Fan 3 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
A189: Pow. Fan 4 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.

Protection/Alarm	Description	Possible Causes
A190: Int. Fan 1 Speed	Internal fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
A191: Int. Fan 2 Speed	Internal fan low speed alarm.	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F228: Serial Communication Timeout	It indicates that the CFW900 stopped receiving telegrams on the serial interface for a period longer than the setting programmed in C9.3.5. **Note:** - Make sure the master always sends telegrams to the equipment within a period shorter than the setting in C9.3.5. - It can be disabled by setting C9.3.5=0.0 s.	- Check network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
F233: No Power Supply on the CAN Interface	It actuates when the CAN interface is powered and lack of power supply to the interface is detected. **Note:** Measure if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables switched or reversed. - Poor contact on the CAN interface cable or connector.
F234: Bus Off	The bus off error in the CAN interface has been detected. If the number of reception or transmission errors detected by the CAN interface is too high, the CAN controller can be taken to the bus off state, where it interrupts the communication and disables the CAN interface. In order that the communication be reestablished, it will be necessary to cycle the power of the product, or remove the power supply from the CAN interface and apply it again, so that the communication be reinitiated.	- Verify if there is any short-circuit between the CAN circuit transmission cables. - Verify if the cables have not been changed or inverted. - Verify if all the network devices use the same baud rate. - Verify if termination resistors with the correct values were installed only at the extremes of the main bus. - Verify if the CAN network installation was carried out in proper manner.
F235: CANopen Off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.
F236: Master in Idle	It actuates when communicating with the DeviceNet network master in Run mode, and transition to Idle mode is detected.	- Set the switch that controls the master operation of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.
F237: DeviceNet Connection timeout	It indicates that one or more DeviceNet I/O connections has expired. It occurs when the cyclical communication between the master and the product is interrupted.	- Check the status of the network master. - Check the network installation, broken cable or poor contact on the connections with the network.
F249: Modbus TCP Timeout	It indicates that the device stopped receiving valid telegrams for a period longer than the setting in C9.6.3. The time counting starts as soon as it receives the first valid telegram.	▪ Check the network installation, broken cable or poor contact on the connections with the network, grounding. ▪ Ensure the Modbus TCP client always sends telegrams to the equipment in a time shorter than the setting in C9.6.3. ▪ Disable the Timeout function in C9.6.3.
A345: IGBT P.U B1 High Load	Alarm of overload on IGBT 1 of phase U.	- High current at the inverter output:
F346: IGBT P.U B1 Overload	Fault of overload on IGBT 1 of phase U.	- High current at the inverter output:

Protection/Alarm	Description	Possible Causes
A348: IGBT P.V B1 High Load	Alarm of overload on IGBT 1 of phase V.	- High current at the inverter output:
F349: IGBT P.V B1 Overload	Fault of overload on IGBT 1 of phase V.	- High current at the inverter output:
A351: IGBT P.W B1 High Load	Alarm of overload on IGBT 1 of phase W.	- High current at the inverter output:
F352: IGBT P.W B1 Overload	Fault of overload on IGBT 1 of phase W.	- High current at the inverter output:
A354: IGBT P.U B2 High Load	Alarm of overload on IGBT 2 of phase U.	- High current at the inverter output:
F355: IGBT P.U B2 Overload	Fault of overload on IGBT 2 of phase U.	- High current at the inverter output:
A357: IGBT P.V B2 High Load	Alarm of overload on IGBT 2 of phase V.	- High current at the inverter output:
F358: IGBT P.V B2 Overload	Fault of overload on IGBT 2 of phase V.	- High current at the inverter output:
A360: IGBT P.W B2 High Load	Alarm of overload on IGBT 2 of phase W.	- High current at the inverter output:
F361: IGBT P.W B2 Overload	Fault of overload on IGBT 2 of phase W.	- High current at the inverter output:
F600: Pulse Update Error	Fault related to updating the PWM pulses.	- Defect on the inverter internal circuits.
F606: Power Monitor Comm Lost	Communication fault between AUI and PMON.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level the inverter withstands. - Power board turned off.
F607: SMM Comm Lost	Communication fault between PWC and SMM.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level the inverter withstands. - Safety interface board turned off.
F608: Code Flow Failure	Internal fault during inverter operation. **Note:** - Reset the inverter. - Load the factory default.	- If the problem persists, please contact WEG assistance.
F609: Model Version Incompatible	Inverter model data version is incompatible with the actual firmware. **Note:** - Contact technical support to arrange the model update.	
A700: HMI Disconnected	Alarm related to the HMI disconnection.	- Commands configured via HMI or the HMI is not connected to the inverter.
F701: HMI Disconnected	Fault related to the HMI disconnection.	- Commands configured via HMI or the HMI is not connected to the inverter.
A702: Inverter Disabled	Alarm indicates that the General Enable command is Inactive.	- Run/Stop command of the SoftPLC application equal to Run, or the movement block was enabled with the ”General Enable” command disabled.
A706: SPLC Refer. Not Progr.	Reference not programmed for SoftPLC.	- It occurs when a movement block is enabled and the speed reference is not set for SoftPLC (check C4.3.1.2).

Protection/Alarm	Description	Possible Causes
A708: SoftPLC Not Running	SoftPLC application is not running.	- Check the SoftPLC status in S6.1.1 and the action configuration for application not running in C10.1.3.
F709: SoftPLC Not Running	SoftPLC application is not running.	- Check the SoftPLC status in S6.1.1 and the action configuration for application not running in C10.1.3.
F1000: Accessory Firmware Update Error	Error during accessory firmware update.	Old inverter firmware version.
A1012: Slot X AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1013: Slot X AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1014: Slot X AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1015: Slot X AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1100: Slot A Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1101: Slot A Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1103: Slot A Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1104: Slot A High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1105: Slot A overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1106: Slot A Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1107: Slot A enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1108: Slot A Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1109: Slot A Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Protection/Alarm	Description	Possible Causes
A1110: Slot A enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1111: Slot A Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1112: Slot A AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1113: Slot A AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1114: Slot A AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1115: Slot A AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1116: Slot A AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1117: Slot A AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1118: Slot A AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1119: Slot A AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1125: Slot A Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1126: Slot A Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1127: Slot A Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
A1128: Slot A High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1129: Slot A Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1130: Slot A Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1131: Slot A Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1132: Slot A High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1133: Slot A Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1134: Slot A Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1135: Slot A Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1136: Slot A High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1137: Slot A Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1138: Slot A Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1139: Slot A Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1140: Slot A High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1141: Slot A Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1142: Slot A Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1143: Slot A Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1144: Slot A High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.

Protection/Alarm	Description	Possible Causes
F1145: Slot A Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1146: Slot A Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1147: Slot A Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1148: Slot A High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1149: Slot A Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1200: Slot B Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1201: Slot B Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1203: Slot B Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1204: Slot B High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1205: Slot B overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1206: Slot B enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1207: Slot B Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1208: Slot B Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1209: Slot B Enc. B cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1210: Slot B Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1211: Slot B enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Protection/Alarm	Description	Possible Causes
A1212: Slot B AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1213: Slot B AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1214: Slot B AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1215: Slot B AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1216: Slot B AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1217: Slot B AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1218: Slot B AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1219: Slot B AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1225: Slot B Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1226: Slot B Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1227: Slot B Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1228: Slot B High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1229: Slot B Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1230: Slot B Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
F1231: Slot B Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1232: Slot B High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1233: Slot B Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1234: Slot B Temperature Sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1235: Slot B Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1236: Slot B High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1237: Slot B Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1238: Slot B Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1239: Slot B Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1240: Slot B High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1241: Slot B Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1242: Slot B Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1243: Slot B Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1244: Slot B High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1245: Slot B Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1246: Slot B Temperature Sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1247: Slot B Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
A1248: Slot B High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1249: Slot B Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1300: Slot C Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1301: Slot C Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1303: Slot C Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1304: Slot C High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1305: Slot C Overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1306: Slot C Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1307: Slot C Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1308: Slot C enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1309: Slot C Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1310: Slot C Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1311: Slot C Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1312: Slot C AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1313: Slot C AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.

Protection/Alarm	Description	Possible Causes
A1314: Slot C AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1315: Slot C AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1316: Slot C AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1317: Slot C AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1318: Slot C AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1319: Slot C AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1325: Slot C Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1326: Slot C Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1327: Slot C Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1328: Slot C High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1329: Slot C Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1330: Slot C Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1331: Slot C Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1332: Slot C High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1333: Slot C Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.

Protection/Alarm	Description	Possible Causes
A1334: Slot C Temperature Sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1335: Slot C Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1336: Slot C High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1337: Slot C Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1338: Slot C Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1339: Slot C Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1340: Slot C High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1341: Slot C Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1342: Slot C Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1343: Slot C Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1344: Slot C High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1345: Slot C Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1346: Slot C Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1347: Slot C Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1348: Slot C High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1349: Slot C Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1400: Slot D Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.

Protection/Alarm	Description	Possible Causes
F1401: Slot D Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1403: Slot D Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1404: Slot D High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1405: Slot D overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1406: Slot D Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1407: Slot D Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1408: Slot D Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1409: Slot D Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1410: Slot D Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1411: Slot D Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1412: Slot D AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1413: Slot D AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1414: Slot D AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1415: Slot D AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.

Protection/Alarm	Description	Possible Causes
A1416: Slot D AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1417: Slot D AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1418: Slot D AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1419: Slot D AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1425: Slot D Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1426: Slot D Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1427: Slot D Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1428: Slot D High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1429: Slot D Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1430: Slot D Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1431: Slot D Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1432: Slot D High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1433: Slot D Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1434: Slot D Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1435: Slot D Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
A1436: Slot D High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1437: Slot D Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1438: Slot D Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1439: Slot D Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1440: Slot D high temperature in sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1441: Slot D Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1442: Slot D Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1443: Slot D Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1444: Slot D High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1445: Slot D Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1446: Slot D Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1447: Slot D Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1448: Slot D High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1449: Slot D Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1500: Slot E Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1501: Slot E Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1503: Slot E Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.

Protection/Alarm	Description	Possible Causes
A1504: Slot E High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1505: Slot E Overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1506: Slot E Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1507: Slot E Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1508: Slot E Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1509: Slot E Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1510: Slot E Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1511: Slot E Enc. Z cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1512: Slot E AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1513: Slot E AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1514: Slot E AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1515: Slot E AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1516: Slot E AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.

Protection/Alarm	Description	Possible Causes
F1517: Slot E AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1518: Slot E AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1519: Slot E AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1525: Slot E Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1526: Slot E Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1527: Slot E Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1528: Slot E High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1529: Slot E Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1530: Slot E Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1531: Slot E Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1532: Slot E High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1533: Slot E Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1534: Slot E Temperature Sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1535: Slot E Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1536: Slot E High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1537: Slot E Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.

Protection/Alarm	Description	Possible Causes
A1538: Slot E Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1539: Slot E Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1540: Slot E High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1541: Slot E Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1542: Slot E Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1543: Slot E Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1544: Slot E High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1545: Slot E Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1546: Slot E Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1547: Slot E Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1548: Slot E High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1549: Slot E Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1600: Slot F Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1601: Slot F Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1603: Slot F Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1604: Slot F High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1605: Slot F overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.

Protection/Alarm	Description	Possible Causes
A1606: Slot F Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1607: Slot F Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1608: Slot F Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1609: Slot F Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1610: Slot F Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1611: Slot F Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1612: Slot F AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1613: Slot F AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1614: Slot F AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1615: Slot F AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1616: Slot F AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1617: Slot F AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.

Protection/Alarm	Description	Possible Causes
A1618: Slot F AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1619: Slot F AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1625: Slot F Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1626: Slot F Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1627: Slot F Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1628: Slot F High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1629: Slot F Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1630: Slot F Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1631: Slot F Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1632: Slot F High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1633: Slot F Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1634: Slot F Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1635: Slot F Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1636: Slot F High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1637: Slot F Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1638: Slot F Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
F1639: Slot F Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1640: Slot F High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1641: Slot F Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1642: Slot F Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1643: Slot F Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1644: Slot F High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1645: Slot F Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1646: Slot F Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1647: Slot F Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1648: Slot F High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1649: Slot F Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1700: Slot G Incompatible Accessory	Error during accessory firmware update.	Old inverter firmware version.
F1701: Slot G Initialization Error	It was not possible to initialize a resource required for the accessory to work.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F1703: Slot G Accessory Connection	Loss of communication with the accessory.	- Above-supported electromagnetic noise. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A1704: Slot G High Temperature	Temperature in the accessory is high.	- Temperature around the inverter close to 60°C.
F1705: Slot G Overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60°C.
A1706: Slot G Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Protection/Alarm	Description	Possible Causes
F1707: Slot G Enc. A Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1708: Slot G Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1709: Slot G Enc. B Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1710: Slot G Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F1711: Slot G Enc. Z Cable Disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where n is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A1712: Slot G AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1713: Slot G AI1 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1714: Slot G AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1715: Slot G AI2 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1716: Slot G AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1717: Slot G AI3 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
A1718: Slot G AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.

Protection/Alarm	Description	Possible Causes
F1719: Slot G AI4 Cable Disconnection	Analog input signal set to actual mode is out of the range 4 to 20 mA.	- AI cable broken (the read value was less than 2 mA for 5 seconds). Poor contact on the signal connection at the terminals.
F1725: Slot G Temp. Sensor Wrong hw Config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the CFW900-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1726: Slot G Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1727: Slot G Temperature Sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1728: Slot G High Temperature in Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1729: Slot G Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1730: Slot G Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1731: Slot G Temperature Sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1732: Slot G High Temperature in Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1733: Slot G Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1734: Slot G Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1735: Slot G Temperature Sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1736: Slot G High Temperature in Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1737: Slot G Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1738: Slot G Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1739: Slot G Temperature Sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Protection/Alarm	Description	Possible Causes
A1740: Slot G High Temperature in Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1741: Slot G Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1742: Slot G Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1743: Slot G Temperature Sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1744: Slot G High Temperature in Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1745: Slot G Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
A1746: Slot G Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F1747: Slot G Temperature Sensor 6 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A1748: Slot G High Temperature in Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.
F1749: Slot G Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment at a high temperature. - Fault actuation level configuration error.

3 SAFETY INSTRUCTIONS

This manual contains the necessary information for the correct programming of the CFW900 frequency inverter. It has been written to be used by qualified personnel with suitable training or technical qualification for operating this type of equipment.

3.1 SAFETY WARNINGS IN THIS MANUAL

The following safety warnings are used in this manual:

DANGER!
The procedures recommended in this type of warning have the purpose of protecting the user against dead, serious injuries and considerable material damage.

WARNING!
The procedures recommended in this warning have the purpose of avoiding material damage.

NOTE!
The information mentioned in this warning is important for the proper understanding and good operation of the product.

3.2 SAFETY WARNINGS ON THE PRODUCT

The following symbols are attached to the product, serving as safety notices:

High voltages are present.

Components sensitive to electrostatic discharge. Do not touch them.

Mandatory connection to the protective earth (PE).

Connection of the shield to the ground.

Hot surface.

3.3 PRELIMINARY RECOMMENDATIONS

DANGER!
Only qualified personnel familiar with the CFW900 frequency inverter and associated equipment should plan or implement the installation, startup and subsequent maintenance of this equipment.
All safety instructions contained in this manual and/or defined by local regulations must be followed.
Failure to comply with these instructions may result in life threatening and/or equipment damage.

NOTE!
Read the CFW900 Frequency Inverter User Manual completely before installing or operating the CFW900.

NOTE!
For the purposes of this manual, qualified personnel are those trained to be able to:
1. Install, ground, energize and operate the CFW900 according to this manual and the effective legal safety procedures.
2. Use protection equipment according to the established standards.
3. Give first aid services.

DANGER!
Always disconnect the input power before touching any electrical component associated to the CFW900 inverter.
Many components can remain charged with high voltages or remain in movement (fans) even after that AC power is disconnected or switched off.
Wait at least 10 minutes before handling the equipment to assure a total discharge of the capacitors.
Always connect the equipment frame to the protection earth (PE) at the suitable connection point.

WARNING!
Electronic boards have components sensitive to electrostatic discharges. Do not touch directly on components or connectors. If necessary, touch the grounded metallic frame before or use an adequate grounded wrist strap.

Do not perform any high pot tests with the CFW900 inverter!
If it is necessary consult WEG.

NOTE!
Frequency inverter may interfere with other electronic equipment. In order to reduce these effects, take the precautions recommended in the Chapter Installation and Connections, of the user's manual.

4 ABOUT THIS MANUAL

This manual presents the necessary information for the configuration of all of the functions and parameters of the CFW900 frequency inverter. Must be used together with the CFW900 User's Manual. It is prohibited the reproduction of the contents of this manual, in whole or in part, without the written permission of the manufacturer.

Because of the variety of functions of this product, it is possible to apply it in ways different from those presented hereby. It is not the purpose of this manual to exhaust all the CFW900 application possibilities. The manufacturer cannot assume any responsibility for the use of the CFW900 not based in this manual.

NOTE!
The text intents to supply additional information to facilitate the use and programming of the CFW900 inspecific applications.

4.1 TERMINOLOGY AND DEFINITIONS

4.1.1 Terms and Definitions Used in the Manual

Indication	Description
Normal Duty (ND)	"Normal duty" (ND) It is the inverter operation regimen that defines the maximum current value for continuousoperation I_{nom-ND} and overload of 110% during 1 minute. It is selected by programming C1.2.1 = 0 (Normal Duty(ND)). It must be used for driving motors that are not subject in that application to high torquesin relation to their rated torque, when operating in permanent regimen, during start, acceleration or deceleration.
I_{nom-ND}	Inverter rated current for use with normal overload regimen (ND= Normal duty). Overload: 1.1 x I_{nom-ND} / 1 minute.
Heavy Duty (HD)	"Heavy duty" (HD) It is the inverter operation regimen that defines the maximum current value forcontinuous operation I_{nom-HD} and overload of 150 % during 1 minute. It is selected by programming C1.2.1 = 1 (Heavy duty(HD)). It must be used for driving motors that are subject in that applicationto high overload torques in relation to their rated torque, when operating in constant speed, during start,acceleration or deceleration.
I_{nom-HD}	Inverter rated current for use with heavy overload regimen (HD= Heavy duty). Overload: 1.5 x I_{nom-HD} / 1 minute.
Rectifier	Input circuit of the inverters that transforms the input AC voltage into DC. It is formed by high-power diodes.
Pre-charge Circuit	It charges the DC Link capacitors with a limited current, thus avoiding current peaks when powering the inverter.
DC link	This is the inverter intermediate circuit. Direct current voltage obtained from the rectification of the supply voltage, or from an external source. It supplies the output IGBTs inverter bridge.
Phase U, V e W	It is a set of two IGBT's of the phases U, V and W at the inverter output.
IGBT	It is the basic component of the output inverter bridge, "Insulated Gate Bipolar Transistor". It operates like an electronic switch in the saturated (closed switch) and cut (open switch) modes.
Braking IGBT	Operates as a switch for the activation of the braking resistor. It is commanded by the DC Link level.
PTC	Resistor whose resistance value in ohms increases proportionally to the temperature; it is used as a temperature sensor in motors.
NTC	Resistor whose resistance value in ohms decreases proportionally to the increase of the temperature; it is used as a temperature sensor in power packs.
HMI	Human-Machine Interface; it is the device that allows the control of the motor, the visualization and the modification of the inverter parameters. It presents keys for commanding the motor, navigation keys and a graphic LCD display.
RAM Memory	"Random Access Memory" (volatile).
FLASH Memory	Nonvolatile memory.
RFI Filter	"Radio Frequency Interference Filter". It is a filter that avoids interference in the radiofrequency range.

Indication	Description
PWM	“Pulse Width Modulation”. It is a pulsing voltage that supplies the motor.
Switching Frequency	Frequency of the PWM modulation carrier to generate the triggering pulses of the inverter bridge IGBT’s, normally given in kHz.
General Enable	When activated, it accelerates the motor with the acceleration ramp provided Run/Stop=Run.When deactivated, the PWM pulses are immediately blocked. It can be commanded through digital input programmed for that function, via communication networks or via SoftPLC.
Run/Stop	Inverter function that when activated (Run) accelerates the motor with the acceleration ramp untilreaching the speed reference, and when deactivated (Stop) decelerates the motor with the deceleration rampdown to stop. It can be commanded via HMI keys (I = Run and O = Stop), through digital input programmed for that function, via communication networks or via SoftPLC.
WPS	Programming software “WEG Programming Suite”.
Direct	Rotation direction with positive speed reference.
Reverse	Opposite to the direct rotation.

5 ABOUT THE CFW900

The CFW900 is a high performance Frequency Inverter that makes it possible the control of speed and torque of low voltage three-phase motors. The key features of this product are the on-board technology, which allows it to flexibly solve different types of applications, and its connectivity. To this end, it has the following functionalities:

- Vector control (Sensorless and Encoder) for induction motors, VVW+ and scalar control for induction motors and VVW+ control for permanent magnet (PM) motors.
- Built-in Ethernet and RS485 communication interfaces. Other communication interfaces available via accessories.
- Advanced Energy Saving Function that reduces motor losses and improves the system performance.
- Thermal Management Function that acts on the inverter to protect the equipment integrity and functionality.
- Specific PWM Modulation function for use with Long Cables at the inverter output to the motor.
- DC Braking function to optimize the inverter star and stop. It can also be used as a motor warm-up function in specific cases.
- Dynamic Braking function and for Optimal Braking vector control. The Optimal Braking enables the controlled braking of the motor, eliminating the braking resistor in some applications.
- Flying Start function that allows driving a motor on the fly, accelerating it from the speed at which it is running.
- Ride-Through function that allows recovering the inverter, without undervoltage locking, when a power failure occurs for a brief time.
- Oriented Startup (Assistant) function groups and allows the definition of the main parameters for the inverter operation.
- Self-Tuning function (Assistant) for the vector control allows the automatic setting of the regulators and control parameters,from the identification (also automatic) of the motor and load parameters.

Navigation through the CFW900 HMI is intuitive, allowing the user to easily set up the inverter. The main navigation groups are: Status, Diagnostics and Configurations. From these three groups, you can access the product identification, measurements (voltages, currents, temperatures etc.), protection and alarm actuation diagnostics (active protection/alarm, time control etc.) and the inverter configurations (supply voltage, motor data, control used, commands, references etc.).

6 SOFTWARE VERSIONS

Software versions define the functions and programming of the CFW900 inverter. All software versions installed on the product are available for viewing. The set of all software versions is called a package. The package, according to (S1.2.1), identifies the set of software versions of all microcontrollers in the product, and should be used as a reference to identify the software version of the product. This manual is updated according to the software version of the package (indicated on the back cover).

The software versions have the format 00.00.00, and follow the following evolution rules:

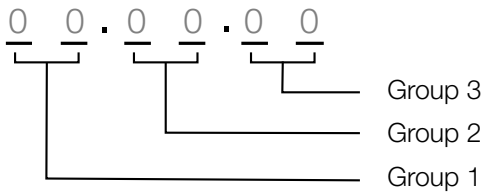


Figure 6.1: *Software version format.*

- Group 1: The first two digits are updated when it is necessary to define an important change, such as a change in the drive hardware that brings about some incompatibility with the software.
- Group 2: The middle two digits are updated when the software is updated with new functionality, such as a new function or new parameter.
- Group 3: The last two digits are updated when the software is updated with corrections or ”Bug Fix”, for example corrections to a certain functionality or errors in the drive’s behavior in general.

7 HMI

The product graphic interface allows viewing and programming the CFW900 frequency inverter. The key navigation provides access to all data by means of groups (Menus).

Figure 7.1: *HMI keys*


USB connector for PC communication.


"Esc": Cancel programming or go back to menu.


"Help": Shows help text for the marked content.


Increment and Decrement values. Navigate the menus.


Switch between screens. Move selection for editing values. Navigate the menus.


Enter key: Save changes. Enter the menus.


Control of the motor direction of rotation if programmed for HMI.

Selects LOCAL or REMOTE control if programmed for HMI.

Run JOG if programmed for HMI.


Stop motor if programmed for HMI or reset fault/protection.


Run motor if programmed for HMI.

NOTE!
When pressed, the LOC/REM key allows you to switch between Local (HMI) control mode and the mode defined according to the configuration made in C4.1.1 (Remote 1 or Remote 2). When the selected command mode is Local, all commands and references will be made via HMI.

8 USING THE HMI

All the HMI operation is based on menus, which contain the reading and writing variables. The menus are divided into levels, containing menus and submenus.

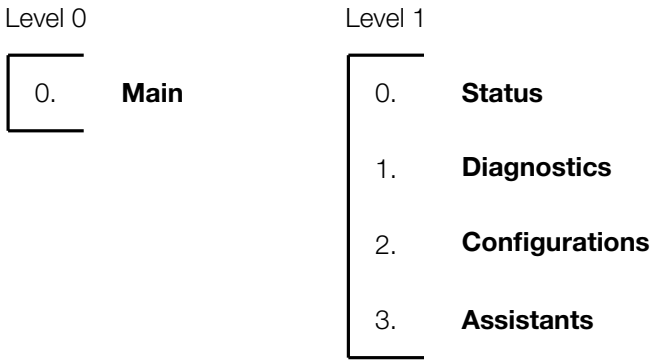


Figure 8.1: *HMI Screens and Menus*

Level 0:
The main screen is located, where you can select which reading variables (**Status**) you want to view.

Level 1:
The main menus to access the variables are located. These, in turn, are divided into reading variables (**Status** and **Diagnósticos**), and writing or programming variables (**Configurations** and **Assistants**).

NOTE!
The **Status** parameters cannot be changed through the HMI. Some of these parameters may be a reading variable from a **Configuration** for a given communication network and thus can be changed using it.

8.1 MAIN SCREEN - LEVEL 0

After powering up the CFW900, the HMI starts up on the **Main** screen, where you can see some reading variables (**Status**).

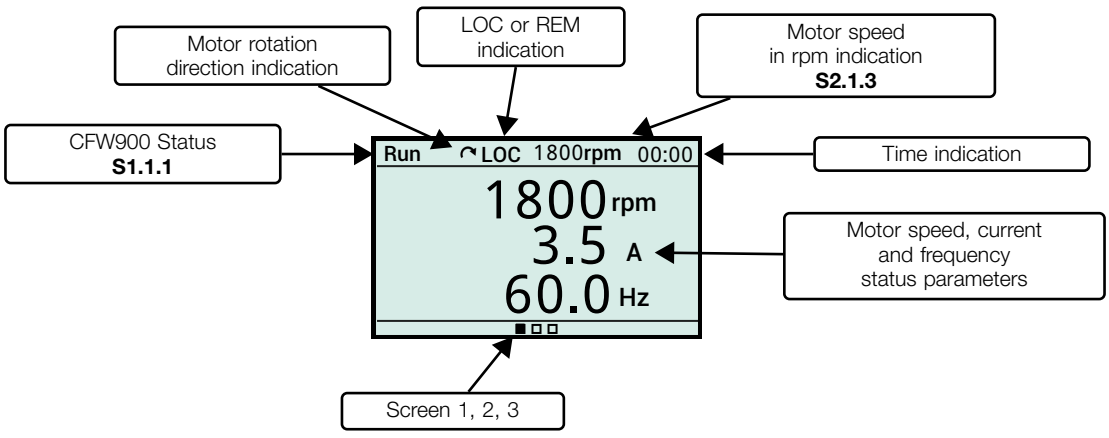


Figure 8.2: *Main screen data*

There are three main screens, which can be set to display up to nine variables each. To customize these main screens, see the 8.6 section of this chapter.

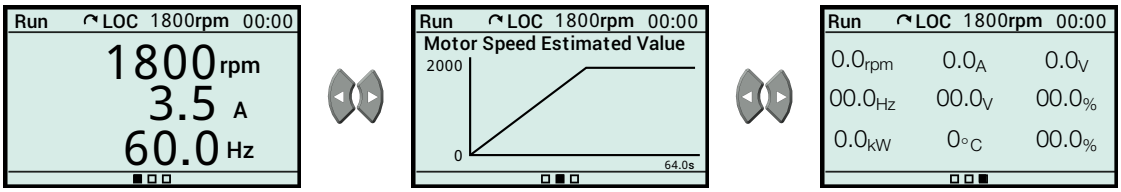


Figure 8.3: *Default main screens*

To access the menus, just press the ”Enter” key.

8.2 MENU ACCESS MODE - MENU LEVELS

When you press the ”Enter” key on a main screen, you access to the menus. In the menus, it is possible to navigate the groups and subgroups to access the variables.

Each variable has its own coding, containing its location in the menu structure (see Chapter 1) and its identification. Digits are separated by periods.

Example:
C2.1.4 = Motor rated voltage value
C2.1.4 = Configurations Motor Motor Data Rated Voltage

Level 1	Level 2	Level 3	Level 4	Edition
C	C2	C2.1	C2.1.4	
Configurations	Motor	Motor Data	Rated Voltage	440V

8.2.1 Reading Variables - Status and Diagnostics Menus

All reading variables for the HMI are available in two main menus: **Status** and **Diagnostics**.

Status Menu: It has reading variables with updated values: current, voltage and others. For more details see Chapter 9.

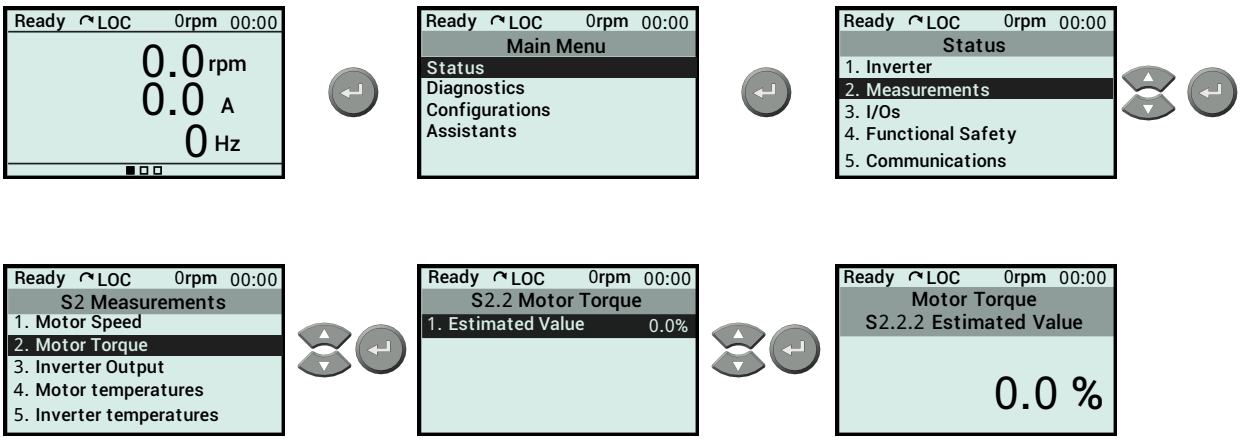


Figure 8.4: *Reading of estimated motor torque value.*

Diagnostics Menu: It has reading variables with values saved as a result of events: activation of protections, alarms, start and others. For more details see Chapter 10.

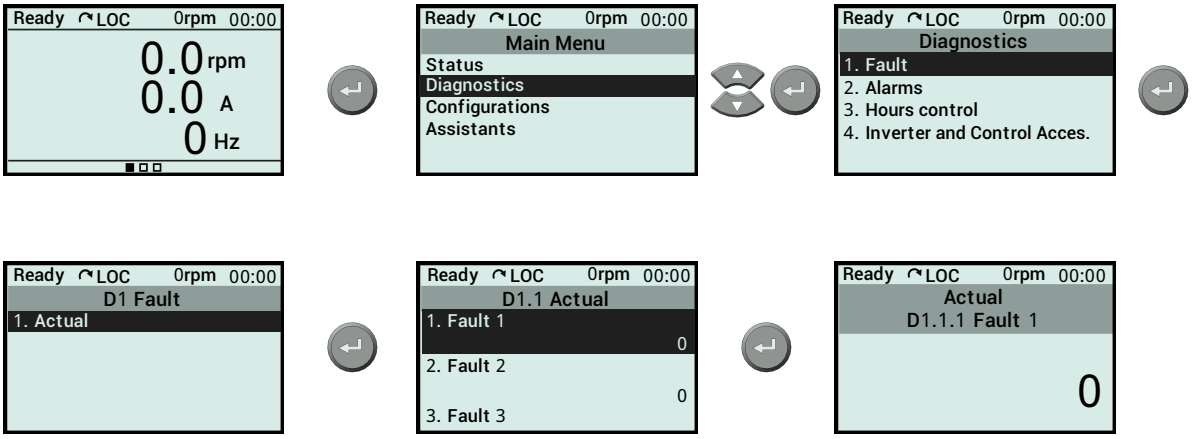


Figure 8.5: *Reading of the protection history.*

8.2.2 Writing Variables - Configurations Menu

All programming or configuration of the CFW900 is carried out through this menu, which is divided into programming submenus, groups or subgroups.

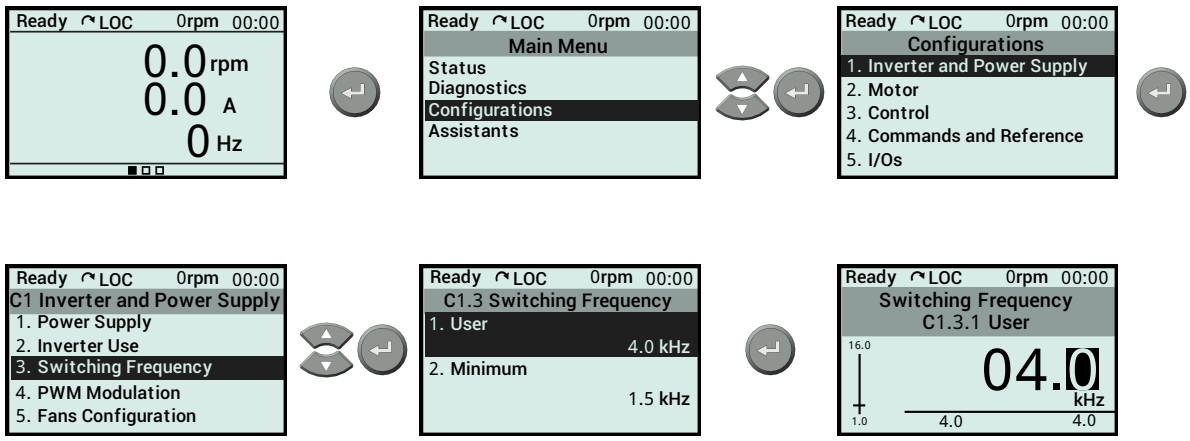


Figure 8.6: *Switching frequency configuration.*

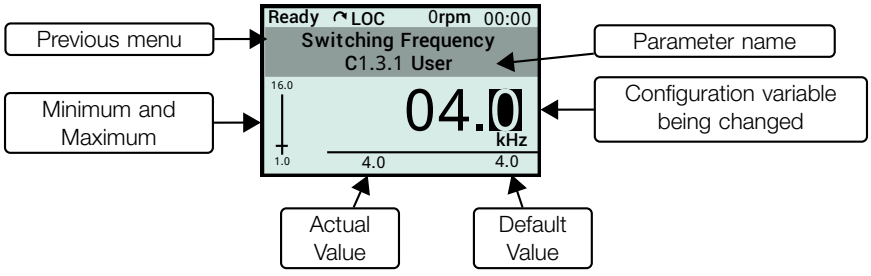


Figure 8.7: *Configuration screen data*

8.2.3 Writing Variables - Assistants Menu

The menu **Assistants** contains some of the most used settings arranged sequentially to facilitate the CFW900 startup. For more details see Chapter 12.

8.3 HELP KEY

Help key

The help key provides more information about the selected text. This key can be used at any time while navigating the menus, parameters or main screens. If, for example, the selected text is a parameter, when the help key is pressed, a text about this parameter will be displayed; if it is pressed on a main screen, the coding of the parameters present in this screen will be displayed.

The figures below show some examples of the use of the help key.

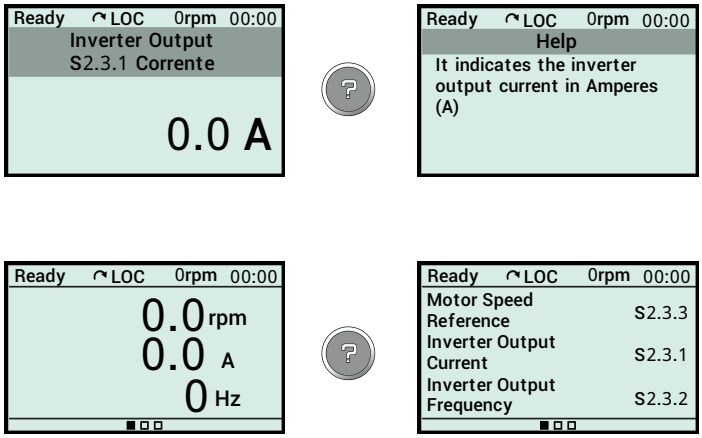


Figure 8.8: *Example of the use of the help key*

8.4 DATE AND TIME SETTING

Set the date and time in the configurations menu, as illustrated below.

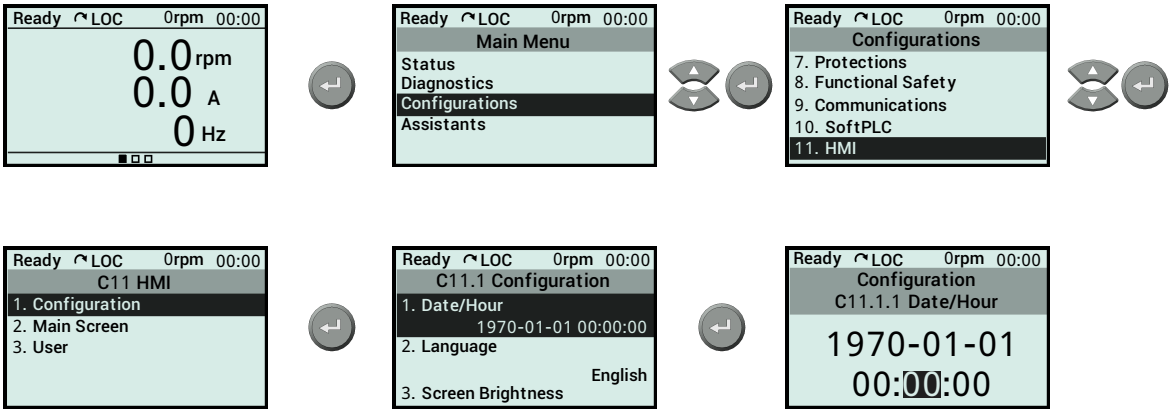


Figure 8.9: *Date and time setting*

8.5 ACCESS CONTROL

It is possible to block the parameter adjustment via the HMI through the login function. The block is activated when a user who does not have permission to perform parameter adjustment, such as the operator, is logged in. To unblock it, just login to a user who has permission, such as the administrator. User adjustment must be started from the configuration menu as illustrated below.

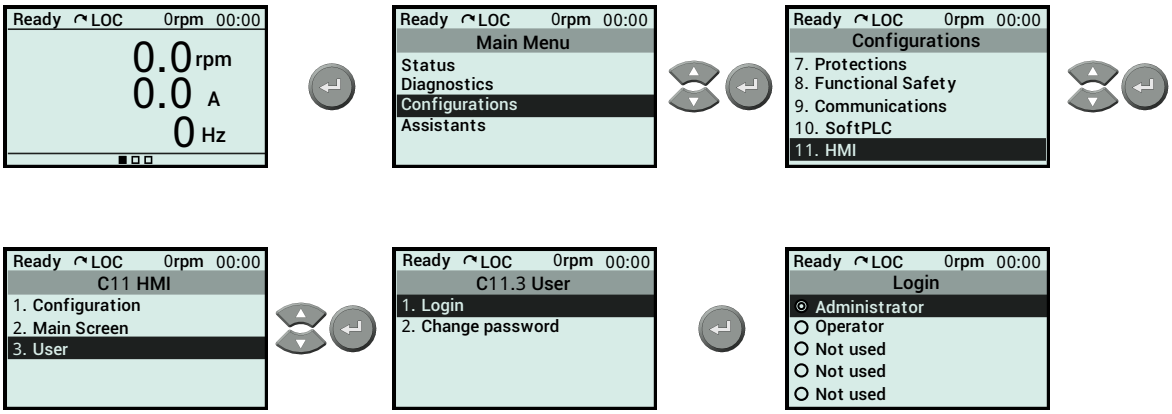


Figure 8.10: *Accessing login screen*

It is possible to enter a password for a specific user, with the exception of the operator, to prevent him from being logged in. This aims to increase the security of the configured parameters. Setting the password must be initiated from the configuration menu as illustrated below.

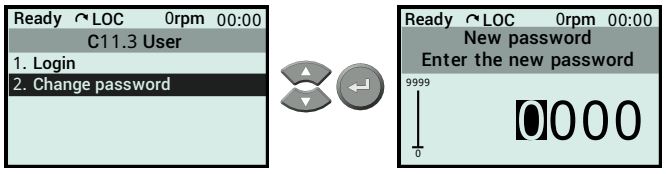


Figure 8.11: *Password setting*

When the active user has a saved password, the inactivity function is enabled. When no command via HMI is detected for more than 15 minutes, the function logs out. Logout also occurs when the inverter is powered down with a user who has a saved password. In order to change the parameters again, it is necessary to login, where the insertion of the saved password will be requested.

For disable a user's password, it must set the new password to zero. When this is executed, any login attempt for this user will be successful.

NOTE!
Factory default resets all saved passwords.

8.6 MAIN SCREEN SETTING

Customizing the main screens allows you to define what will always be displayed when powering up the CFW900. Three easy-access main screens are available. Each screen can be set among 3 view modes.

8.6.1 View Modes

- **Line**: In one line, it is possible to display a reading variable in the format **text, value or bar**. The figure 8.12 shows an example with the 3 formats.

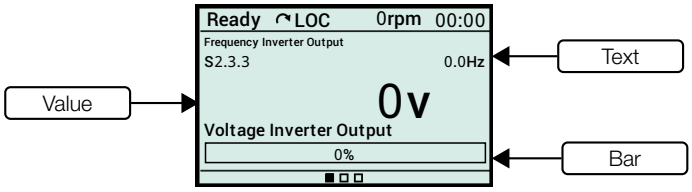


Figure 8.12: Inline View

- **Full screen**: It covers an entire main screen and allows viewing reading variables in the format **text, bar or graphic**. Figure 8.13 shows a view example.

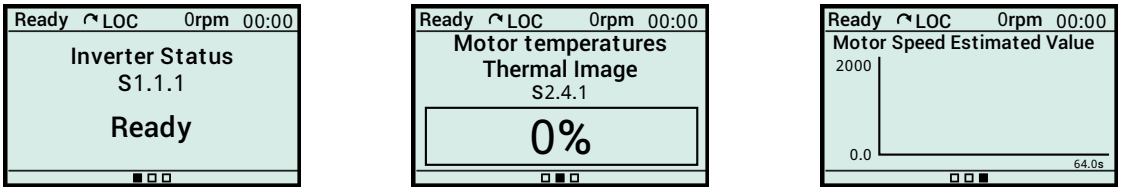


Figure 8.13: View in (a) text, (b) bar and (c) graphic.

- **Slot**: The HMI screen is divided into 9 parts called Slots and allows viewing reading variables in the format **value**. Figure 8.14 shows a view example.

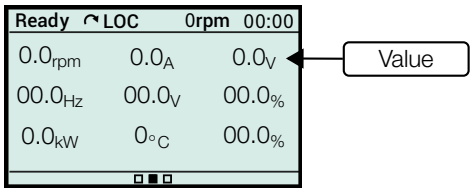


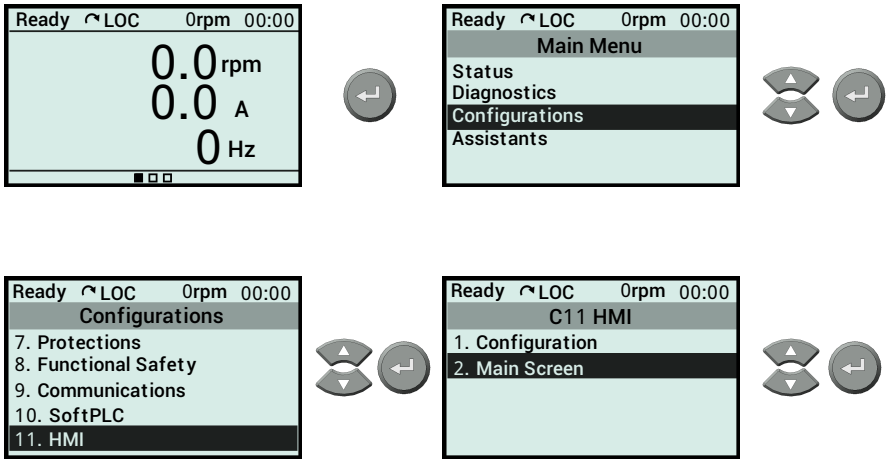
Figure 8.14: Slot view.

NOTE!
The view modes **Line** and **Slot** can be merged if there is space in the line.

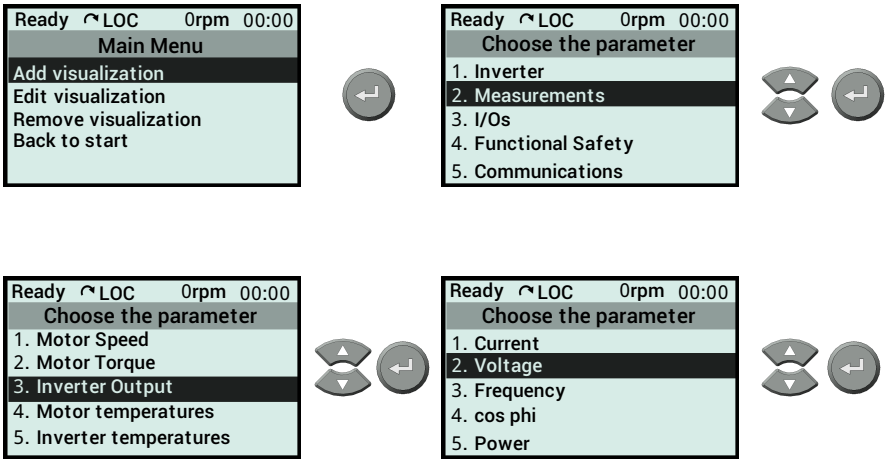
8.6.2 Main Screen Modification

The main screens can be modified following the steps below:

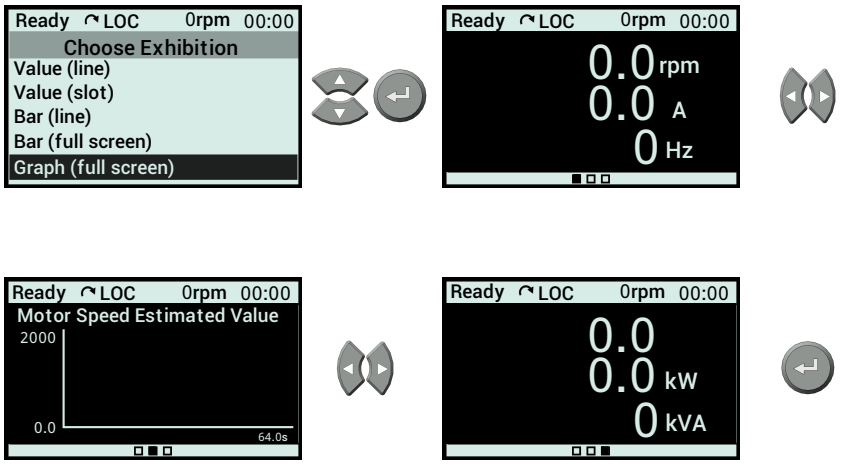
1. Navigate to the HMI main screen configuration menu (C11.2).



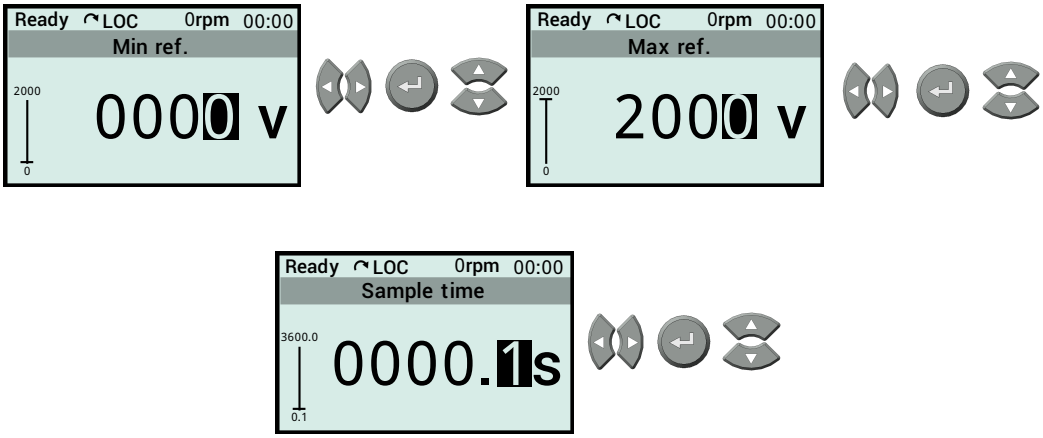
2. Select *Add View* and choose the reading variable to be added to the screen **Main**.



3. Then select the view format of the reading variable and its location on the main screens. In this example, full screen mode in graphic format will be chosen. Use the navigation keys to move between screens.

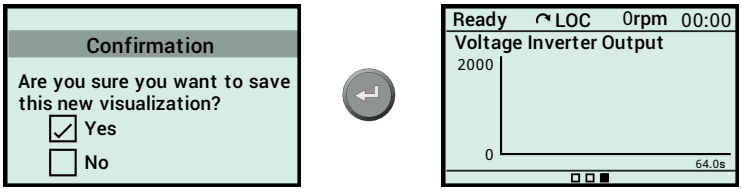


4. Configure the view format. For this example, choose the graph range and sampling rate.



> **NOTE!**
> The option to *Edit View* is applied to the bar and graph mode, where you can set the minimum and maximum values for existing views.

5. Confirm the new view.



8.6.3 Screen Examples

Other screens examples are shown below:

Example 1

Figure 8.15 is an example of a main screen with parameter readings displayed in mode **Slot** and **Line**, which shows:

- in the first line, the temperatures of the motor stator windings in mode **Slot**, format **value**;
- in the second line, the thermal image of the motor in mode **Line**, format **text**;
- in the third line, the internal air temperature of the power in mode **Line**, format **bar**.

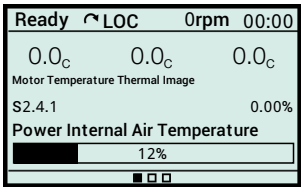


Figure 8.15: *Main screen examples*

Example 2

Figure 8.16 is an example of a main screen with parameter readings displayed in mode **Line**, which shows:

- in the first line, the inverter output current in mode **Line**, format **text**;
- in the second line, the inverter output voltage in mode **Line**, format **text**;
- in the third line, the inverter output power in mode **Line**, format **bar**.

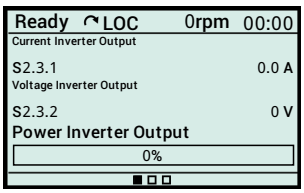


Figure 8.16: *Main screen examples*

8.7 USB MODE

The CFW900 HMI has a USB port to connect the inverter to a computer with the WPS software installed. This software application allows, among other things, reading variables, configuring parameters and updating the inverter firmware. For more details, consult the WPS (WEG Programming Suite) manual, available at www.weg.net.

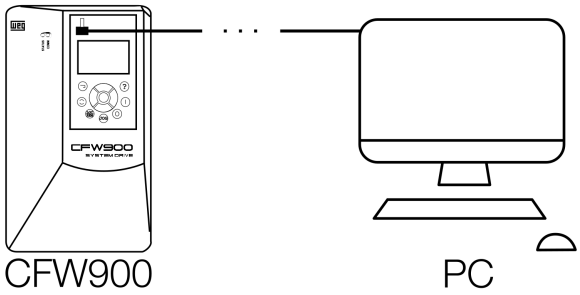


Figure 8.17: *CFW900 USB connection to a computer.*

When the inverter is not powered or connected to an external 24 Vdc source, the control circuit is powered by the USB port, which imposes some restrictions. Only the control circuit will be enabled; other circuits, control accessories and networks will be disabled.

The USB power supply allows reading and writing parameters through the HMI and connection to the WPS software, but the I/O parameters and connected accessories will not be available, as well as the parameters related to regulation functions (which depend on the operation of other parts of the inverter). Functions that use the MicroSD card will also be unavailable.

WARNING!
In the USB mode, the HMI cannot be used remotely. It must be directly connected to the inverter.

NOTE!
Once powered by the USB port, when making changes to the inverter parameters via HMI, wait for the confirmation screen to ensure the saving of the parameter.

WARNING!
If the inverter control circuit is powered by the USB, and another power supply is connected, the drive will reset.

9 S STATUS

This menu contains status information for the drive, motor, control accessories, and networks. You can also access information related to the functional safety of the drive. Allows you to view the reading variables of the CFW900.

NOTE!
All parameters in this menu can only be viewed on the HMI display, and cannot be changed by the user, unless they are linked to parameters in the **Configuration** menu.

S1 INVERTER

Allows viewing the characteristics and status of the CFW900.

S1.1 Status

Allows viewing the operating status of the CFW900.

S1.1 Status	
.1 Inverter	0 ... 9
.2 HMI	0 ... 9
.3 Pre-Charge	0 ... 1
.4 Config	0 ... 26

.1 Inverter This parameter indicates one of the possible inverter states. The following table shows the description of each state.

Indication	Description
0 = Ready	Indicates that the inverter is ready to drive the motor.
1 = Run	Indicates that the inverter is driving the motor.
2 = Undervoltage	Indicates that the inverter has insufficient supply voltage for operation (undervoltage) and will not accept a command to start the motor.
3 = Fault	Indicates that the inverter is in the fault state.
4 = Configuration	Indicates that the inverter is running an assistant or is programmed with incompatible parameters.
5 = STO	Indicates that the STO safety function is acting.
6 = Power Off	Indicates that communication with the power board has not been established.
7 = Disable	Indicates that the inverter is disabled.
8 = SS1	Indicates that the SS1-t safety function is running.
9 = Self-Tuning	Indicates that the inverter is executing the Self-tuning routine.

.2 HMI Indicates one of the possible inverter states shown in abbreviated form on the upper left corner of the HMI. The following table contains the description of each status.

Indication	Description
0 = Ready	Indicates that the inverter is ready to drive the motor.
1 = Run	Indicates that the inverter is driving the motor.
2 = Sub	Indicates that the inverter has insufficient supply voltage for operation (undervoltage) and will not accept a command to start the motor.
3 = Fault	Indicates that the inverter is in the fault state.
4 = Config	Indicates that the inverter is running an assistant or is programmed with incompatible parameters.
5 = STO	Indicates that the STO safety function is acting.
6 = P.Off	Indicates that communication with the power board has not been established.
7 = Disab.	Indicates that the inverter is disabled.
8 = SS1	Indicates that the SS1-t safety function is running.
9 = SelfTun	Indicates that the inverter is executing the Self-tuning routine.

.3 Pre-Charge Indicates the state of the inverter pre-charge.

Indication	Description
0 = Running	Running the inverter pre-charge.
1 = Done	Inverter pre-charge completed.

.4 Config Indicates if the CFW900 is in CONFIG state and, if so, which input condition is leading to this situation .

Indication	Description
0 = No Config	Indicates that the CFW900 is not in the CONFIG state.
1 = Run/Stop DIx	Indicates that the Run/Stop command source of Remote 1 and/or Remote 2 mode has been configured to Run/Stop via DI mode, but no DI has been specified.
2 = Forward R1	Indicates that the Run/Stop command source of Remote 1 mode has been configured to Forward/Reverse mode via DI, but no foward DI has been specified or the Speed Direction command source is not configured to Forward/Reverse via DI mode.
3 = Forward R2	Indicates that the Run/Stop command source of Remote 2 mode has been configured to Forward/Reverse mode via DI, but no foward DI has been specified.
4 = Reverse R1	Indicates that the Run/Stop command source of Remote 1 mode has been configured to Forward/Reverse mode via DI, but no reverse DI has been specified.
5 = Reverse R2	Indicates that the Run/Stop command source of Remote 2 mode has been configured to Forward/Reverse mode via DI, but no reverse DI has been specified.
6 = 3-wire Start/Stop	Indicates that the Run/Stop command source of Remote 1 and/or Remote 2 mode has been configured to 3-Wire Start/Stop via DI mode, but no DI has been specified.
7 = Direct/Reverse DIx	Indicates that the Direction of Rotation command source of Remote 1 and/or Remote 2 mode has been configured to Direct/Reverse via DI mode, but no DI has been specified.
8 = JOG DIx	Indicates that the JOG command source of Remote 1 and/or Remote 2 mode has been configured to Digital Input (DI) mode, but no DI has been specified.
9 = R1/R2 DIx	Indicates that the selection command source between Remote 1 and Remote 2 modes has been configured to Digital Input (DI) mode, but no DI has been specified.
10 = Ramp selection DIx	Indicates that the ramp selection command source has been configured to Digital Input (DI) mode, but no DI has been specified.
11 = Oriented Startup	Indicates that the Oriented Startup is running.
12 = Backup	Indicates that Copy Parameters functions are running.
13 = Not used	Not used.
14 = SS1 configuration	Indicates that the SS1 is not properly set.
15 = Switching Frequency	Indicates that the minimum and/or user switching frequencies are not properly set.
16 = Undefined model	Indica que there is an incompatibility in the recorded drive model. Reset to factory default to fix this problem.
17 = Encoder Vector Control	Indicates that the Vector Control with Encoder type has been selected but there is no Encoder accessory defined in any slot.
18 = ENC Acc. not configured	Indicates that the Encoder accessory was selected for one of the slots, but it is not connected or set to in the corresponding slot.
19 = Speed Ref. AIx/FIx	Indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been configured to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified.
20 = PM Motor Control	Indicates that Motor Type has been set to PM Motor but the Control Type is not set to VVW+.
21 = General Enable DIx	Indicates that the General Enable command source of Remote 1 and/or Remote 2 mode has been configured to Digital Input (DI) mode, but no DI has been specified.
22 = Multispeed	Indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been configured to Multispeed mode, but no DI has been specified.
23 = Not used	Not used.
24 = Electronic Potentiometer	Indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been configured to Electronic Potentiometer mode, but no DI has been specified.
25 = FI used as DI	This state occurs when the user tries to configure some command that needs a DI with one that was previously configured to be an FI and vice versa.
26 = Torque Ref.AIx/FIx	Indicates that the torque reference source of Remote 1 and/or Remote 2 mode has been configured to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified.

S1.2 Software Version

Indicates the software versions contained in all microcontrollers installed in the CFW900.

S1.2 Software Version
.1 Package

.1 Package Indicates the version of the software package, which is formed by the set of program files saved in the CFW900 microcontrollers.

S1.2.2 Details

Indicates details of the software versions contained in all microcontrollers installed in the CFW900.

S1.3 Inverter Data

Allows viewing the identification codes of the CFW900.

S1.3 Inverter Data	
.1 Model	1 ... 40
.2 Inverter Serial No.	0 ... 4294967295
.3 Power Serial No.	0 ... 4294967295
.4 Power - Option/Voltages	0 ... 12 Bit
.5 Rated Current	0.0 ... 6553.0 A
.6 Effective Rated Current	0.0 ... 6553.0 A
.7 Inverter Model Version	0 ... 4294967295

.1 Model Indicates the CFW900 inverter smart code/model.

.2 Inverter Serial No. Indicates the CFW900 inverter serial number.

.3 Power Serial No. Indicates the CFW900 inverter power board serial number.

.4 Power - Option/Voltages Indicates the supply voltage range and type (single-phase, three-phase, DC link) of the CFW900 inverter model.

Bit	Value/Description
Bit 0 200V	Indicates if the inverter supports operation at 200 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 1 208/220/230/240V	Indicates if the inverter supports operation at 208, 220, 230 and 240 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 2 380V	Indicates if the inverter supports operation at 380 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 3 400/415V	Indicates if the inverter supports operation at 400 and 415 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 4 440/460V	Indicates if the inverter supports operation at 440 and 460 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 5 480V	Indicates if the inverter supports operation at 480 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 6 500/525V	Indicates if the inverter supports operation at 500 and 525 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 7 550/575/600V	Indicates if the inverter supports operation at 550, 575 and 600 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 8 660/690V	Indicates if the inverter supports operation at 660 and 690 Vac rated voltage. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 9 DC Link Power Supply	Indicates if the inverter supports operation with power supply via DC link. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 10 Single-phase Power Supply	Indicates if the inverter supports operation with single-phase power supply. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 11 Three-phase Power Supply	Indicates if the inverter supports operation with three-phase power supply. **0 = No**: It does not support operation. **1 = Yes**: It supports operation.
Bit 12 Not used	Not used.

.5 Rated Current Indicates the inverter rated current.

.6 Effective Rated Current Indicates the rated current of the inverter considering additional derates.

Takes into account the supply voltage (C1.1.2), the application (C1.2.1), the switching frequency (C1.3.1 and C7.11.2) and the user's manual setting (C1.6.4).

.7 Inverter Model Version Indicates the version of the inverter model database.

S1.4 Control Accessory Data

Presents the control accessories that are installed in the CFW900.

S1.4.1 Backplane

Allows you to view the Backplane model that is connected to the CFW900.

S1.4.1 Backplane	
.1 Model	0 ... 2

.1 Model Model of the Backplane installed.

Indication	Description
0 = Disconnected	Indicates that no Backplane is connected to the CFW900.

Indication	Description
1 = CFW900-4SLOTS	Indicates that the 4-position (Slot) Backplane is connected to the CFW900.
2 = CFW900-7SLOTS	Indicates that the 7-position (Slot) Backplane is connected to the CFW900.

S1.4.2 Slot A to S1.4.8 Slot G

Allows viewing Slot accessory information.

S1.4.2 Slot A
S1.4.3 Slot B
S1.4.4 Slot C
S1.4.5 Slot D
S1.4.6 Slot E
S1.4.7 Slot F
S1.4.8 Slot G

.1 Identified Accessory 0 ... 9

.1 Identified Accessory Model of the accessory installed.

Indication	Description
0 = Unknown	Indicates that the accessory installed in the Slot is not recognized by this version of the CFW900
1 = No Accessory	Indicates that the Slot has no accessories
2 = CFW900-IOAI-01	Accessory with analog inputs and outputs
3 = CFW900-IOD-01	Accessory with digital inputs and outputs
4 = CFW900-REL-01	Accessory with digital relay outputs
5 = CFW900-TEMP-01	Accessory with isolated inputs for PTC/PT100/PT1000 sensors
6 = CFW900-ENC-01	Accessory for incremental encoder connection
7 = Not used	Not used.
8 = CFW900-CCAN-W	Communication accessory for CAN interface
9 = Not used	Not used.

NOTE!
Control accessories can be installed in any available slot. It is only possible to use one communication module of each type. Except for explicitly listed cases, up to 7 accessories of the same type can be used.

S1.5 Date/Hour

Allows viewing the date and time setting of the CFW900.

S1.5 Date/Hour

.1 Actual YYYY-MM-DD HH:MM:SS

.1 Actual Indicates the actual date (YYYY-MM-DD) and time (HH:MM:SS) of the CFW900.

S1.6 Control Words

Allows viewing the status of the HMI, DI and global control words. Each bit of this word represents a command that can be executed in the inverter.

S1.6 Control Words

.1 Global	0 ... 7 Bit
.2 HMI	0 ... 7 Bit
.3 DI	0 ... 7 Bit

.1 Global Indicates the status of the CFW900 global control word.

This is the effective command word for the CFW900.

The global control word bits are generated from the specific control words of each source according to the command mode (Local/Remote) and the settings in the C4.2.1 and C4.2.2 menus.

NOTE!
The general enable command may contain a digital input that acts together with the chosen command source. Both must be active/inactive simultaneously for the command to take place. When parameter C4.2.3.1 is set to ”Inactive”, the general enable command is assigned only by the source set (C4.2.1.1 or C4.2.2.1).

NOTE!
The quick stop command may contain a digital input that acts together with the chosen command source. Both must be active/inactive simultaneously for the command to take place. When parameter C4.2.3.7 is set to ”Inactive”, the quick stop command is assigned only by the source set (C4.2.1.2 or C4.2.2.2).

NOTE!
The fault reset command occurs through any command source, regardless of the command mode (Local/Remote 1/Remote 2) or source set.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.2 HMI Indicates the status of the control word via HMI.

For the commands of this parameter to be executed, the inverter must be programmed to be controlled via HMI. This programming is done through the menu C4.

HMI Control Word:

- When pressing the HMI key I, the command Enable Ramp is set to 1.
- When pressing the HMI key O, the command Enable Ramp is set to 0.

- The General Enable command can be disabled when the key O of the HMI is pressed and the parameter C4.2.4.1 is set to coast to stop.
- When pressing the HMI key , the RotateReverse command is alternated
- As long as the HMI key JOG is pressed, the Enable JOG command is kept at 1.
- When pressing the HMI key LOC REM the command mode is changed from local to remote or vice versa.
- The 2nd Ramp command is always kept at 0 (always 1st Ramp).
- The Quick Stop command can be activated when the key O of the HMI is pressed and the parameter C4.2.4.1 is set to fast stop.
- When there is an active fault, when pressing the HMI key O, the Reset Fault command is set to 1.

Bit	Value/Description
Bit 0 Ramp Enable	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 JOG Enable	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 LOC/REM Mode	**0 = REM**: selects the Remote command mode **1 = LOC**: selects the Local command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.3 DI Indicates the status of the control word via digital inputs.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Digital Input. This programming is done through the menus C4 and C4.2.3.

Control Word via DI:

- The Enable Ramp command depends on the configuration of parameters C4.2.1.2 and C4.2.2.2, according to options 7, 8 and 9 below.
  - For option 7: Forward/Reverse DI, the Enable Ramp command reflects the state of the digital input set in C4.2.3.2. Active DI means Enable Ramp and inactive DI means Disable Ramp.
  - For option 8: Forward/Reverse DI, the behavior of the Enable Ramp command is determined by a combination of the states of the digital inputs set in C4.2.3.5 and C4.2.3.6.
  - For option 9: 3-Wire Start/Stop DI, the Enable Ramp command behaves according to a combination of the states of the digital inputs set in C4.2.3.3 and C4.2.3.4.
- The General Enable command reflects the state of the digital input set in C4.2.3.1. Active DI means General Enabled and Inactive DI means General Disabled.
- The Forward Reverse command depends on the configuration parameters C4.2.1.3 and C4.2.2.3, according to options 7 and 8 below.
  - For option 7: Forward/Reverse DI, the Forward Reverse command reflects the state of the digital input set in C4.2.3.8. Active DI means Reverse Direction and inactive DI means Forward Direction.
  - For option 8: Forward/Reverse DI, the behavior of the Forward Reverse command is determined by a combination of the states of the digital inputs set in C4.2.3.5 and C4.2.3.6.

- The Enable JOG command reflects the state of the digital input set in C4.2.3.9. DI active means Enable JOG and DI inactive means Disable JOG.
- The 2ª Ramp command reflects the state of the digital input set in C4.2.3.10. Active DI means 2ª Ramp and inactive DI means 1ª Ramp.
- The Quick Stop command reflects the state of the digital input set in C4.2.3.7. Active DI means No Quick Stop and Inactive DI means With Quick Stop.
- The Fault Reset command reflects the state of the digital input set in C4.2.3.11. Active DI means Fault Reset and Inactive DI means No Action.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

S2 MEASUREMENTS

Allows viewing the variables measured by the CFW900.

S2.1 Motor Speed

Indicates the variables related to the motor speed.

S2.1 Motor Speed	
.1 Reference	0 ... 60000 rpm
.2 Total Reference	0 ... 60000 rpm
.3 Actual Value	0 ... 60000 rpm
.4 Encoder	0 ... 65535 rpm
.5 Estimated Value	0 ... 60000 rpm

.1 Reference Indicates the speed reference value in RPM.

.2 Total Reference Indicates the speed reference value in RPM.

.3 Actual Value Indicates the actual motor speed value in RPM used by the controller module.

This value considers the control type selected in C3.1.1 to use either the estimated value in S2.1.5 or the speed measured by the encoder in S2.1.4.

.4 Encoder Indicates the present encoder speed in RPM.

.5 Estimated Value Indicates the estimated motor speed value in RPM.

The estimation is based on the control type selected on C3.1.1, presenting the theoretical speed defined by the V/f curve or the value estimated by the speed observers.

S2.2 Motor Torque

Indicates the variables related to the motor torque.

S2.2 Motor Torque	
.1 Reference	-400.0 ... 400.0 %
.2 Total Reference	-400.0 ... 400.0 %
.3 Estimated Value	-400.0 ... 400.0 %

.1 Reference Indicates the electrical torque reference on the motor in % based on the motor rated torque.

.2 Total Reference Indicates the value of the motor torque reference after the ramp.

.3 Estimated Value Indicates the estimated electrical torque on the motor in % based on the rated motor torque.

S2.3 Inverter Output

Indicates the CFW900 output variables applied to the motor.

S2.3 Inverter Output	
.1 Current	0.0 ... 4500.0 A
.2 Voltage	0 ... 2000 V
.3 Frequency	0.0 ... 1020.0 Hz
.4 cos phi	-1.00 ... 1.00
.5 Power	0.00 ... 655.35 kW
.6 Energy GWh	0 ... 999 GWh
.7 Energy MWh	0 ... 999 MWh
.8 Energy kWh	0.0 ... 999.9 kWh
.9 Actual Switc. Freq.	0.00 ... 16.00 kHz

.1 Current Indicates the RMS value of the fundamental component of the inverter output current in Amperes (A).

.2 Voltage Indicates the inverter output voltage in Volts (V).

.3 Frequency Indicates the motor synchronous frequency in Hz.

.4 cos phi Indicates the motor cos phi value.

.5 Power Indicates the electrical power at the inverter output in kW.

.6 Energy GWh Indicates the energy consumed by the motor in GWh.

.7 Energy MWh Indicates the energy consumed by the motor in MWh.

.8 Energy kWh Indicates the energy consumed by the motor in kWh.

NOTE!
The total amount of energy consumed by the motor is the sum of indicated GWh, MWh and kWh values. However, these parameters are calculated indirectly and should not be used to measure energy consumption.

.9 Actual Switc. Freq. Indicates the switching frequency of the PWM signals applied to the inverter circuit (IGBTs) in kHz.

S2.4 Motor Temperatures

Indicates the motor overload protection variables.

S2.4 Motor Temperatures	
.1 Thermal Image	0.00 ... 655.35 %
.3 Measured Value Sensor	-100.0 ... 250.0 °C

.1 Thermal Image Indicates the estimated thermal image of the motor.

.3 Measured Value Sensor Indicate the value of the motor temperature measured by the temperature accessory.

The indicated value considers the highest temperature measured by the first temperature accessory identified by the inverter. If no temperature accessory is identified, this parameter will remain hidden for viewing by the HMI.

S2.5 Inverter Temperatures

Indication of IGBT and internal air temperatures.

S2.5.1 IGBT Temperature

Indicates the temperature of the inverter IGBT modules.

S2.5.1 IGBT Temperature	
.1 Fase U/T1 IGBT1	-50.0 ... 250.0 °C
.2 Phase V/T2 IGBT1	-50.0 ... 250.0 °C
.3 Phase W/T3 IGBT1	-50.0 ... 250.0 °C

.1 Fase U/T1 IGBT1 Indicates the actual temperature of phase U IGBT 1 module (°C).

.2 Phase V/T2 IGBT1 Indicates the actual temperature of phase V IGBT 1 module (°C).

.3 Phase W/T3 IGBT1 Indicates the actual temperature of phase W IGBT 1 module (°C).

S2.5.3 Internal Air Temperature

Indicates the temperature of the inverter internal air.

S2.5.3 Internal Air Temperature	
.1 Power	-50.0 ... 250.0 °C
.2 Control	-50.0 ... 250.0 °C

.1 Power Indicates the actual temperature of the power unit internal air (°C).

.2 Control Indicates the actual temperature of the internal air on the main control board (°C).

This temperature is used, in conjunction with other measurements, in the overtemperature protection of the control board.

The user's temperature offset setting affects this temperature value.

S2.7 DC Link

Allows viewing the DC Link voltage value.

S2.7 DC Link

.1 Voltage	0 ... 2000 V

.1 Voltage Indicates the actual voltage on the inverter DC Link in Volts (V).

S2.8 Torque Current Limitation

Displays the parameters related to the motor torque limiter via Analog Input.

S2.8 Torque Current Limitation

.1 Global Torque AIx	0.0 ... 400.0 %

.1 Global Torque AIx Defines the maximum torque value in the four motor operating quadrants via Analog Input (selected in parameter C3.3.5.1.6). If it is necessary to control the torque in the four operating quadrants of the motor, parameters C3.3.5.1.2 to C3.3.5.1.5 must be used.

S3 I/OS

Allows viewing the status of the I/O accessories installed on the CFW900.

S3.1 Slot X Status

Allows viewing the state of the status parameters of slot.

S3.1.1 Analog Inputs

Allows to view the value of the analog inputs of the accessory connected to the slot.

S3.1.1 Analog Inputs

.1 AI1	-100.00 ... 100.00 %
.2 AI2	-100.00 ... 100.00 %

.1 AI1, .2 AI2 Value of analog input in percentage according to the type of set signal.

Where 0% = minimum value of the configured signal - includes gain and offsets (e.g. 4mA for 4...20mA signal) and 100% = maximum value of the configured signal.

S3.1.2 Analog Outputs

Allows to view the value of the analog output of the accessory connected to the slot.

The data source for each output is independently configured through specific parameters described in C5.1.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in item C5.1.2.

S3.1.2 Analog Outputs

.1 AO1	-100.00 ... 100.00 %
.2 AO1 Network	-100.00 ... 100.00 %
.3 AO1 SoftPLC	-100.00 ... 100.00 %
.4 AO2	-100.00 ... 100.00 %
.5 AO2 Network	-100.00 ... 100.00 %
.6 AO2 SoftPLC	-100.00 ... 100.00 %

.1 AO1 , .4 AO2 Value of the analog output in percentage according to the type of signal configured.

.2 AO1 Network, .5 AO2 Network Value of the analog output, when controlled by communication network, in percentage according to the type of signal configured.

.3 AO1 SoftPLC, .6 AO2 SoftPLC Value of the analog output, when controlled by SoftPLC, in percentage according to the type of signal configured.

S3.1.3 Digital Inputs

Allows to view the value of the digital inputs of the accessory connected to the slot.

S3.1.3 Digital Inputs	
.1 DI	0 ... 5 Bit
.2 FI5	-100.00 ... 100.00 %
.3 FI5 (Hz)	0 ... 32000 Hz
.4 FI6	-100.00 ... 100.00 %
.5 FI6 (Hz)	0 ... 32000 Hz

.1 DI Indicates the status of digital inputs.

Bit	Value/Description
Bit 0 DI1	Indicates the status of Digital Input DI1. **0 = Off**: Indicates that Digital Input DI1 is inactive. **1 = On**: Indicates that Digital Input DI1 is active.
Bit 1 DI2	Indicates the status of Digital Input DI2. **0 = Off**: Indicates that Digital Input DI2 is inactive. **1 = On**: Indicates that Digital Input DI2 is active.
Bit 2 DI3	Indicates the status of Digital Input DI3. **0 = Off**: Indicates that Digital Input DI3 is inactive. **1 = On**: Indicates that Digital Input DI3 is active.
Bit 3 DI4	Indicates the status of Digital Input DI4. **0 = Off**: Indicates that Digital Input DI4 is inactive. **1 = On**: Indicates that Digital Input DI4 is active.
Bit 4 DI5	Indicates the status of Digital Input DI5. **0 = Off**: Indicates that Digital Input DI5 is inactive. **1 = On**: Indicates that Digital Input DI5 is active.
Bit 5 DI6	Indicates the status of Digital Input DI6. **0 = Off**: Indicates that Digital Input DI6 is inactive. **1 = On**: Indicates that Digital Input DI6 is active.

.2 FI5, .4 FI6 Indicates (in percentage of the full scale) the current value of frequency input.

.3 FI5 (Hz), .5 FI6 (Hz) Indicates (in Hz) the current value of frequency input.

S3.1.4 Digital Outputs

Allows to view the value of the digital outputs of the accessory connected to the slot.

S3.1.4 Digital Outputs	
.1 DO	0 ... 1 Bit
.2 DO Network	0 ... 1 Bit
.3 DO SoftPLC	0 ... 1 Bit
.4 FO1	-100.00 ... 100.00 %
.5 FO1 (Hz)	0 ... 32000 Hz
.6 FO1 Network	-100.00 ... 100.00 %
.7 FO1 SoftPLC	-100.00 ... 100.00 %
.8 FO2	-100.00 ... 100.00 %
.9 FO2 (Hz)	0 ... 32000 Hz
.10 FO2 Network	-100.00 ... 100.00 %
.11 FO2 SoftPLC	-100.00 ... 100.00 %

.1 DO Indicates the status of digital outputs.

.2 DO Network Indicates the Network command status to the digital outputs.

.3 DO SoftPLC Indicates the SoftPLC command status to the digital outputs.

Bit	Value/Description
Bit 0 DO1	Indicates the state of Digital Output DO1. **0 = Off**: Indicates that Digital Output DO1 is inactive. **1 = On**: Indicates that Digital Output DO1 is active.
Bit 1 DO2	Indicates the state of Digital Output DO2. **0 = Off**: Indicates that Digital Output DO2 is inactive. **1 = On**: Indicates that Digital Output DO2 is active.

.4 FO1, .8 FO2 Indicates (in percentage of the full scale) the current value of frequency output.

.5 FO1 (Hz), .9 FO2 (Hz) Indicates (in Hz) the current value of frequency output.

.6 FO1 Network, .10 FO2 Network Indicates (in percentage of the full scale) the current value supplied via Networks to frequency output.

.7 FO1 SoftPLC, .11 FO2 SoftPLC Indicates (in percentage of the full scale) the current value supplied via SoftPLC to frequency output.

S3.1.5 Encoder

Allows to view the actual status of the encoder signal measurements carried out by the accessory.

S3.1.5 Encoder	
.1 Number Turns	0 ... 65535
.2 Fraction Turn	0 ... 65535
.3 Speed	-60000 ... 60000 rpm

.1 Number Turns Number of whole revolutions measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when one complete revolution is measured in the forward direction and decreases when one complete revolution is measured in the reverse direction.

For example, for a 1024-pulse encoder (set in C5.1.5.1) that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 3 revolutions. If the encoder shaft rotates 0.75 revolution in the reverse direction, totaling 2.75 revolutions (2816 pulses), the parameter will indicate 2 revolutions.

.2 Fraction Turn Value proportional (from 0 to 65535) to the fraction of a revolution (incomplete revolution) measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when pulses are measured in the forward direction and decreases when pulses are measured in the reverse direction.

For example, for a 1024-pulse encoder that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 32768 (0.5 revolutions). If the encoder shaft rotates 0.75 revolutions in the reverse direction, totaling 2.75 revolutions (2816 pulses) the parameter will indicate 49152 (0.75 revolutions).

.3 Speed Indicates the speed, in rpm, measured by the encoder.

The speed indicated in this parameter is calculated by counting the encoder pulses occurred in a time frame of 1 ms.

This parameter is updated every 1 ms.

Positive values indicate forward rotation, and negative values indicate reverse rotation.

The value of this parameter is presented without filters.

S3.2 Slot A Status
S3.3 Slot B Status
S3.4 Slot C Status
S3.5 Slot D Status
S3.6 Slot E Status
S3.7 Slot F Status
S3.8 Slot G Status

Allows viewing the state of the status parameters of slot.

S3.2.1 Analog Inputs to S3.8.1 Analog Inputs

Allows to view the value of the analog inputs of the accessory connected to the slot.

S3.2.1 Analog Inputs **S3.3.1 Analog Inputs** **S3.4.1 Analog Inputs** **S3.5.1 Analog Inputs** **S3.6.1 Analog Inputs** **S3.7.1 Analog Inputs** **S3.8.1 Analog Inputs**	
.1 AI1 to .3 AI3	-100.00 ... 100.00 % -100.00 ... 100.00 %

.1 AI1, .2 AI2, .3 AI3 Value of analog input in percentage according to the type of set signal.

Where 0% = minimum value of the configured signal - includes gain and offsets (e.g. 4mA for 4...20mA signal) and 100% = maximum value of the configured signal.

S3.2.2 Analog Outputs to S3.8.2 Analog Outputs

Allows to view the value of the analog outputs of the accessory connected to the slot.

The data source for each output is independently configured through specific parameters described in C5.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in item C5.2.

S3.2.2 Analog Outputs S3.3.2 Analog Outputs S3.4.2 Analog Outputs S3.5.2 Analog Outputs S3.6.2 Analog Outputs S3.7.2 Analog Outputs S3.8.2 Analog Outputs	
.1 AO1	-100.00 ... 100.00 %
.2 AO1 Network	-100.00 ... 100.00 %
.3 AO1 SoftPLC	-100.00 ... 100.00 %
.4 AO2	-100.00 ... 100.00 %
.5 AO2 Network	-100.00 ... 100.00 %
.6 AO2 SoftPLC	-100.00 ... 100.00 %

.1 AO1 , .4 AO2 Value of the analog output in percentage according to the type of signal configured.

.2 AO1 Network, .5 AO2 Network Value of the analog output, when controlled by communication network, in percentage according to the type of signal configured.

.3 AO1 SoftPLC, .6 AO2 SoftPLC Value of the analog output, when controlled by SoftPLC, in percentage according to the type of signal configured.

S3.2.3 Digital Inputs to S3.8.3 Digital Inputs

Allows to view the value of the digital inputs of the accessory connected to the slot.

S3.2.3 Digital Inputs S3.3.3 Digital Inputs S3.4.3 Digital Inputs S3.5.3 Digital Inputs S3.6.3 Digital Inputs S3.7.3 Digital Inputs S3.8.3 Digital Inputs	
.1 DI	0 ... 7 Bit

.1 DI Indicates the status of digital inputs.

Bit	Value/Description
Bit 0 DI1	Indicates the status of Digital Input DI1. **0 = Off**: Indicates that Digital Input DI1 is inactive. **1 = On**: Indicates that Digital Input DI1 is active.
Bit 1 DI2	Indicates the status of Digital Input DI2. **0 = Off**: Indicates that Digital Input DI2 is inactive. **1 = On**: Indicates that Digital Input DI2 is active.
Bit 2 DI3	Indicates the status of Digital Input DI3. **0 = Off**: Indicates that Digital Input DI3 is inactive. **1 = On**: Indicates that Digital Input DI3 is active.
Bit 3 DI4	Indicates the status of Digital Input DI4. **0 = Off**: Indicates that Digital Input DI4 is inactive. **1 = On**: Indicates that Digital Input DI4 is active.
Bit 4 DI5	Indicates the status of Digital Input DI5. **0 = Off**: Indicates that Digital Input DI5 is inactive. **1 = On**: Indicates that Digital Input DI5 is active.
Bit 5 DI6	Indicates the status of Digital Input DI6. **0 = Off**: Indicates that Digital Input DI6 is inactive. **1 = On**: Indicates that Digital Input DI6 is active.
Bit 6 DI7	Indicates the status of Digital Input DI7. **0 = Off**: Indicates that Digital Input DI7 is inactive. **1 = On**: Indicates that Digital Input DI7 is active.
Bit 7 DI8	Indicates the status of Digital Input DI8. **0 = Off**: Indicates that Digital Input DI8 is inactive. **1 = On**: Indicates that Digital Input DI8 is active.

S3.2.4 Digital Outputs to S3.8.4 Digital Outputs

Allows to view the value of the digital outputs of the accessory connected to the slot.

S3.2.4 Digital Outputs
S3.3.4 Digital Outputs
S3.4.4 Digital Outputs
S3.5.4 Digital Outputs
S3.6.4 Digital Outputs
S3.7.4 Digital Outputs
S3.8.4 Digital Outputs

.1 DO	0 ... 7 Bit
.2 DO Network	0 ... 7 Bit
.3 DO SoftPLC	0 ... 7 Bit

.1 DO Indicates the status of digital outputs.

.2 DO Network Indicates the Network command status to the digital outputs.

.3 DO SoftPLC Indicates the SoftPLC command status to the digital outputs.

Bit	Value/Description
Bit 0 DO1	Indicates the state of Digital Output DO1. **0 = Off**: Indicates that Digital Output DO1 is inactive. **1 = On**: Indicates that Digital Output DO1 is active.
Bit 1 DO2	Indicates the state of Digital Output DO2. **0 = Off**: Indicates that Digital Output DO2 is inactive. **1 = On**: Indicates that Digital Output DO2 is active.
Bit 2 DO3	Indicates the state of Digital Output DO3. **0 = Off**: Indicates that Digital Output DO3 is inactive. **1 = On**: Indicates that Digital Output DO3 is active.
Bit 3 DO4	Indicates the state of Digital Output DO4. **0 = Off**: Indicates that Digital Output DO4 is inactive. **1 = On**: Indicates that Digital Output DO4 is active.
Bit 4 DO5	Indicates the state of Digital Output DO5. **0 = Off**: Indicates that Digital Output DO5 is inactive. **1 = On**: Indicates that Digital Output DO5 is active.
Bit 5 DO6	Indicates the state of Digital Output DO6. **0 = Off**: Indicates that Digital Output DO6 is inactive. **1 = On**: Indicates that Digital Output DO6 is active.
Bit 6 DO7	Indicates the state of Digital Output DO7. **0 = Off**: Indicates that Digital Output DO7 is inactive. **1 = On**: Indicates that Digital Output DO7 is active.
Bit 7 DO8	Indicates the state of Digital Output DO8. **0 = Off**: Indicates that Digital Output DO8 is inactive. **1 = On**: Indicates that Digital Output DO8 is active.

S3.2.5 Encoder to S3.8.5 Encoder

Allows to view the actual status of the encoder signal measurements carried out by the accessory.

S3.2.5 Encoder
S3.3.5 Encoder
S3.4.5 Encoder
S3.5.5 Encoder
S3.6.5 Encoder
S3.7.5 Encoder
S3.8.5 Encoder

.1 Number Turns	0 ... 65535
.2 Fraction Turn	0 ... 65535
.3 Speed	-60000 ... 60000 rpm
.4 Zero Search	0 ... 1

.1 Number Turns Number of whole revolutions measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when one complete revolution is measured in the forward direction and decreases when one complete revolution is measured in the reverse direction.

For example, for a 1024-pulse encoder (set in C5.2.5.1) that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 3 revolutions. If the encoder shaft rotates 0.75 revolution in the reverse direction, totaling 2.75 revolutions (2816 pulses), the parameter will indicate 2 revolutions.

.2 Fraction Turn Value proportional (from 0 to 65535) to the fraction of a revolution (incomplete revolution) measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when pulses are measured in the forward direction and decreases when pulses are measured in the reverse direction.

For example, for a 1024-pulse encoder that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 32768 (0.5 revolutions). If the encoder shaft rotates 0.75 revolutions in the reverse direction, totaling 2.75 revolutions (2816 pulses) the parameter will indicate 49152 (0.75 revolutions).

.3 Speed Indicates the speed, in RPM, measured by the encoder

The speed indicated in this parameter is calculated by counting the encoder pulses occurred in a time frame of 1 ms. This parameter is updated every 1 ms.

Positive values indicate forward rotation, and negative values indicate reverse rotation.

The value of this parameter is presented without filters.

.4 Zero Search Indicates whether the zero search function of encoder has completed.

Indication	Description
0 = Inactive	Indicates the search zero function has not been started or is in progress.
1 = Complete	Indicates the search zero function has been completed.

S3.2.6 Temperatures to S3.8.6 Temperatures

Allows to view the temperature of the sensors connected to the slot accessory in °C.

S3.2.6 Temperatures S3.3.6 Temperatures S3.4.6 Temperatures S3.5.6 Temperatures S3.6.6 Temperatures S3.7.6 Temperatures S3.8.6 Temperatures	
.1 Sensor 1 to .6 Sensor 6	-100.0 ... 250.0 °C -100.0 ... 250.0 °C

.1 Sensor 1, .2 Sensor 2, .3 Sensor 3, .4 Sensor 4, .5 Sensor 5, .6 Sensor 6 Indicates the temperature at sensor measured by Slot (°C).

S4 FUNCTIONAL SAFETY

Displays information related to the functional safety of CFW900.

S4 Functional Safety	
.1 State	0 ... 5
.2 SS1-t Delay Time	0 ... 999 s

.1 State Indicates the state of STO90.

Indication	Description
0 = Not used	Not used.
1 = STO	Indicates that STO90 is in the STO (Safe Torque Off) state.
2 = Operational	Indicates that STO90 is in operational state (torque enabled).
3 = Programming	Indicates that STO90 is in programming mode (delay time).
4 = SS1-t	Indicates that STO90 is executing the SS1-t (Safe Stop 1 - time controlled) function.
5 = Fault	Indicates that STO90 is in a fault state.

.2 SS1-t Delay Time Indicates the delay time of the SS1-t safety function set in STO90.

S5 COMMUNICATIONS

It allows viewing the parameters used for monitoring and controlling the CFW900 inverter using communication interfaces.

S5.1 Status and Commands

Allows viewing the CFW900 logical status and commands.

S5.1 Status and Commands	
.1 Status Word 1	0 ... 15 Bit
.2 Status Word 2	0 ... 15 Bit
.3 Speed	-200.00 ... 200.00 %

.1 Status Word 1 Indicates the operating status of the inverter. Each bit represents a status.

Bit	Value/Description
Bit 0 STO	**0 = No**: STO function is inactive (inverter operational) **1 = Yes**: STO function is active (inverter locked)
Bit 1 Run Command	**0 = No**: no run command active **1 = Yes**: run command active
Bit 2 Local	**0 = No**: inverter in the Remote command mode **1 = Yes**: inverter in the Local command mode
Bit 3 Not used	Not used.
Bit 4 No Quick Stop	**0 = No**: no quick stop command active **1 = Yes**: quick stop command active
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp by C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp by C6.1.4 and C6.1.5
Bit 6 Config. Mode	**0 = No**: inverter in normal operation **1 = Yes**: inverter in configuration state. Indicates a special condition in which the inverter cannot be enabled
Bit 7 Alarm	**0 = No**: without alarm **1 = Yes**: with alarm active
Bit 8 Running	**0 = No**: motor is stopped **1 = Yes**: motor is running according to reference and command
Bit 9 Enabled	**0 = No**: inverter is general disabled **1 = Yes**: inverter is general enabled
Bit 10 Reverse	**0 = No**: motor running in the forward direction **1 = Yes**: motor running in the reverse direction
Bit 11 JOG	**0 = No**: no JOG command active **1 = Yes**: JOG command is active
Bit 12 Remote 2	**0 = No**: inverter in Remote 1 command mode **1 = Yes**: inverter in Remote 2 command mode
Bit 13 Undervoltage	**0 = No**: without undervoltage **1 = Yes**: with undervoltage
Bit 14 Not used	Not used.
Bit 15 Fault	**0 = No**: without fault **1 = Yes**: with active fault

.2 Status Word 2 Indicates other states of the inverter functions. Each bit represents a state.

Bit	Value/Description
Bit 0 Self-tuning	**0 = No**: inverter is not running the self-tuning routine. **1 = Yes**: inverter is running Motor the Self-Tuning routine to estimate the motor parameters
Bit 1 Not used	Not used.
Bit 2 Pre-Charge OK	**0 = No**: pre-charge of the DC link capacitors not completed **1 = Yes**: pre-charge of the DC link capacitors completed
Bit 3 SF reduction	**0 = No**: output frequency reduction inactive **1 = Yes**: output frequency reduction active
Bit 4 Not used	Not used.
Bit 5 Decel. Ramp	**0 = No**: no deceleration **1 = Yes**: inverter decelerating
Bit 6 Accel. Ramp	**0 = No**: no acceleration **1 = Yes**: inverter accelerating
Bit 7 Freeze Ramp	**0 = No**: ramp operating in normal conditions **1 = Yes**: the path of the ramp is frozen by some command source or internal function
Bit 8 Setpoint OK	**0 = No**: motor speed has not reached the reference yet **1 = Yes**: motor speed has reached the reference
Bit 9 DC Link Limitation	**0 = No**: DC link limitation or current limitation inactive **1 = Yes**: DC link limitation or current limitation active
Bit 10 Current Limitation	**0 = No**: current limitation inactive **1 = Yes**: current limitation active
Bit 11 Torque Limitation	**0 = No**: torque limitation inactive **1 = Yes**: torque limitation active
Bit 12 Ride-Through	**0 = No**: no execution of Ride-through **1 = Yes**: executing Ride-through
Bit 13 Flying Start	**0 = No**: no execution of Flying start **1 = Yes**: executing Flying start
Bit 14 DC Braking	**0 = No**: DC breaking inactive **1 = Yes**: DC breaking active
Bit 15 PWM pulses	**0 = No**: PWM voltage pulses at the output disabled **1 = Yes**: PWM voltage pulses at the output enabled

.3 Speed Indicates the actual speed of the motor driven by the inverter in percentage of the maximum speed.
- S5.1.3 = 0.00 % ⇒ motor speed = 0 rpm
- S5.1.3 = 100.00 % ⇒ motor speed = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the value read is 25.0 %, considering C4.3.1.1.2 = 1800 rpm, to get the value in rpm you should calculate:

100.00 % : 1800 rpm
25.00 % : Speed

$$\text{Speed} = \frac{25.00 \times 1800}{100.00}$$

Speed = 450 rpm

Negative values indicate that the motor is rotating in the reverse direction.

S5.2 Serial RS485

Allows viewing the status of the RS485 serial interface and the commands received by this interface.

S5.2 Serial RS485

.1 Interface Status	0 ... 2
.2 Control Word	0 ... 7 Bit
.3 Speed Reference	-200.00 ... 200.00 %
.5 Received Telegram	0 ... 65535
.6 Transmitted Telegram	0 ... 65535
.7 Telegram with Error	0 ... 65535
.8 Reception Errors	0 ... 65535

.1 Interface Status Indicates the status of the RS485 serial interface.

Indication	Description
0 = Off	Not used.
1 = On	Serial interface active.
2 = Timeout Error	Indicates that the CFW900 did not receive valid telegrams for a time longer than the limit set.

.2 Control Word Indicates the status of the control word via RS-485 serial interface. This parameter can only be changed via RS-485 serial interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Serial. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.3 Speed Reference Indicates the speed reference sent via RS-485 Serial interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via RS-485 serial interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Serial. This programming is done through menu C4.
- S5.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the spin direction command bit in S1.6.1:

- Bit Rotation Direction = 1 e S5.2.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 e S5.2.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.2.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.2.3 < 0: reference for the forward direction

.5 Received Telegram Indicates the number of telegrams received.

.6 Transmitted Telegram Indicates the number of telegrams transmitted.

.7 Telegram with Error Indicates the number of telegrams received with errors (CRC, Checksum).

.8 Reception Errors Indicates the number of bytes received with errors.

The counters are cyclic, that is, above 65535 they return to 0.

NOTE!
These counters start at 0 whenever the product is powered on. They also return to 0 whenever the maximum limit of the parameter is reached.

S5.3 Ethernet

Allows viewing the status of the Ethernet network interface and the commands received by this interface.

S5.3 Ethernet	
.1 Interface Status	0 ... 1 Bit
.2 Control Word	0 ... 7 Bit
.3 Speed Reference	-200.00 ... 200.00 %
.5 Actual IP Address	0.0.0.0 ... 255.255.255.255
.6 Drive Scan Status	0 ... 2
.7 Drive Scan Latest Public.	YYYY-MM-DD HH:MM:SS
.8 SNTP - Status	0 ... 2
.9 SNTP - Last update	YYYY-MM-DD HH:MM:SS

.1 Interface Status Indicates the status of the Ethernet network interface. Each bit represents a state.

Bit	Value/Description
Bit 0 Link 1	**0 = No**: Link active at port 1. **1 = Yes**: Link active at port 1.
Bit 1 Link 2	**0 = No**: No link at port 2. **1 = Yes**: Link active at port 2.

.2 Control Word Indicates the status of the control word via Ethernet network interface. This parameter can only be changed via Ethernet network interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Ethernet. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.3 Speed Reference Indicates the speed reference sent via Ethernet network interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via Ethernet network interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Ethernet. This programming is done through menu C4.
- S5.3.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.3.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, one should calculate:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the spin direction command bit in S1.6.1:

- Bit Rotation Direction = 1 e S5.3.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 e S5.3.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.3.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.3.3 < 0: reference for the forward direction

.5 Actual IP Address Allows viewing the IP address in use by the device.

.6 Drive Scan Status Indicates the state of the Embedded Drive Scan function, regarding settings and the sending of data to the server.

Indication	Description
0 = Inactive	Indicates that the Embedded Drive Scan function is not configured; it is disabled.
1 = No Connection	Indicates that the Embedded Drive Scan function has been configured and is enabled, but there is currently no active connection to the configured Broker.
2 = Connected	Indicates that the Embedded Drive Scan function has been configured, is enabled and has an active connection with the configured Broker.

.7 Drive Scan Latest Public. Indicates the date and time of the last successful sending of data collected to the Embedded Drive Scan function.

.8 SNTP - Status Indicates the state of the NTP server, with respect to setting up and receiving data from the server.

Indication	Description
0 = Inactive	Indicates that the NTP server is not configured; it is disabled.
1 = No Connection	Indicates that the NTP server has been configured and is enabled, but there is currently no active connection.
2 = Connected	Indicates that the NTP server has been configured, is enabled and has an active connection.

.9 SNTP - Last update Indicates the date and time of the last update of the NTP server.

S5.5 Modbus TCP

Allows viewing information about the Modbus TCP protocol.

S5.5 Modbus TCP

.1 Communication Status	0 ... 3
.2 Received Telegram	0 ... 65535
.3 Transmitted Telegram	0 ... 65535
.4 Active Connexions	0 ... 65535

.1 Communication Status Allows identifying the communication status with the Modbus TCP server.

Indication	Description
0 = Inactive	Not used.
1 = No Connection	Communication enabled, but no Modbus TCP connection active.
2 = Connected	At least one active Modbus TCP connection.
3 = Timeout Error	Device detected timeout in the Modbus TCP communication.

.2 Received Telegram Indicates the number of telegrams received by the device as a server in the Modbus TCP network.

.3 Transmitted Telegram Indicates the number of telegrams sent by the equipment as a server in the Modbus TCP network.

NOTE!
These counters start at 0 whenever the product is powered on. They also return to 0 whenever the maximum limit of the parameter is reached.

.4 Active Connexions Indicates the number of Modbus TCP connections active in the product.

S5.7 CAN/CANop/DNet

Status of the CAN communication accessory and the protocols that use this interface.

S5.7 CAN/CANop/DNet

.1 CAN Controller Status	0 ... 6
.2 Control Word	0 ... 7 Bit
.3 Speed Reference	-200.00 ... 200.00 %
.5 Received Telegram	0 ... 65535
.6 Transmitted Telegram	0 ... 65535
.7 Bus Off Counter	0 ... 65535
.8 Lost Messages	0 ... 65535
.9 CANopen Comm. Status	0 ... 5
.10 CANopen Node State	0 ... 4
.11 DNet Network Status	0 ... 5
.12 DNet Master Status	0 ... 1

.1 CAN Controller Status Allows identifying if the CAN interface is properly installed and if the communication has errors.

Indication	Description
0 = Disabled	CAN interface inactive. It occurs when the equipment does not have CAN protocol programmed in C9.8.1.
1 = Auto-Baud	Executing function for automatic baud rate detection (only for DeviceNet protocol).
2 = CAN Enabled	CAN interface active and without errors.
3 = Warning	CAN controller has reached the warning state.
4 = Error Passive	CAN controller has reached the passive error state.
5 = Bus Off	CAN controller has reached the bus off state.
6 = No Bus Power	CAN interface has no power supply between pins 1 and 5 of the connector.

.2 Control Word Indicates the status of the control word via CAN interface. This parameter can only be changed via CAN interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via CAN/CO/DN. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.3 Speed Reference Indicates the speed reference sent via CAN interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via CAN interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via CAN/CO/DNET. This programming is done through menu C4.

- S5.7.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.7.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the spin direction command bit in S1.6.1:

- Bit Rotation Direction = 1 e S5.7.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 e S5.7.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.7.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S5.7.3 < 0: reference for the forward direction

.5 Received Telegram This parameter works as a cyclic counter that is incremented every time a CAN telegram is received. It provides feedback to the operator if the device is able to communicate with the network.

.6 Transmitted Telegram This parameter works as a cyclic counter that is incremented every time a CAN telegram is transmitted. It provides feedback to the operator if the device is able to communicate with the network.

.7 Bus Off Counter Cyclic counter that indicates the number of times the equipment entered the bus off state on the CAN network.

.8 Lost Messages It is a cyclic counter that indicates the number of messages the CAN interface received but could not be processed. In case the number of lost messages frequently increases, it is recommended to reduce the baud rate used in the CAN network.

NOTE!
These counters are reset to zero whenever the equipment is turned off, reset or reach the maximum limit set in the parameter.

.9 CANopen Comm. Status Indicates the status of the CAN accessory in relation to the CANopen network, informing if the protocol has been enabled and if the error control service is active (Node Guarding or Heartbeat).

Indication	Description
0 = Disabled	CANopen protocol disabled.
1 = Reserved	
2 = Comm. Enabled	Communication enabled.
3 = Error Ctrl. Enab.	Communication enabled and error control enabled (Node Guarding/Heartbeat).
4 = Guarding Error	Node Guarding error occurred.
5 = HeartbeatError	Heartbeat error occurred.

.10 CANopen Node State Each slave in the CANopen network has a state machine that controls its behavior in relation to communication. This parameter indicates which state the device is in, according to the protocol specification.

Indication	Description
0 = Disabled	CANopen protocol disabled.
1 = Initialization	Communication with the device is not possible during this stage, which is completed automatically.

Indication	Description
2 = Stopped	Only the NMT object is available.
3 = Operational	All communication objects are available.
4 = Pre-Operational	It is already possible to communicate with the slave but its PDOs are not available for operation yet.

.11 DNet Network Status It indicates the status of the DeviceNet network.

Indication	Description
0 = Offline	No power supply or not online. Communication cannot be established.
1 = OnLine Not Conn.	Device online but not connected. Slave has successfully completed the MacID verification procedure. This means that the baud rate setting is correct (or correctly detected in case of using autobaud) and that there are no other nodes in the network with the same address. However, at this stage, there is still no communication with the master.
2 = OnLine,Conn	Device operational and under normal conditions. Master allocated a set of I/O type connections with the slave. In this step, the data exchange takes place through I/O type connections.
3 = Conn.Timed-Out	One or more I/O type connections timed out.
4 = Link Failure	Indicates that the slave cannot enter the network due to address problems or due to bus off. Check if the address is not already being used by another device, if the baud rate selected is correct or if there are problems in the installation.
5 = Auto-Baud	Equipment running the autobaud mechanism routine.

.12 DNet Master Status It indicates the status of the DeviceNet network master. It may be in operation mode (Run) or in configuration mode (Idle).

Indication	Description
0 = Run	The master normally processes and updates reading and writing telegrams.
1 = Idle	The master only updates slave reading telegrams. Writing, in this case, is disabled.

NOTE!
When communication is disabled, this parameter does not represent the actual status of the master.

S5.9 Bluetooth

The following configurations are available for products that have HMI interface with integrated Bluetooth technology.

S5.9 Bluetooth	
.1 MAC Address	00:00:00:00:00:00 ... FF:FF:FF:FF:FF:FF

.1 MAC Address Bluetooth device MAC Address is a unique 48-bit identifier assigned to each Bluetooth device by the manufacturer.

S6 SOFTPLC

The SoftPLC function adds to the CFW900 inverter the functionalities of a PLC (Programmable Logic Controller), adding flexibility to the product and allowing the users to develop their own applications (user programs). See the WPS (WEG Programming Suite) manual for more details regarding the programming of the CFW900 PLC functions, available at www.weg.net.

S6.1 Program Execution

Allows viewing the state of the SoftPLC function status parameters.

S6.1 Program Execution

.1 State	0 ... 4
.2 Time	0 ... 65535 ms

.1 State Allows the user to view the SoftPLC state.

Indication	Description
0 = No App	Indicates that there is no program saved in the SoftPLC memory area. User parameters will not be shown on the HMI.
1 = Saving	Indicates that the program is being saved in the SoftPLC memory area.
2 = Invalid App	Indicates that the program is saved in the SoftPLC memory area and is not compatible with the firmware version (S1.2.1) of the CFW900. In this case, the user must recompile the project in the WPS software considering the new firmware version of the CFW900 and redo the "download".
3 = App Stopped	Indicates that there is a valid program in the SoftPLC memory area, but it is not running, that is, it is stopped.
4 = App Running	Indicates that there is a valid program in the SoftPLC memory area and it is running.

.2 Time Indicates the program execution time in milliseconds. The larger the program, the longer the execution time (scan) tends to be.

S6.2 Control and References

Allows viewing the status of the SoftPLC control and reference parameters.

S6.2 Control and References

.1 Control Word	0 ... 7 Bit
.3 Speed Reference	-200.00 ... 200.00 %

.1 Control Word Indicates the status of the control word via SoftPLC function. This parameter can only be changed via SoftPLC function. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via SoftPLC. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: stops the motor by deceleration ramp **1 = Yes**: the motor spins according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: disables the inverter completely, interrupting the motor power supply **1 = Yes**: enables the inverter completely, allowing the operation of the motor
Bit 2 Turn Reverse	**0 = No**: spins the motor in the direction of the reference signal (forward) **1 = Yes**: spins the motor in the opposite direction of the reference signal (reverse)
Bit 3 Enable JOG	**0 = No**: disables the JOG function **1 = Yes**: enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: selects the Remote 1 command mode **1 = R2**: selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1ª acceleration and deceleration ramp according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2ª acceleration and deceleration ramp according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: enables quick stop **1 = Yes**: disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if in a fault state, it resets the fault

.3 Speed Reference Indicates the speed reference via SoftPLC function for the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via SoftPLC function. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via SoftPLC. This programming is done through menu C4.

- S6.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S6.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the spin direction command bit in S1.6.1:

- Bit Rotation Direction = 1 e S6.2.3 > 0: reference for the forwards direction
- Bit Rotation Direction = 1 e S6.2.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S6.2.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 e S6.2.3 < 0: reference for the forwards direction

S7 USER

Allows viewing the current user informations.

S7 User	
.1 Active Login	0 ... 5

.1 Active Login Indicates the currently logged user.

Indication	Description
0 = Administrator	Enabled to change any user configuration parameter.
1 = Operator	Enabled to change only the commands available by HMI keypad.
2 ... 5 = Not used	Not used.

10 D DIAGNOSTICS

Allows viewing variables and events that can help diagnose problems or improve the CFW900 operation.

D1 FAULT

Allows viewing the faults occurred in the CFW900.

D1.1 Actual

Allows viewing the faults occurred in the CFW900. If any fault is active, the fault number is displayed; otherwise, 0 is displayed.

The faults disable the motor. They are removed only with the command to reset the faults or de-energizing of the CFW900 control.

Faults are placed in a line, which can display up to 5 faults simultaneously. Whenever a fault occurs, it goes to the first empty position (if there is no indication of any previous fault, it will be shown in Fault 1). The reset command will only reset Fault 1.

Visually on the HMI, if only one fault occurs, it will be in the first position (Fault 1).

D1.1 Actual	
.1 Fault 1	0 ... 1999
.2 Fault 2	0 ... 1999
.3 Fault 3	0 ... 1999
.4 Fault 4	0 ... 1999
.5 Fault 5	0 ... 1999

.1 Fault 1 First position of fault indication (Actual fault).

.2 Fault 2 Second position of fault indication.

.3 Fault 3 Third position of fault indication.

.4 Fault 4 Fourth position of fault indication.

.5 Fault 5 Fifth position of fault indication.

D1.2 Historic

Shows the log of faults that have occured, with indication of the value of some parameters at the moment of the fault.

The history indication by the CFW900's HMI is limited to instant value of some parameters at the time of the 10 most recent faults.

The visualization of more information, older faults (guaranteed the latest 50) and/or graphs of parameters from moments before the fault is available in the historical visualization tool in WPS.

The graphs are available in two sample rates: one slower (1 second) and other faster (10 milliseconds) to allow greater resolution in the final moments before the fault.

Below is the list of parameters and graphs of variables monitored in the failure history.

List of parameters visible on HMI and WPS:

- Fault or protection code.
- Occurrence date and time [S1.5.1].
- Motor current [S2.3.1].
- Output voltage [S2.3.2].
- Output frequency [S2.3.3].
- Speed reference [S2.1.1].
- Motor speed [S2.1.3].
- DC link voltage [S2.7.1].

List of parameters visible only on WPS:

- Status of Slot X digital inputs [S3.1.3.1].
- Status of Slot X digital outputs [S3.1.4.1].
- IGBT junction temperature [D4.1.6.4].
- Actual switching frequency [S2.3.9].
- Motor torque [S2.2.3].
- Temperature of phase U IGBT [S2.5.1.1].
- Temperature of phase V IGBT [S2.5.1.2].
- Temperature of phase W IGBT [S2.5.1.3].
- Temperature of the internal air on the main control board [S2.5.3.2].
- Temperature of the power unit internal air [S2.5.3.1].
- Motor temperature [S2.4.3].
- Heat sink fan 1 speed [D4.1.1.1].
- Heat sink fan 2 speed [D4.1.1.2].
- Heat sink fan 3 speed [D4.1.1.3].
- Heat sink fan 4 speed [D4.1.1.4].
- Internal fan 1 speed [D4.1.1.5].
- Internal fan 2 speed [D4.1.1.6].
- Encoder speed [S2.1.4].
- IGBT overload [D4.1.6.2].

List of graphs visible on WPS:

- Motor current.
- Output frequency.
- DC link voltage.
- Output voltage.
- IGBT junction temperature.

- Motor speed.
- Motor torque.
- Total speed reference.

NOTE!
Critical faults have a fast action of the inverter over the output (interruption of the generation of PWM signals to trigger the IGBTs), guaranteeing the integrity of the product and the application. In these cases, the instantaneous value of the parameters may not faithfully represent the exact situation at the moment of the fault. In cases where the observed values are inconsistent with the presented fault, it is recommended to use WPS to view the recent history of operation at the time of the fault.

D2 ALARMS

Allows viewing the alarms occurred in the CFW900.

D2.1 Actual

Allows viewing the alarms occurred in the CFW900. If there is an active alarm, the alarm number is displayed; otherwise, 0 is displayed.

The alarms are displayed on the HMI and on the CFW900 status word. They are automatically removed after leaving the alarm condition.

Alarms are placed in a line, which can display up to 5 alarms simultaneously. Whenever an alarm occurs, it goes to the first empty position (if there is no indication of any previous alarm, it will be shown in Alarm 1).

Visually on the HMI, if only one alarm occurs, it will be in the first position (Alarm 1).

D2.1 Actual	
.1 Alarm 1	0 ... 1999
.2 Alarm 2	0 ... 1999
.3 Alarm 3	0 ... 1999
.4 Alarm 4	0 ... 1999
.5 Alarm 5	0 ... 1999

.1 Alarm 1 First position of alarm indication (Actual alarm).

.2 Alarm 2 Second position of alarm indication.

.3 Alarm 3 Third position of alarm indication.

.4 Alarm 4 Fourth position of alarm indication.

.5 Alarm 5 Fifth position of alarm indication.

D2.2 Historic

Shows the log of alarms that have occured, with indication of the value of some parameters at the moment of the alarm.

The history indication by the CFW900's HMI is limited to instant value of some parameters at the time of the 10 most recent alarms.

The visualization of more information, older alarms (guaranteed the latest 50) and/or graphs of parameters from moments before the alarm is available in the historical visualization tool in WPS.

The graphs are available in two sample rates: one slower (1 second) and other faster (10 milliseconds) to allow greater resolution in the final moments before the alarm.

Below is the list of parameters and graphs of variables monitored in the alarm history.

List of parameters visible on HMI and WPS:

- Alarm code.
- Occurrence date and time [S1.5.1].
- Motor current [S2.3.1].
- Output voltage [S2.3.2].
- Output frequency [S2.3.3].
- Speed reference [S2.1.1].
- Motor speed [S2.1.3].
- DC link voltage [S2.7.1].

List of parameters visible only on WPS:

- Status of Slot X digital inputs [S3.1.3.1].
- Status of Slot X digital outputs [S3.1.4.1].
- IGBT junction temperature [D4.1.6.4].
- Actual switching frequency [S2.3.9].
- Motor torque [S2.2.3].
- Temperature of phase U IGBT [S2.5.1.1].
- Temperature of phase V IGBT [S2.5.1.2].
- Temperature of phase W IGBT [S2.5.1.3].
- Temperature of the internal air on the main control board [S2.5.3.2].
- Temperature of the power unit internal air [S2.5.3.1].
- Motor temperature [S2.4.3].
- Heat sink fan 1 speed [D4.1.1.1].
- Heat sink fan 2 speed [D4.1.1.2].
- Heat sink fan 3 speed [D4.1.1.3].
- Heat sink fan 4 speed [D4.1.1.4].
- Internal fan 1 speed [D4.1.1.5].
- Internal fan 2 speed [D4.1.1.6].
- Encoder speed [S2.1.4].
- IGBT overload [D4.1.6.2].

List of graphs visible on WPS:

- Motor current.

- Output frequency.
- DC link voltage.
- Output voltage.
- IGBT junction temperature.
- Motor speed.
- Motor torque.
- Total speed reference.

D3 HOURS CONTROL

Allows viewing the total running hours of some CFW900 conditions.

D3 Hours control	
.1 Time Powered	0 ... 65536 h
.2 Time Enabled	0 ... 65536 h
.3 Fan Enabled Time	0 ... 65536 h

.1 Time Powered Indicates the total hours the inverter has been powered up.

This value is maintained even when the inverter is turned off.

.2 Time Enabled Indicates the total hours the inverter has been enabled.

It indicates up to 2147483648 hours, and then it returns to zero. Setting parameter C4.2.2.1 option 3, the value of parameter D3.2 goes to zero.This value is maintained even when the inverter is powered down.

.3 Fan Enabled Time Indicates the hours the heatsink fan was running.

It indicates up to 2147483648 hours, and then it returns to zero. Setting parameter C1.6.2 option 2, the value of parameter D3.3 goes to zero. This value is maintained even when the inverter is powered down.

D4 INVERTER AND CONTROL ACCESS.

Allows viewing the measurement of the CFW900 operating conditions.

D4.1 Inverter

Allows viewing the measurement of operating conditions related to the inverter.

D4.1.1 Fans Speeds

Indicates the speeds of the CFW900 fans.

D4.1.1 Fans Speeds	
.1 Power Fan Speed 1	0 ... 30000 rpm
.2 Power Fan Speed 2	0 ... 30000 rpm
.3 Power Fan Speed 3	0 ... 30000 rpm
.4 Power Fan Speed 4	0 ... 30000 rpm
.5 Int. Fan 1 Speed	0 ... 30000 rpm
.6 Int. Fan 2 Speed	0 ... 30000 rpm

.1 Power Fan Speed 1 Indicates heatsink fan 1 speed (rpm).

.2 Power Fan Speed 2 Indicates heatsink fan 2 speed (rpm).

.3 Power Fan Speed 3 Indicates heatsink fan 3 speed (rpm).

.4 Power Fan Speed 4 Indicates heatsink fan 4 speed (rpm).

.5 Int. Fan 1 Speed Indicates internal fan 1 speed (rpm).

.6 Int. Fan 2 Speed Indicates internal fan 2 speed (rpm).

D4.1.2 Temperatures

Indicates the temperatures of the inverter air.

D4.1.2 Temperatures	
.2 Control Temperature 2	-50.0 ... 250.0 °C
.3 Control Temperature 3	-50.0 ... 250.0 °C
.4 Power Temp. 2	-50.0 ... 250.0 °C

.2 Control Temperature 2 Indicates the control temperature measured by the SMM UC1 board (°C).

This temperature is used in the control overtemperature protection in conjunction with the measurements of the SMM UC2 board, AUI and PWC. Furthermore, this temperature is subjected to the user's temperature offset.

.3 Control Temperature 3 Indicates the control temperature measured by the SMM UC2 board (°C).

This temperature is used in the control overtemperature protection in conjunction with the measurements of the SMM UC1 board, AUI and PWC. Furthermore, this temperature is subjected to the user's temperature offset.

.4 Power Temp. 2 Indicates the internal air temperature in °C on the power board, sensor 2.

D4.1.3 DC Link

Indicates the variables related to the DC link voltage.

D4.1.3 DC Link	
.1 100Hz Harmonic	0.0 ... 999.9 V
.2 120Hz Harmonic	0.0 ... 999.9 V

.1 100Hz Harmonic Indicates the 100Hz harmonic amplitude in the DC link voltage signal.

.2 120Hz Harmonic Indicates the 120Hz harmonic amplitude in the DC link voltage signal.

D4.1.4 Control Voltage

Indicates the voltage of the CFW900 control board power supplies.

D4.1.4 Control Voltage	
.1 Voltage 24V IO	0.00 ... 655.35 V
.2 Voltage Batery	0.00 ... 655.35 V
.3 Voltage 3.3V Control	0.00 ... 655.35 V
.4 Voltage 24V Control	0.00 ... 655.35 V
.5 Voltage 3.3V IO	0.00 ... 655.35 V
.6 Voltage 5V AUI	0.00 ... 655.35 V

.1 Voltage 24V IO Indicates 24 V supply voltage for IO accessories (V).

.2 Voltage Batery Indicates the battery voltage (V).

.3 Voltage 3.3V Control Indicates the 3.3 V supply voltage for the control board (V).

.4 Voltage 24V Control Indicates the 24 V supply voltage for the control board (V).

.5 Voltage 3.3V IO Indicates 3.3 V supply voltage for IO accessories (V).

.6 Voltage 5V AUI Indicates the AUI 5V voltage (V).

D4.1.5 Motor Overl. Protection

Indicates the control variable of the motor overload protection function.

D4.1.5 Motor Overl. Protection	
.1 Ixt Motor Level	0 ... 100 %

.1 Ixt Motor Level Indicates the actual status of the motor overload.

D4.1.6 Thermal Management

Indicates the control variables of the inverter thermal management function.

D4.1.6 Thermal Management	
.1 IGBT Overload Status	0 ... 3
.2 IGBTs Overload Counter	0.00 ... 100.00 %
.3 Heatsink Temp.	0.00 ... 655.35 °C
.4 IGBT Junction Temp.	0.00 ... 655.35 °C
.5 Diode Junction Temp.	0.00 ... 655.35 °C

.1 IGBT Overload Status Indicates the status of the IGBT overload protection through the overload curve that is active.

The overload curve is active when the output current is greater than the rated current. At this point, the active curve is determined as a function of the overload class chosen by the user and the ratio between the two currents.

Indication	Description
0 = No Overload	IGBTs are not operating under overload. The ratio between the output current and rated current is below 1. The counter to trip the overload protection is decreased until it reaches 0.
1 = Slow Curve Overload	IGBTs are operating under light overload. The ratio between the output current and rated current is between 1 and 1.15 for ND, and 1 and 1.5 for HD.
2 = Fast Curve 1 Overload	IGBTs are operating under heavy overload. The ratio between the output current and rated current is between 1.15 and 1.3 for ND and 1.5, and 1.9 for HD.
3 = Fast Curve 2 Overload	IGBTs are operating under very heavy overload. The ratio between the output current and rated current is above 1.3 for ND and above 1.9 for HD.

.2 IGBTs Overload Counter Indicates the IGBT overload protection counter value (%).

The IGBT high load alarm trips with the counter at 90%, and the fault with the counter at 100%. The counter value increases as a function of the ratio between the output current and the rated current.

.3 Heatsink Temp. Indicates the inverter heatsink temperature (°C).

.4 IGBT Junction Temp. Indicates the estimated inverter IGBT junction temperature (°C).

.5 Diode Junction Temp. Indicates the estimated inverter diode junction temperature (°C).

D4.2 Control Accessories

Allows viewing the diagnostics data of the control accessories installed in the CFW900.

D4.2.1 Diag. Slot A to D4.2.7 Diag. Slot G

Allows viewing the diagnostics data of the accessory connected to the slot.

D4.2.1 Diag. Slot A
D4.2.2 Diag. Slot B
D4.2.3 Diag. Slot C
D4.2.4 Diag. Slot D
D4.2.5 Diag. Slot E
D4.2.6 Diag. Slot F
D4.2.7 Diag. Slot G

.1 State	0 ... 3
.2 Error Cause	0 ... 8
.3 Temperature	-100.0 ... 250.0 °C

.1 State Presents the accessory status.

Indication	Description
0 = Not Connected	No accessory is connected
1 = Initializing	An accessory is connected, and it is initializing
2 = Active	An accessory is connected, and it is communicating properly
3 = Error	An accessory is connected, and it is presenting some error in the communication with the CFW900

.2 Error Cause Last accessory communication error.

Indication	Description
0 = No Error	No errors occurred
1 = Recognition Error	There was an error recognizing the accessory
2 = Accessory Not Supported	The CFW900 does not support the accessory
3 = Initialization Error	The accessory is not compatible with the CFW900 firmware version
4 = Not used	Not used.
5 = Incorrect Accessory	The identified accessory is different from the required one
6 = Disconnected	The accessory is not correctly connected to the CFW900
7 = Data Error 1	There was an error communicating with the accessory
8 = Not used	Not used.

.3 Temperature Indicates the control temperature measured by the accessory.

11 C CONFIGURATION

Allows you to change the configuration parameters of CFW900. Depending on the property of the parameter, it is possible to adjust its value according to the table below.

Property	Description
Stopped	Parameter can only be changed when the motor is stopped.
Model	Default value can change according inverter model.

NOTE!
Parameter options with the description ”Reserved” are for exclusive use by WEG.

C1 INVERTER AND POWER SUPPLY

Configuration of inverter parameters related to power supply, utilization, switching frequency, fans and general settings.

C1.1 Power Supply

Allows configuring the type (three-phase, single-phase, DC) of the CFW900 main power supply.

C1.1 Power Supply
C1.1.1 Type
Range: 0 ... 2 **Default:** -
Properties: Stopped, Model

Description:
Determines the type of the inverter power supply.

Selects whether the inverter power supply is 3-phase AC, single-phase AC or DC.

Indication	Description
0 = AC Three-Phase	Power supply with three phases in alternating current.
1 = AC Single-Phase	Power supply with phase and neutral or two phases in alternating current.
2 = DC	Power supply via DC link in direct current.

C1.1 Power Supply
C1.1.2 Rated Voltage
Range: 1 ... 1200 V **Default:** -
Properties: Stopped, Model

Description:
Indicates the inverter rated supply voltage.

The voltage value complies with the type of power supply selected by the user (C1.1.1), being a value in alternating voltage (Vac) if the type of power supply is three-phase or single-phase AC, and a value in direct voltage (Vdc) if the power supply is DC.

C1.2 Inverter Use

Allows setting the inverter operating duty.

C1.2 Inverter Use

C1.2.1 Overload Type

Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
Selects the inverter duty cycle between normal duty (ND) or heavy duty (HD).

This parameter directly influences the inverter rated current value (S1.3.5) used as a reference for the IGBTs overload and output overcurrent protections.

Indication	Description
0 = Normal Duty	Operates at 110% of ND rated current for 1 minute.
1 = Heavy Duty	Operates at 150% of HD rated current for 1 minute.

C1.3 Switching Frequency

Allows setting the inverter Switching Frequency values.

NOTE!
The value of C1.3.1 can only be changed with the motor stopped.

C1.3 Switching Frequency

C1.3.1 User

Range:	1.0 ... 16.0 kHz	**Default:** -
Properties:	Stopped, Model	

Description:
Sets the inverter switching frequency value.

C1.3 Switching Frequency

C1.3.2 Minimum

Range:	1.00 ... 16.00 kHz	**Default:** -
Properties:	Stopped, Model	

Description:
Sets the minimum value that the switching frequency may have depending on the setting of the thermal management functions.

C1.4 PWM Modulation

Allows configuring the PWM modulation modes.

C1.4 PWM Modulation

C1.4.1 Modulation

Range:	0 ... 2	**Default:** 0
Properties:		

Description:
Sets the vector modulation type.

Indication	Description
0 = Standard	Modulation suitable for general applications.
1 = Not used	Not used.
2 = Long Cable Modulation	Modulation suitable for applications with long cable.

C1.4 PWM Modulation

C1.4.4 Pul.Wid.Adj.PWM Long Cab.

Range: 0.00 ... 1.00 **Default:** 0.15

Properties:

Description:

Sets the minimum duty cycle value allowed in the switching of the inverter. This parameter must only be changed when it is observed that the voltage peaks reflected in the motor stator are exceeding twice value of the DC link. In this case, it is suggested that you gradually increase this value.

NOTE!

This parameter is only functional when C1.4.1 = Long Cable.

C1.4 PWM Modulation

C1.4.5 Dead Time Compens.

Range: 0 ... 1 **Default:** 1

Properties: Stopped

Description:

Enables the dead time compensation algorithm.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C1.5 Fans Configuration

Allows setting the activation of the power and internal fans of the CFW900.

C1.5 Fans Configuration

C1.5.1 Power

Range: 0 ... 3 **Default:** 2

Properties:

Description:

Sets the drive method for the inverter heatsink fan.

NOTE!

Options 2 and 3 in the table below, with and without initial test, mean that the fans will or will not be running for 1 min after the inverter is powered up.

Indication	Description
0 = Off	Fan always off.
1 = On	Fan always running.
2 = Temp.Control w/ Inic.Test	Software-controlled fan with initial test.
3 = Temperature Control	Software-controlled fan without initial test.

C1.5 Fans Configuration

C1.5.2 Internal

Range: 0 ... 3 **Default:** 2

Properties:

Description:
Sets the drive method for the inverter control board fan.

NOTE!
Options 2 and 3 in the table below, with and without initial test, mean that the fans will or will not be running for 1 min after the inverter is powered up.

Indication	Description
0 = Off	Fan always off.
1 = On	Fan always running.
2 = Temp.Control w/ Inic.Test	Software-controlled fan with initial test.
3 = Temperature Control	Software-controlled fan without initial test.

C1.6 General Config.

Allows reversing the inverter output phase sequence, resetting the inverter counters and setting the inverter rated current reduction.

C1.6 General Config.
C1.6.1 Invert Output Phase Seq.
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
Sets the motor direction of rotation.

Indication	Description
0 = U(T1)/V(T2)/W(T3)	Direction of rotation according to the direction of the run command.
1 = W(T3)/V(T2)/U(T1)	Direction of rotation opposite the direction of the run command.

C1.6 General Config.
C1.6.2 Reset Counters
Range: 0 ... 3 **Default:** 0
Properties:

Description:
Allows reseting the values for the parameters of energy, fan running hours and inverter enabled hours.

Indication	Description
0 = Disabled	Disables function.
1 = Energy	Resets energy parameters S2.3.6, S2.3.7 and S2.3.8.
2 = Fan On	Resets fan running hours parameter D3.3.
3 = Enabled Inverter	Resets fan enabled hours parameter D3.3.

C1.6 General Config.
C1.6.4 Inom Manual Reduction
Range: 0.0 ... 100.0 % **Default:** 0.0 %
Properties:

Description:
Determines the manual derating value to be applied to the rated current.

Additionally applied to the rated current value after the settings relating to the inverter power supply and switching frequency.

C2 MOTOR

Definition of the characteristics of the motor to be driven by the CFW900 inverter.

C2.1 Motor Data

Definition of motor rated data.

NOTE!
The motor data set in C2.1 (from C2.1.1 to C2.1.12) must be exactly as shown on the motor nameplate. If the motor rated data is set out of the Oriented Startup routine, the motor must be stopped.

C2.1 Motor Data
C2.1.1 Type
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
Sets the type of motor to be driven by the CFW900 inverter.

Indication	Description
0 = Induction	Selects an induction motor.
1 = Permanent Magnet (PM)	Selects a permanent magnet motor.

C2.1 Motor Data
C2.1.2 Motor Power Unit
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
Sets the unit used to specify the motor power.

Indication	Description
0 = HP/cv	Sets the power unit to horsepower.
1 = kW	Sets the power unit to kilowatts.

C2.1 Motor Data
C2.1.3 Rated Power
Range: 0.0 ... 2000.0 **Default:** 2.0
Properties: Stopped

Description:
Sets the value of the motor rated power (according to the unit defined in C2.1.2) as per the motor nameplate data.

C2.1 Motor Data
C2.1.4 Rated Voltage
Range: 1 ... 690 V **Default:** -
Properties: Stopped, Model

Description:
Sets the motor rated voltage. This value cannot be above the rated power supply voltage set in C1.1.2.

C2.1 Motor Data

C2.1.5 Rated Current

Range:	0.0 ... 2223.0 A	**Default:** 3.6 A
Properties:	Stopped	

Description:
Sets the motor rated current. The value must be set according to the motor nameplate data.

C2.1 Motor Data

C2.1.6 Rated Frequency

Range:	1 ... 500 Hz	**Default:** 60 Hz
Properties:	Stopped	

Description:
Sets the motor rated frequency.

NOTE!
The maximum output frequency of the drive is limited to 1/8 of the nominal switching frequency. For example, with a switching frequency of 4.0kHz, the maximum output frequency will be 500Hz. For more information, see the User Manual.

C2.1 Motor Data

C2.1.7 Pole Pair Numbers

Range:	1 ... 48	**Default:** 3
Properties:	Stopped	

Description:
Sets the number of the motor pole pairs.

For example, the default setting of this parameter is 3 pole pairs, this means that the motor has 6 poles.

NOTE!
Parameter available only for PM motor.

C2.1 Motor Data

C2.1.8 Rated Speed

Range:	0 ... 18000 rpm	**Default:** 1750 rpm
Properties:	Stopped	

Description:
Sets the motor rated speed.

C2.1 Motor Data

C2.1.9 Rated Efficiency

Range:	50.0 ... 99.9 %	**Default:** 90.0 %
Properties:	Stopped	

Description:
Sets the motor rated efficiency (η).

C2.1 Motor Data

C2.1.10 Rated cos phi

Range:	0.50 ... 0.99	**Default:** 0.82
Properties:	Stopped	

Description:
Sets the motor rated cos phi (cos φ).

C2.1 Motor Data
C2.1.11 Service Factor
Range: 1.00 ... 1.50 **Default:** 1.15
Properties: Stopped

Description:
Sets the motor rated service factor (SF).

C2.1 Motor Data
C2.1.12 Ventilation
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
Defines the motor ventilation system.

Indication	Description
0 = Self-Vent.	Motor uses its own ventilation.
1 = Separate Vent.	Motor uses external ventilation.

In the Oriented Startup routine, the value set in C2.1.12 automatically changes the parameters related to the motor overload protection as follows:

C2.1.12	C7.4.3 (100%)	C7.4.4 (50%)	C7.4.5 (5%)
0	1.05 x C2.1.5	0.9 x C2.1.5	0.65 x C2.1.5
1	1.05 x C2.1.5	1.05 x C2.1.5	1.05 x C2.1.5

Table 11.13: *Change of the motor overload protection as a function of* C2.1.12

C2.2 Motor Model Parameters

Allows viewing and changing the motor electrical parameters estimated by the Self-tuning routine. The user can manually set the data if they have the motor data sheet.

C2.2 Motor Model Parameters
C2.2.1 Stator Resistance
Range: 0.000 ... 10.000 Ω **Default:** 1.000 Ω
Properties:

Description:
Sets the motor stator resistance value.

C2.2 Motor Model Parameters
C2.2.2 Magnetization Reactance
Range: 0.0 ... 500.0 Ω **Default:** 1.0 Ω
Properties:

Description:
Sets the motor magnetizing reactance value.

C2.2 Motor Model Parameters
C2.2.3 Leakage Reactance
Range: 0.00 ... 50.00 Ω **Default:** 1.00 Ω
Properties:

Description:
Sets the motor leakage reactance value.

C2.2 Motor Model Parameters		
C2.2.4 Rotor Resistence		
Range:	0.000 ... 10.000 Ω	**Default:** 1.000 Ω
Properties:		

Description:
Sets the motor rotor resistance value.

C2.2 Motor Model Parameters		
C2.2.5 Rotor Reactance		
Range:	0.00 ... 50.00 Ω	**Default:** 1.00 Ω
Properties:		

Description:
Sets the motor rotor reactance value.

C2.2 Motor Model Parameters		
C2.2.8 Ke Constant		
Range:	0.0 ... 2000.0	**Default:** 0.0
Properties:		

Description:
Sets the value of the Ke voltage constant generated by the motor. The engineering unit used is V/krpm (Volts/1000 rpm).

C3 CONTROL

The inverter supplies the motor with variable voltage, current and frequency, which enables the motor speed and torque control. The values applied to the motor follow a control strategy, depending on the selected control type and the inverter parameter settings.

In this menu, choose the control type according to the static and dynamic torque and speed demands of the driven load.

Control Types:

V/F: scalar control; simpler control type by imposed voltage/frequency; speed regulation in open loop or with slip compensation (programmable); allows multiple motor operation.

VVW+: Voltage Vector WEG Plus; static speed control more accurate than V/F; automatic adjustment to the input supply line and load variations, but dynamic response is not fast.

Sensorless vector: field-oriented control; no motor speed sensor; able to drive standard motors; speed control in the range of 1:100; 0.5 % static accuracy of rated speed in speed control; high control dynamics.

Vector with encoder: field-oriented control; requires encoder on the motor and interface module for encoder on the inverter (ENC-01); speed control up to 0 rpm; 0.01 % static accuracy of rated speed in speed control; high static and dynamic performance of speed and torque control.

C3.1 Configuration

Allows setting the control type used to drive the motor.

C3.1 Configuration		
C3.1.1 Control Type		
Range:	0 ... 3	**Default:** 0
Properties:	Stopped	

Description:
Defines the type of control that will be used to control the motor speed or torque.

NOTE!
To change the control type out of the Oriented Startup routine, the motor must be stopped.

NOTE!
The VVW+ option is also available for PM motors.

Indication	Description
0 = Scalar	Voltage/frequency scalar control.
1 = VVW+	Voltage Vector WEG Plus control.
2 = Encoder Vector	Vector control with encoder (with speed sensor).
3 = Sensorless Vector	Sensorless vector control (without speed sensor).

C3.2 VVW+ and Scalar Control

In this chapter the scalar and VVW+ control types will be discussed. A brief explanation of the operation of each control will be presented, as well as recommendations for applications where each control can get the best performance.

SCALAR CONTROL FOR INDUCTION MOTOR

This is the classic control for a three-phase induction motor, based on a curve that relates output frequency and voltage. The inverter works as a variable voltage and frequency source, generating frequency and voltage values according to this curve. Figure 11.1 shows the block diagram of the Scalar control.

The Scalar Control is recommended for the following cases:

- Drive of several motors with the same inverter (multiple motor drive).
- Energy saving in the drive of loads with quadratic torque/speed relationship.
- Motor rated current below 1/3 of the inverter rated current.
- For test purposes, the inverter is turned on without motor or with a small motor with no load.
- Applications where the load connected to the inverter is not a three-phase induction motor.

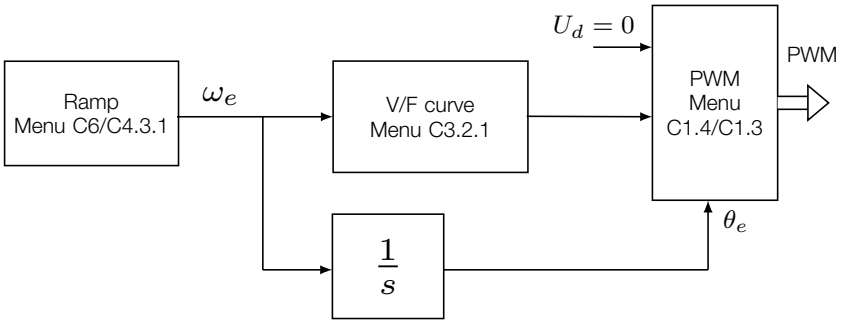


Figure 11.1: *Block diagram of scalar control for induction motor*

VVW+ CONTROL FOR INDUCTION MOTOR

The VVW+ scalar control is an improvement on the classic scalar control structure. In the former, two additional loops are integrated to improve control performance at low frequencies. The first one is the speed loop, in which the motor slip is calculated, and it is fed back into the speed reference. The second one is the voltage loop, in which the voltage drop of the stator resistance is calculated, and it is fed back into the voltage reference. Figure 11.2 shows the VVW+ scalar control in a block diagram.

The main advantage, in comparison to the V/F control, is the best speed regulation with greater torque capacity at low speeds (frequencies below 5 Hz), allowing a relevant improvement in the drive performance in permanent duty.In relation to the sensorless vector control, it is much simpler and easier to adjust.

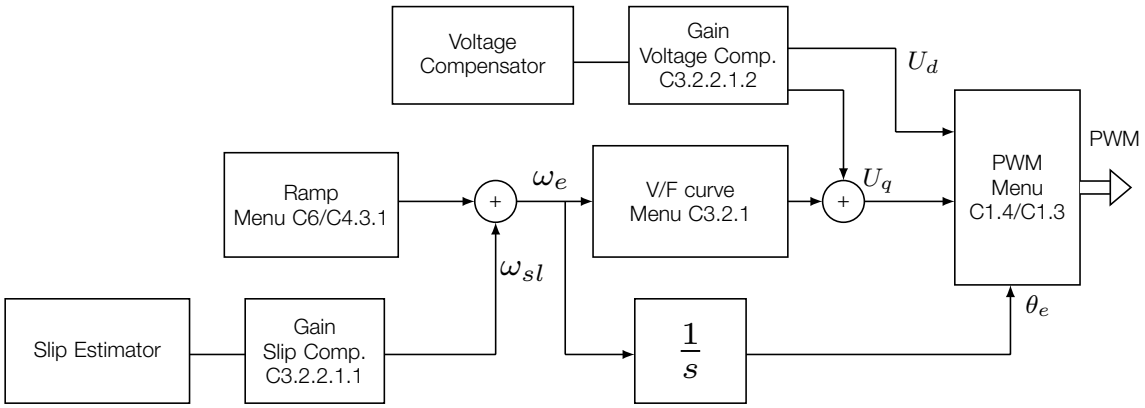


Figure 11.2: *Block Diagram of VVW+ WEG Scalar Control*

In this control strategy Self-tuning is not required, however, to achieve good regulation one must put the motor nameplate data information into the Oriented Startup.

VVW+ CONTROL FOR PM MOTOR

The VVW+ PM control type (Voltage Vector WEG Plus for Permanent Magnet motor) uses a control method based on the voltage-oriented vector control technique for permanent magnet motors with good performance for systems with slow dynamics. This control is easy to use and has high performance reducing losses and saving energy due to the tracking of the maximum torque per ampere and the maintainability in the current stability, according to the diagram in Figure 11.3.

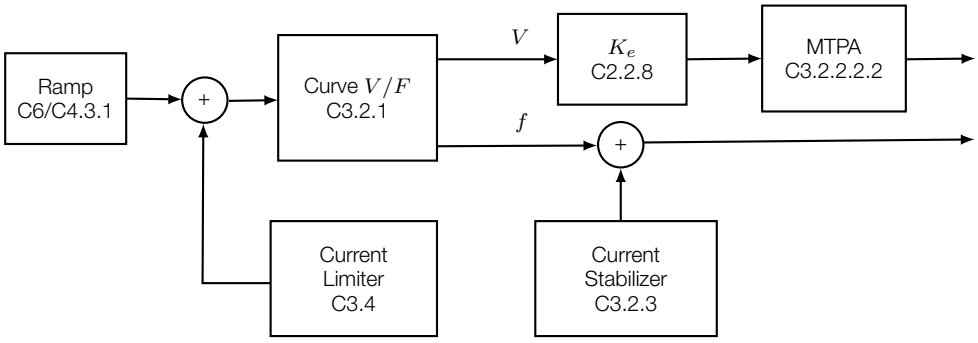


Figure 11.3: *Block Diagram of the VVW+ PM Control*

In this control strategy no self-tuning is required; however, to achieve a good adjustment, the motor nameplate data must be entered into the Oriented Startup.

This type of control is ideal for medium and high speed applications which do not require a fast dynamic response, focused on energy efficiency such as the driving of:

- Fans.
- Pumps.
- Compressors.

On the other hand, the VVW+ PM is not recommended for applications requiring fast dynamic response or precise torque control, focused on dynamic performance such as:

- Dynamometers.
- Cargo handling (such as overhead cranes, hoists, elevators).
- Applications requiring performance similar to servomotors, such as CNC machines and machine tools (positioning and high dynamics required).

AUXILIARY FUNCTIONS

At Figure 11.4, the block diagram of the scalar controls for induction motor and VVW+ for induction motor and PM is shown, with all the auxiliary functions presented.

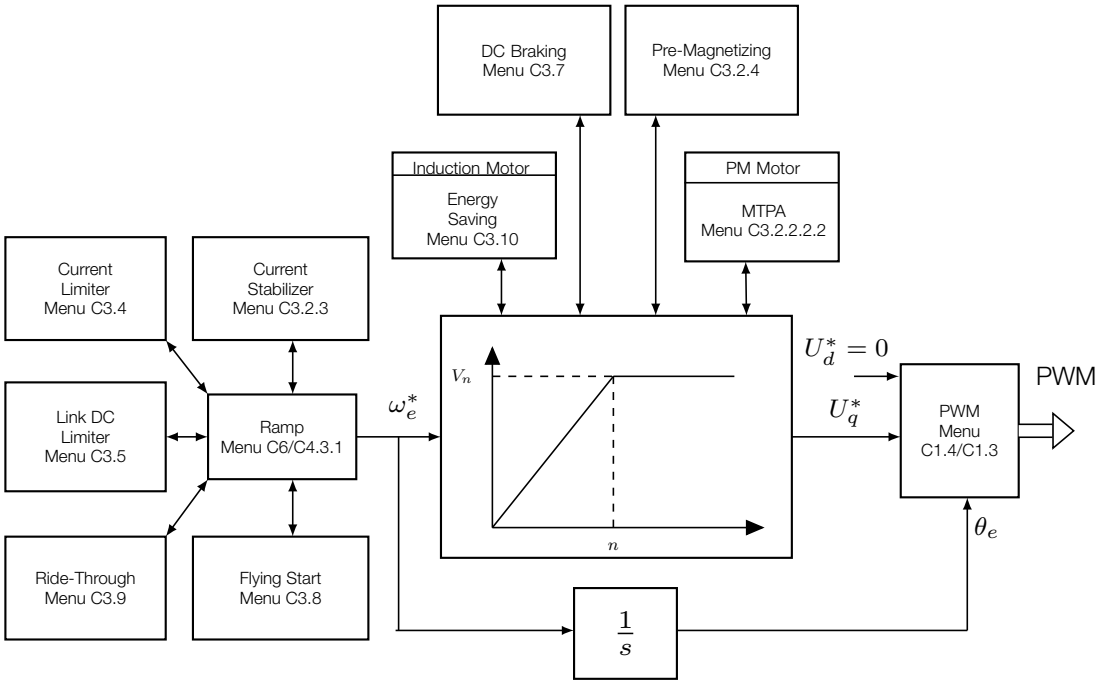


Figure 11.4: *Scalar control block diagram for induction motor and VVW+ for induction motor and PM*

In the following items C3.2.1, C3.2.3 and C3.2.4 details are given about the V/F Curve, Current Stabilization and Pre-Magnetization functions, which are common to both scalar and VVW+ control types. In the item C3.2.2 additional information unique to VVW+ control is presented, and in items C3.4 to C3.10 information about the functions common to all control types (including vector control).

C3.2.1 V/F Curve

Allows you to adjust the curve defined by the output voltage and frequency of the inverter. Example using this feature: when a transformer is used between the inverter and the motor and you want to compensate for the voltage drop of the cable used to connect the motor.

C3.2.1 V/F Curve

C3.2.1.1 Manual Torque Boost

Range:	0.0 ... 20.0 %	**Default:** 2.0 %
Properties:		

Description:
It acts at low frequencies, that is, in the range from 0 to C3.2.1.5, increasing the inverter output voltage to compensate for the voltage drop in the motor stator resistance in order to maintain a constant torque .

The optimum setting is the smallest value of C3.2.1.1 which allows the motor satisfactory start. A value greater than necessary will excessively increase the motor current at low speeds, which may lead the inverter to a fault condition (F048, F053 or F071) or alarm condition (A046, A047 or A110), as well as to the motor heating. Figure 11.5 shows the Torque Boost action region between points P_0 and P_1.

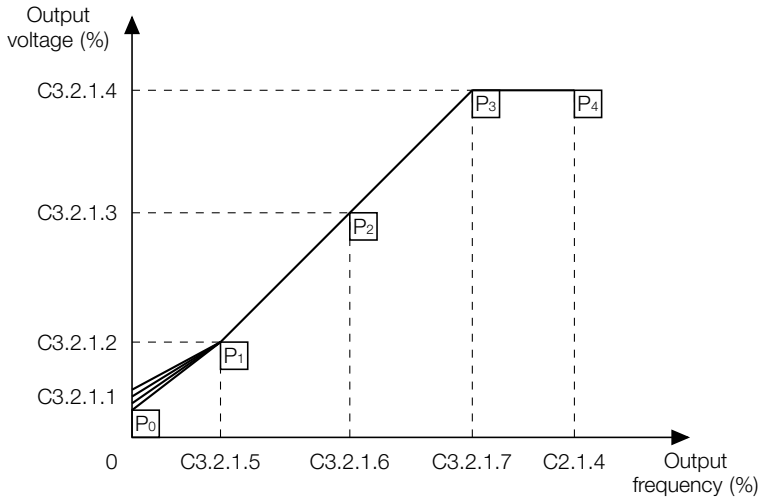


Figure 11.5: *Torque boost region.*

C3.2.1 V/F Curve

C3.2.1.2 Low Output Voltage

Range:	0.0 ... 100.0 %	**Default:** 33.3 %
Properties:	Stopped	

Description:
Sets the voltage value of point P_1 to adjust the inverter V/F curve together with its pair C3.2.1.5.

C3.2.1 V/F Curve

C3.2.1.3 Interm. Output Voltage

Range:	0.0 ... 100.0 %	**Default:** 66.7 %
Properties:	Stopped	

Description:
Sets the voltage value of point P_2 to adjust the inverter V/F curve together with its pair C3.2.1.6.

C3.2.1 V/F Curve

C3.2.1.4 Maximum Voltage Output

Range:	0.0 ... 100.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
Sets the voltage value of point P_3 to adjust the inverter V/F curve together with its pair C3.2.1.7.

NOTE!
The maximum output voltage C3.2.1.4 at 100% corresponds to the motor rated voltage C2.1.4. In cases where the inverter is being supplied with a line voltage above the motor rated voltage, the output voltage the inverter applies remains the value set in C2.1.4.

C3.2.1 V/F Curve		
C3.2.1.5 Low Speed		
Range:	0.0 ... 200.0 %	**Default:** 33.3 %
Properties:	Stopped	

Description:
Sets the speed value of point P_1 to adjust the inverter V/F curve together with its pair C3.2.1.2.

C3.2.1 V/F Curve		
C3.2.1.6 Intermediate Speed		
Range:	0.0 ... 200.0 %	**Default:** 66.7 %
Properties:	Stopped	

Description:
Sets the speed value of point P_2 to adjust the inverter V/F curve together with its pair C3.2.1.3.

C3.2.1 V/F Curve		
C3.2.1.7 Field Weakening Speed		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
Sets the speed value of point P_3 to adjust the inverter V/F curve together with its pair C3.2.1.4.

C3.2.1 V/F Curve		
C3.2.1.8 Rated Flux		
Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:		

Description:
For scalar and VVW+ control, it allows to adjust a percentage of the motor stator flux in relation to the nominal stator flux.

NOTE!
In the scalar control type, the parameter C3.2.1.8 allows for regulation of the inverter output voltage after setting the V/F curve. This can be useful in applications that require output voltage compensation or field weakening.

C3.2.2 VVW+ Optimization

Allows adjustments to the dynamics of the VVW+ control. The VVW+ control is factory configured to meet most applications, if an improvement in the dynamic behavior of the control for induction and PM motors is required, the following parameters are available.

C3.2.2.1 VVW+ Induction Motor

Allows setting the parameters of the VVW+ control for induction motor.

C3.2.2.1 VVW+ Induction Motor

C3.2.2.1.1 Slip Compensator Gain

Range: 0.00 ... 10.00 **Default:** 1.00

Properties:

Description:

Allows applying a gain to the slip estimator of the VVW+ scalar control. See Figure 11.2 for further details.

NOTE!
This value should be adjusted gradually when there is a speed error in the system.

C3.2.2.1 VVW+ Induction Motor

C3.2.2.1.2 Volt. Compensator Gain

Range: 0.00 ... 5.00 **Default:** 1.00

Properties:

Description:

Allows applying a gain to the VVW+ scalar control voltage compensator. See Figure 11.2 for further details.

NOTE!
This value should be adjusted gradually when there is a voltage error in the system.

C3.2.2.2 VVW+ PM Motor

The MTPA function determines the region of high operating efficiency of the PM motor. This function guides the motor voltage vector so that it operates with the ratio between the maximum torque applied to the PM motor and its lowest possible current.

NOTE!
This function is only available for PM motors.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.1 MTPA Function

Range: 0 ... 1 **Default:** 1

Properties:

Description:

Enables the MTPA function for scalar control of synchronous machines.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.2 MTPA Optimization

Range: 0 ... 1 **Default:** 0

Properties:

Description:

Enables the MTPA function optimizer to allow determining the point of greatest efficiency.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.3 MTPA Minim. Speed

Range: 0 ... 100 % **Default:** 2 %

Properties:

Description:

Sets a percentage of the motor rated speed to activate the MTPA function. If S2.1.1 is greater than C3.2.2.2.3 x C2.1.8, the motor MTPA function will be activated.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.4 Efficiency Adjust Gain

Range: 0.000 ... 4.000 **Default:** 0.500

Properties:

Description:

Allows adjusting the MTPA function for better efficiency.This setting can be checked by the ratio of cos phi and the motor output current.

The setting can be performed according to the application requirement. It is possible to obtain a reactive power reduction setting, increasing the motor cos phi and reducing the output current.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.5 Kp MTPA Gain

Range: 0.000 ... 1.000 **Default:** 0.010

Properties:

Description:

Sets the value of the MTPA regulator proportional gain.

NOTE!
The gain values of this controller are automatically adjusted by the inverter.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.6 Ki MTPA Gain

Range: 0.000 ... 1.000 **Default:** 0.002

Properties:

Description:

Sets the value of the MTPA regulator integral gain.

NOTE!
The gain values of this controller are automatically adjusted by the inverter.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.7 MTPA Reference

Range: 0 ... 100 % **Default:** 100 %

Properties:

Description:

Allows setting the MTPA operating point reference.

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.8 MTPA Min. Voltage

Range: 0 ... 100 % **Default:** 100 %

Properties:

Description:
Defines the minimum voltage value at a given speed that will be applied to the motor when the MTPA function is active.

The minimum voltage value in Volts (V) is the percentage of the ratio (C2.2.8 * S2.1.1)/1000.

E.g.:

C2.2.8: Motor Model Parameters - Ke Constant = 120 V/kRPM.

S2.1.1: Motor Speed - Reference = 900 RPM.

C3.2.2.2.8: VVW+ PM Motor - MTPA Min. Voltage = 50.0 %.

Minimum MTPA Voltage (V) = (C3.2.2.2.8 / 100) * (C2.2.8 * S2.1.1) / 1000 = 54 V.

C3.2.3 Current Stabilization

The Current Stabilization function is used to dampen electromechanical oscillations present in the motor when it is operating with low load and at low frequencies. Those oscillations cause instability in the system that, in some cases, may generate an overcurrent faults.

C3.2.3 Current Stabilization

C3.2.3.1 Function Enable

Range: 0 ... 1 **Default:** 1

Properties:

Description:
Defines whether or not the motor current stabilization function will be active.

This function eliminates oscillations in the motor currents resulting from operation at low speeds and with little load.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.2.3 Current Stabilization

C3.2.3.2 Kp Gain Stabilization

Range: 0.000 ... 1.999 **Default:** 0.150

Properties:

Description:
Sets the proportional gain value of the Current Stabilizer. The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

NOTE!
If you need to change the gains of this controller, first gradually increase the value of C3.2.3.3.

C3.2.3 Current Stabilization

C3.2.3.3 Ki Gain Stabilization

Range: 0.000 ... 1.999 **Default:** 0.020

Properties:

Description:

Sets the integral gain value of the Current Stabilizer. The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

C3.2.3 Current Stabilization

C3.2.3.4 Saturation PI Stab.

Range: 0.0 ... 10.0 % **Default:** 5.0 %

Properties:

Description:

Sets the saturation level of the motor current stabilization regulator output.

C3.2.3 Current Stabilization

C3.2.3.5 Max. Freq. Operation

Range: 0 ... 300 % **Default:** 0 %

Properties:

Description:

Disables the Current Stabilization function after the speed exceeds the value set in this parameter. When the value is set to zero, this functionality is disabled. This parameter is only available for induction motors.

C3.2.4 Pré-Magnetization

The Pre-Magnetization function improves the dynamic behavior of the motor start when subjected to a very high load.

Figure 11.6 shows the operation flow of the Pre-Magnetization function together with the motor drive. In this activation, before the motor accelerates, the stator is magnetized so that it has energy for starting with load. The magnetization is performed with the injection of a direct current (C3.2.4.2) for a programmed time interval (C3.2.4.3). The voltage boost during motor acceleration can be controlled by setting C3.2.4.4.

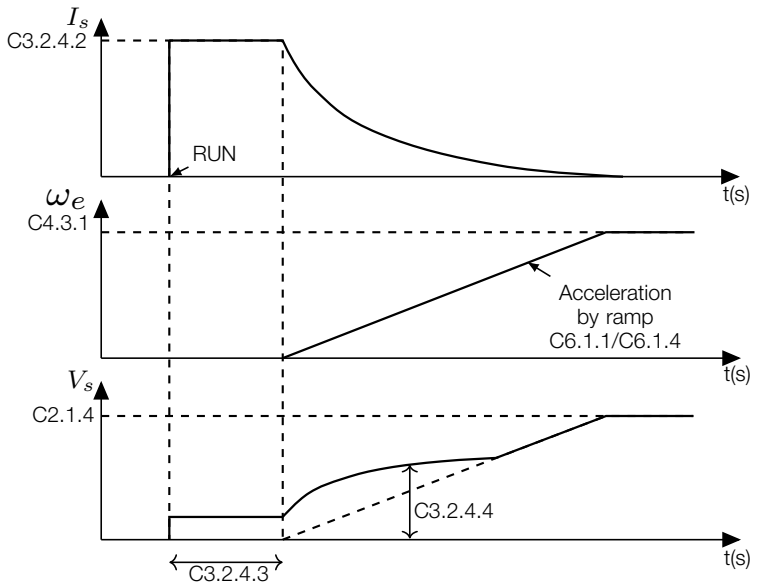


Figure 11.6: *Illustrative diagram of the operation of the pre-magnetization function.*

C3.2.4 Pré-Magnetization

C3.2.4.1 Function Enable

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:
Enables the motor pre-magnetization function.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.2.4 Pré-Magnetization

C3.2.4.2 Current

Range: 0 ... 350 % **Default:** 100 %

Properties:

Description:
Allows setting the current level applied during the motor pre-magnetization process. The full scale is the rated motor current set in C2.1.5.

NOTE!
If the value set in C3.2.4.2 is greater than the inverter current, it will be automatically limited to the inverter maximum current capacity.

C3.2.4 Pré-Magnetization

C3.2.4.3 Time

Range: 0 ... 5000 ms **Default:** 2000 ms

Properties:

Description:
Allows setting the motor pre-magnetization time, which is the time that the inverter considers to indicate that the motor is general enabled (or magnetized) after receiving the general enable command.

C3.2.4 Pré-Magnetization

C3.2.4.4 Gain

Range: 1.0 ... 7.0 **Default:** 3.5

Properties:

Description:
Allows setting the voltage boost applied during the motor acceleration. See Figure 11.6 for further details.

C3.3 Vector Control

This is the type of control based on the separation of the motor current into two components:

- Direct current I_d (oriented with the motor electromagnetic flux vector).
- Quadrature current I_q (perpendicular to the motor flux vector).

The direct current is related to the motor electromagnetic flux, while quadrature current is directly related to the electromagnetic torque produced in the motor shaft. With this strategy you have the so-called decoupling, that is, you can independently control the flux and torque in the motor by controlling the currents I_d and I_q, respectively.

As these currents are represented by vectors that spin at synchronous speed, when viewed from a stationary frame of reference, the frame is transformed to change them for a synchronous frame of reference. In the synchronous frame,

these vectors are turned into DC values proportional to the amplitude of the respective vectors. This considerably simplifies the control circuit.

When vector I_d is aligned with the motor flux, we can say said that the vector control is oriented. Therefore, it is necessary that the motor parameters be correctly set. These parameters must be set according to the motor nameplate data and other information obtained automatically by the Self-Tuning, or through the motor data sheet provided by the manufacturer.

Figure2 11.7 and 11.8, on page 111, shows the block diagram for vector control with encoder and sensorless in speed mode and torque mode, respectively. The speed information and the currents measured by the inverter will be used to obtain the correct direction of the vectors. For vector control with encoder, the speed is obtained directly from the encoder signal, while in sensorless vector control there is an algorithm that estimates the speed based on the output currents and voltages.

The vector control measures the currents, separates the components into direct and quadrature portions and transforms these variables for the synchronous frame of reference. The motor is controlled by imposing the desired currents and comparing them to the actual values.

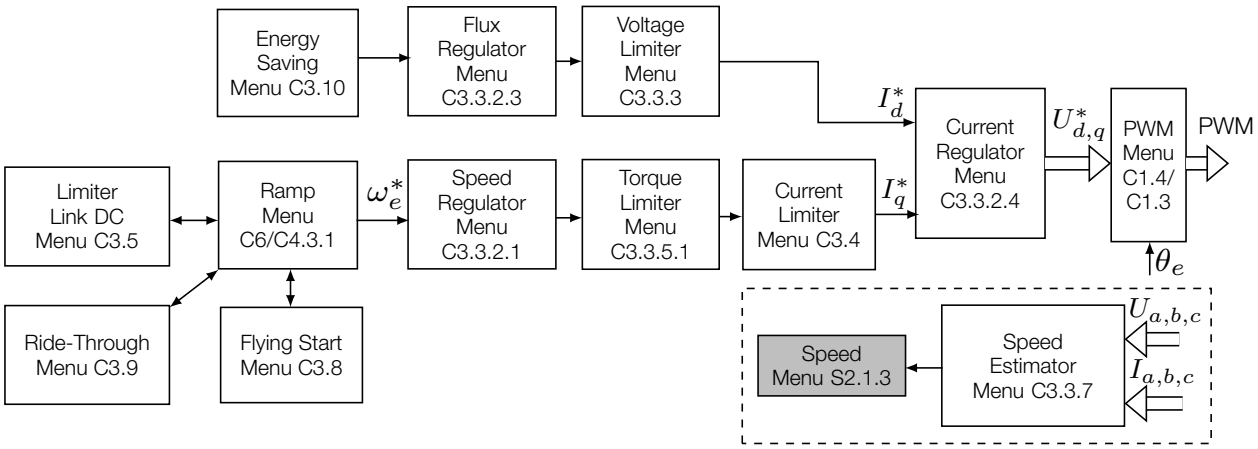


Figure 11.7: *Block diagram of the induction motor vector control in speed mode.*

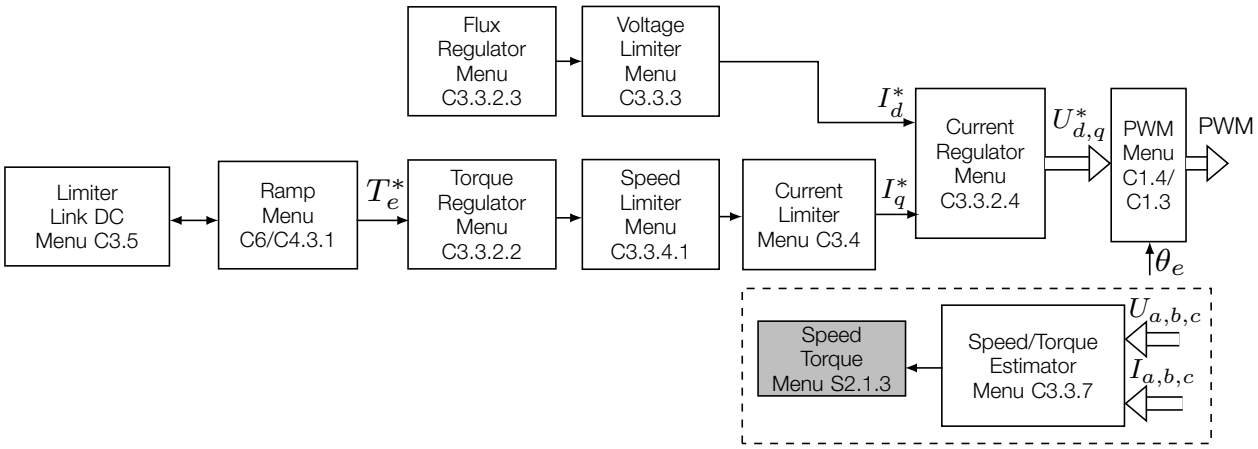


Figure 11.8: *Block diagram of the induction motor vector control in torque mode.*

NOTE!
It is recommended that the motor rated current be greater than 1/3 of the inverter rated current.

SENSORLESS VECTOR CONTROL

The Sensorless Vector Control is recommended for most applications as it allows operation in a 1:100 speed range, 0.5 % speed control accuracy of the rated speed, high starting torque and fast dynamic response.

Another advantage of this kind of control is greater robustness against sudden voltage variations of the power supply and load, preventing unnecessary shutdowns by overcurrent.

The necessary settings for the proper operation of the sensorless control are made automatically. To that end, the motor to be used must be connected to the CFW900.

VECTOR CONTROL WITH ENCODER

The Vector Control with Encoder on the motor presents the same advantages as those of the sensorless previously mentioned with the following additional benefits:

- Speed and torque control up to 0 (zero) rpm.
- Precision of 0.01 % in the speed control (if digital references are used, for example, via HMI, Profibus DP, DeviceNet, etc.).

Vector control with encoder requires accessory for interfacing with incremental encoder (E.g. ENC-01). For more installation and connection details, refer to the accessory manual.

C3.3.1 Configuration

Defines some settings of the vector control.

C3.3.1 Configuration

C3.3.1.1 Control Mode

Range: 0 ... 2 **Default:** 0

Properties:

Description:
Sets the control mode for the motor.

Indication	Description
0 = Speed	Enables control in Speed mode.
1 = Torque	Enables control in Torque mode.
2 = Defined by DI	The control mode is defined by the state of the digital input set in (C3.3.1.2). Inactive input selects Speed mode and active input selects Torque mode.

NOTE!
The Torque mode is only active when the control type is set to Vector with Encoder (C3.1.1 = 2).

C3.3.1 Configuration

C3.3.1.2 Control Mode DI Config.

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:
Defines which digital input makes the transition from Speed mode to Torque mode or vice versa. Table 11.20 on page 113 shows the options.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.20: *Values assigned to the Digital Inputs of X and A...G Slots for defining the Control Mode.*

C3.3.1 Configuration

C3.3.1.3 Control Encoder

Range: 0 ... 8 **Default:** 8

Properties: Stopped

Description:

Defines which accessory Slot will be used for reading the encoder signals.

Indication	Description
0 = Slot X	Reading of the encoder signals via IO1 and IO2 of the Slot X accessory.
1 = Slot A	Reading of the encoder signals via ENC-01 accessory in Slot A.
2 = Slot B	Reading of the encoder signals via ENC-01 accessory in Slot B.
3 = Slot C	Reading of the encoder signals via ENC-01 accessory in Slot C.
4 = Slot D	Reading of the encoder signals via ENC-01 accessory in Slot D.
5 = Slot E	Reading of the encoder signals via ENC-01 accessory in Slot E.
6 = Slot F	Reading of the encoder signals via ENC-01 accessory in Slot F.
7 = Slot G	Reading of the encoder signals via ENC-01 accessory in Slot G.
8 = None	There is no accessory for reading the encoder signals installed on the CFW900.

C3.3.1 Configuration

C3.3.1.6 Magnetization Mode

Range: 0 ... 1 **Default:** 1

Properties: Stopped

Description:

Defines which command will start the motor magnetization.

NOTE!
For applications with starts with load, it is recommended that the motor be already magnetized.

NOTE!
This parameter is for induction motors only.

Indication	Description
0 = General Enable	Applies magnetizing current after General Enable ON.
1 = Run/Stop	Applies magnetizing current after Run/Stop = Run.

C3.3.2 Regulators

Allows viewing and changing the parameters related to the vector control flux, current and speed regulators.

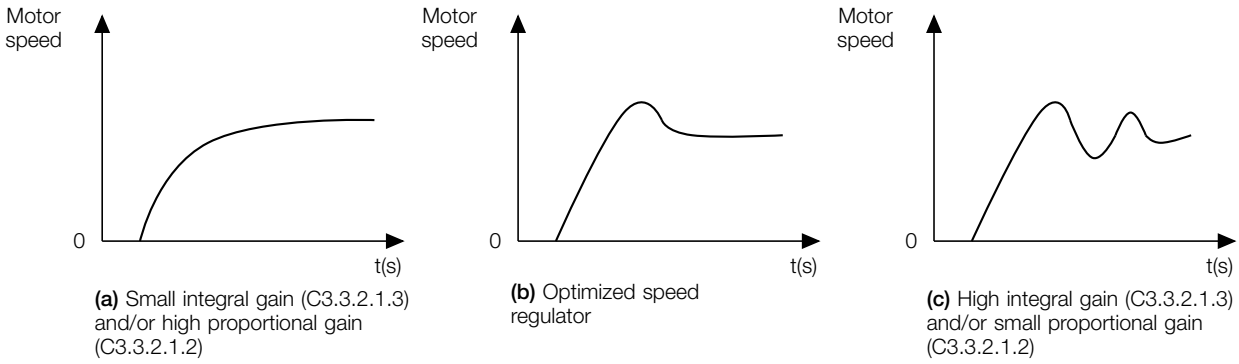
C3.3.2.1 Speed Regulator

Speed regulator gains are automatically calculated as a function of parameter C2.2.5. By changing C2.2.5, parameters C3.3.2.1.2 and C3.3.2.1.3 are modified proportionally; however, those gains can be adjusted manually to optimize the speed dynamic response.

The Proportional gain (C3.3.2.1.2) stabilizes sudden speed or reference changes, while the Integral gain (C3.3.2.1.3) corrects the error between reference and speed and improves the torque response at low speeds. Differential gain (C3.3.2.1.4) helps minimize variations in the motor speed produced by sudden load changes.

Manual Adjustment Procedure for Speed Regulator Optimization:

1. Select the acceleration time (C6.1.1 or C6.1.4) and/or deceleration time (C6.1.2 or C6.1.5) according to the application.
2. Set the speed reference to 75 % of the maximum value.
3. Using the WPS software, set a trend to the ”Effective Speed” variable.
4. Lock the speed ramp (Run/Stop = Stop) and wait for the motor to stop.
5. Release the speed ramp (Run/Stop = Run). Observe the motor speed signal with the WPS trend.
6. Check among the options in Figure 11.9 which waveform best represents the signal read.



(a) Small integral gain (C3.3.2.1.3) and/or high proportional gain (C3.3.2.1.2)

(b) Optimized speed regulator

(c) High integral gain (C3.3.2.1.3) and/or small proportional gain (C3.3.2.1.2)

Figure 11.9: *(a), (b) and (c) - Types of speed regulator response*

7. Set C3.3.2.1.2 and C3.3.2.1.3 according to the type of response shown in Figure 11.9.

a. Decrease the proportional gain (C3.3.2.1.2) and/or increase the integral gain (C3.3.2.1.3).
b. Speed regulator optimized.
c. Increase the proportional gain (C3.3.2.1.2) and/or decrease the integral gain (C3.3.2.1.3).

In the sensorless vector control, the maximum typical value of the proportional gain C3.3.2.1.2 must not be greater than 9.0. Otherwise, strange behaviors can be observed in the motor, such as: motor remains still or spins at low speed, despite the output current being different from zero. It is recommended to reduce the value set in C3.3.2.1.2 until the motor behavior is correct.

C3.3.2.1 Speed Regulator		
C3.3.2.1.1 Adjusted Gain Enable		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Allows to automatically adjust the speed regulator gains according to the speed and torque level of the application.. The calculation routine is performed from the values set in C3.3.2.1.2 e C3.3.2.1.3.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.3.2.1 Speed Regulator
C3.3.2.1.2 Proportional Gain
Range: 0.0 ... 50.0 **Default:** 5.0
Properties:

Description:
Sets the value of the Speed Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.1.3.

C3.3.2.1 Speed Regulator
C3.3.2.1.3 Integral Gain
Range: 0.001 ... 1.000 **Default:** 0.100
Properties:

Description:
Sets the value of the Speed Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed Regulator
C3.3.2.1.4 Differential Gain
Range: 0.00 ... 7.99 **Default:** 0.00
Properties:

Description:
Sets the value of the Speed Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed Regulator
C3.3.2.1.5 Filter
Range: 0.012 ... 1.000 s **Default:** 0.012 s
Properties:

Description:
Sets the low-pass filter time constant value of the speed signal used in the Speed Regulator.

NOTE!
In general, this parameter must not be changed. Increasing its value makes the system response slower.

C3.3.2.2 Torque Regulator

TORQUE REGULATOR

C3.3.2.2 Torque Regulator
C3.3.2.2.1 Propotional Gain
Range: 0.00 ... 5.00 **Default:** 1.00
Properties:

Description:
Sets the value of the Torque Regulator proportional gain.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.4.2.2.

C3.3.2.2 Torque Regulator		
C3.3.2.2.2 Integral Gain		
Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
Sets the value of the Torque Regulator integral gain.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

C3.3.2.2 Torque Regulator		
C3.3.2.2.3 Differential Gain		
Range:	0.00 ... 7.99	**Default:** 0.00
Properties:		

Description:
Sets the value of the Torque Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.2 Torque Regulator		
C3.3.2.2.4 Filter		
Range:	0.012 ... 10.000	**Default:** 0.012
Properties:		

Description:
Allows setting the low-pass filter time constant value of the torque signal.

C3.3.2.3 Flux Regulator

Allows viewing and changing the parameters related to the vector control flux regulator.

C3.3.2.3 Flux Regulator		
C3.3.2.3.1 Proportional Gain		
Range:	0.0 ... 5.0	**Default:** 3.0
Properties:		

Description:
Sets the value of the Flux Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.3.2.

C3.3.2.3 Flux Regulator
C3.3.2.3.2 Integral Gain

Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
Sets the value of the Flux Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.3 Flux Regulator
C3.3.2.3.3 Rated Flux

Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
Sets the value of flow reference for vector control. This value is a reference in percentage of the motor rated flux value.

C3.3.2.4 Current Regulator

Allows viewing and changing the parameters related to the vector control current regulator.

C3.3.2.4 Current Regulator
C3.3.2.4.1 Id Prop. Gain

Range:	0.00 ... 1.99	**Default:** 0.20
Properties:		

Description:
Sets the value of the Current Regulator proportional gain (D axis of the synchronous frame of reference). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.2.

C3.3.2.4 Current Regulator
C3.3.2.4.2 Id Integral Gain

Range:	0.001 ... 1.000	**Default:** 0.050
Properties:		

Description:
Sets the value of the Current Regulator integral gain (D axis of the synchronous frame of reference). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.4 Current Regulator
C3.3.2.4.3 Iq Prop. Gain

Range:	0.00 ... 1.99	**Default:** 0.30
Properties:		

Description:
Sets the value of the Current Regulator proportional gain (Q axis of the synchronous frame of reference). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.4.

C3.3.2.4 Current Regulator
C3.3.2.4.4 Iq Integral Gain
Range: 0.001 ... 1.000 **Default:** 0.050
Properties:

Description:
Sets the value of the Current Regulator integral gain (Q axis of the synchronous frame of reference). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.3 Output Voltage Limiter

Allows viewing and changing the parameters related to the output voltage limiter for proper control in the field weakening region.

The Output Voltage Limiter prevents the voltage imposed by the inverter from exceeding a preset value programmed in C3.3.3.1. This will prevent electrical damage to the motor stator. This region of operation is commonly known as the field weakening region, because, in this region, the motor magnetic field is weakened to ensure that the voltage imposed on the stator is limited to the value C3.3.3.1. This will occur whenever the value set in C3.3.3.1 is equal to or greater than the value of the motor rated voltage (C2.1.4).

C3.3.3 Output Voltage Limiter
C3.3.3.1 Max Output Voltage
Range: 0.0 ... 120.0 % **Default:** 100.0 %
Properties:

Description:
Allows setting the value of the maximum output voltage. The value set in this parameter corresponds to a percentage in relation to the motor rated voltage set in C2.1.4.

C3.3.3 Output Voltage Limiter
C3.3.3.2 Ganho Proporcional
Range: 0.00 ... 5.00 **Default:** 0.20
Properties:

Description:
Sets the value of the Voltage Limiter regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.3.3.

C3.3.3 Output Voltage Limiter
C3.3.3.3 Integral Gain
Range: 0.000 ... 1.000 **Default:** 0.120
Properties:

Description:
Sets the value of the Voltage Limiter regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.4 Torque Mode

Settings for torque control mode in vector control.

C3.3.4.1 Speed Limiter

SPEED LIMITER

Allows viewing and changing the parameters related to the motor speed limiters. These limiters prevent motor overspeed.

The Speed Limiter is enabled when in torque control mode (C3.3.1.1 = 1). The motor speed is monitored to prevent it from exceeding the values set in C3.3.5.2.1 and C3 .3.5.2.2 (Figure 11.10). If the motor speed exceeds these values, the torque reference is decreased to keep the motor speed limited.

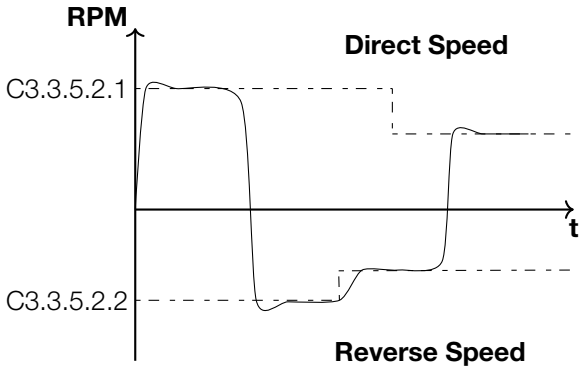


Figure 11.10: *Speed behavior limited according to the settings [C3.3.5.3.1 - C3.3.5.3.5].*

C3.3.4.1 Speed Limiter		
C3.3.4.1.1 Direct Speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
Sets the value of the maximum motor speed when running in the forward direction.

C3.3.4.1 Speed Limiter		
C3.3.4.1.2 Reverse Speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
Sets the value of the maximum motor speed when running in the reverse direction.

C3.3.4.1 Speed Limiter		
C3.3.4.1.3 Proportional Gain		
Range:	0.00 ... 5.00	**Default:** 0.50
Properties:		

Description:
Sets the value of the Speed Limiter regulator proportional gain.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.
This parameter can be changed after the Self-tuning process.

NOTE!
If you need to change the gains of this controller, It is suggested that you first gradually increase the value of C3.3.4.1.4.

C3.3.4.1 Speed Limiter

C3.3.4.1.4 Integral Gain

Range: 0.000 ... 1.000 **Default:** 0.010

Properties:

Description:
Sets the value of the Speed Limiter regulator integral gain.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.
This parameter can be changed after the Self-tuning process.

C3.3.5 Speed Mode

Settings for the speed in vector control type.

C3.3.5.1 Torque Limiter

TORQUE LIMITER

Allows viewing and changing the parameters related to the motor torque limiter.

The Torque Limiter is enabled when the selected control mode is the speed mode (C3.3.1.1). The torque limiter contains five parameters that enable operation in the four quadrants.

Parameters C3.3.5.1.2 (Torque Q1), C3.3.5.1.3 (Torque Q2), C3.3.5.1.4 (Torque Q3) and C3.3.5.1.5 (Torque Q4) independently limit the torque in each motor operation quadrant (Fig. 11.11).

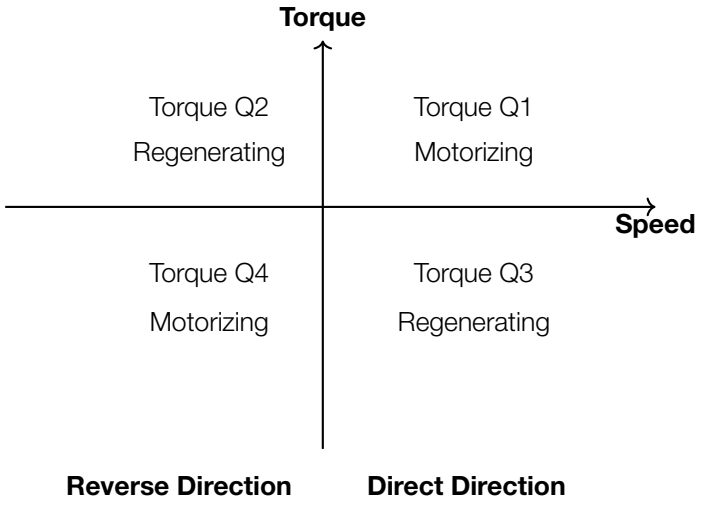


Figure 11.11: *Convention of the motor torque limiters in the four motor operation quadrants.*

It is also possible to limit the motor torque with parameter C3.3.5.1.1 (Global Torque). This parameter prevails over the others and acts in all four quadrants at the same time. Figure 11.12 shows the torque of the monitored motor to prevent it from exceeding the values set in C3.3.5.1.1 to C3.3.5.1.5. If the motor is in torque limitation, the motor speed will be reduced.

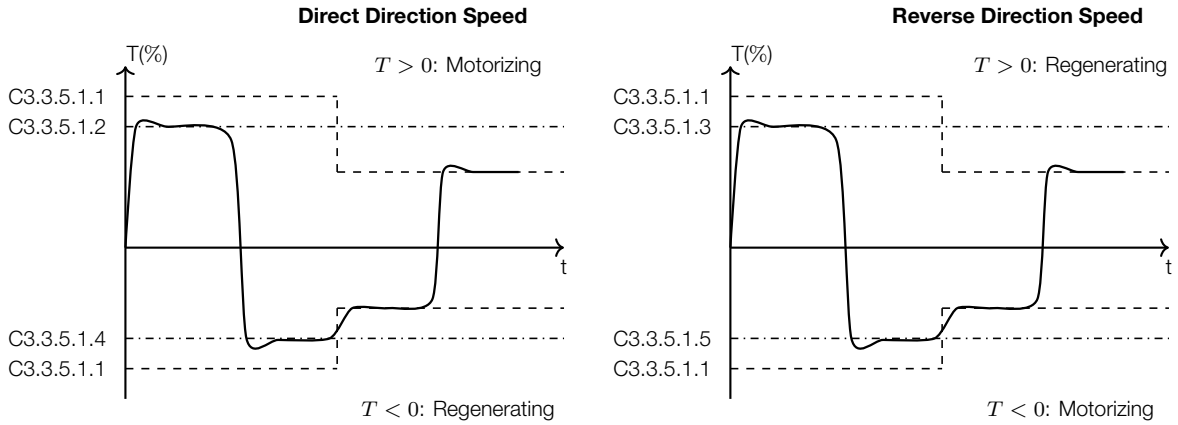


Figure 11.12: *Torque behavior limited according to the settings [C3.3.5.3.1 - C3.3.5.3.5].*

C3.3.5.1 Torque Limiter

C3.3.5.1.1 Global Torque

Range: 0.0 ... 400.0 % **Default:** 125.0 %

Properties:

Description:

Sets the maximum torque in the four motor operation quadrants. If it is necessary to control the torque in the four motor operation quadrants, parameters C3.3.5.1.2 to C3.3.5.1.5 must be used.

C3.3.5.1 Torque Limiter

C3.3.5.1.2 Torque Q1

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

Sets the maximum torque of the motor running in the forward direction and in the 'motoring' operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.3 Torque Q2

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

Sets the maximum torque of the motor running in the reverse direction and in the regenerating operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.4 Reverse Torque Q3

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

Sets the maximum torque of the motor running in the forward direction and in the regenerating operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.5 Reverse Torque Q4

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

Sets the maximum torque of the motor running in the reverse direction and in the 'motoring' operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.6 Global Torque AI Config.

Range: 0 ... 30 **Default:** 0

Properties: Stopped

Description:

Enables the use and defines the analog input that will be used to limit the motor maximum torque. Table 11.24 on page 122 shows the options.

Analog Inputs options for X and A...G Slots

Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)
AI4	–	A-4 (6)	B-4 (10)	C-4 (14)	D-4 (18)	E-4 (22)	F-4 (26)	G-4 (30)

Table 11.24: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!

Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C3.3.5.1 Torque Limiter

C3.3.5.1.7 Proportional Gain

Range: 0.00 ... 20.00 **Default:** 0.10

Properties:

Description:

Sets the value of the Torque Limiter regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.5.1.8.

C3.3.5.1 Torque Limiter

C3.3.5.1.8 Integral Gain

Range: 0.000 ... 1.000 **Default:** 0.050

Properties:

Description:

Sets the value of the Torque Limiter regulator integral gain.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.7 Speed Steady State Estimator

Allows viewing and changing the parameters related to the vector control steady state speed estimator.

C3.3.7 Speed Steady State Estimator

C3.3.7.1 Speed Adjusted

Range: 0.10 ... 10.00 **Default:** 1.00

Properties:

Description:
Allows correcting the estimated speed error.

C3.3.7 Speed Steady State Estimator
C3.3.7.2 Regenerative Compensator
Range: 0.00 ... 2.00 **Default:** 1.00
Properties:

Description:
Allows to correct the estimated speed in regenerative mode application. This parameter increases the dynamic performance of the speed observer in regenerative mode applications. This parameter has to be changed only when it is not possible to run the motor or speed reversal in regenerative mode operations.

C3.3.7 Speed Steady State Estimator
C3.3.7.3 Proportional Gain
Range: 0.00 ... 10.00 **Default:** 1.00
Properties:

Description:
Sets the value of the Steady State Speed Estimator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.7.4.

C3.3.7 Speed Steady State Estimator
C3.3.7.4 Integral Gain
Range: 0.00 ... 10.00 **Default:** 1.00
Properties:

Description:
Sets the value of the Steady Speed Observer integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.7 Speed Steady State Estimator
C3.3.7.5 Filter.
Range: 1 ... 15 ms **Default:** 2 ms
Properties:

Description:
Set the Low Pass Filter frequency of the speed observer .

This parameter has functionality only when using the encoder vector control. In case of small oscillations present in the electrical torque signal, gradually increase the parameter value.

C3.3.9 Online Parameter Estimation

ON-LINE ELECTRICAL PARAMETER ESTIMATER

Allows viewing and changing the parameters related to the on-line electrical parameter estimater.

The Xm Estimater determines the magnetic impedance of the induction machine according to the load level. The Taus Estimater determines the stator time constant og the induction machine according to the load level. These functions are fundamental for the proper operation of the sensorless vector control at low speed region.

The Taur estimater determines the rotor time constant of the induction machne according to the system load level. This function is exclusive to the encoder vector control.

C3.3.9 Online Parameter Estimation

C3.3.9.1 Config. Estimation

Range: 0 ... 2 Bit **Default:** 3

Properties:

Description:

Allows to configure specific function modules for online parametric estimation. The Xm Online Estimator determines the magnetic impedance of the induction motor. This function is enabled only for operating frequency above 15% of the rated frequency set in parref403. The Taus Online Estimator determines the stator time constant of the induction motor. This function is enabled only for operating frequency below 15% of the rated frequency set in parref403. The online Taur Estimator determines the rotor time constant of the induction motor. This function is enabled only for encoder vector control.

NOTE!
This online parametric estimation module is only enabled for induction motors.

Bit	Value/Description
Bit 0 Enable Xm Estimation	Enables the online estimator of the magnetizing impedance (Xm) of the three-phase induction motor. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.
Bit 1 Enable Taus Estimation	Enables the online estimator of the stator time constant (Taus) of the three-phase induction motor. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.
Bit 2 Enable Taur Estimation	Enables the online estimator of the stator time constant (Taur) of the three-phase induction motor. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.

C3.4 Current Limiter

Allows viewing and changing the parameters related to the motor current limiter.

The current limiting function prevents inverter overcurrent faults during starts or stops with very short ramps. The function is also important to protect the motor in case of an overload, when it is operating at constant speed.

1 - Characteristics of the current limiting function when the motor is accelerating or decelerating:

The current limiting function always operates when the motor current exceeds the value set in C3.4.1. During the acceleration or deceleration process, the current limiting function controls the motor acceleration or deceleration rate to prevent the motor current from exceeding the value of C3.4.1. Figure 11.13 illustrates the function operation process during the motor acceleration and deceleration process.

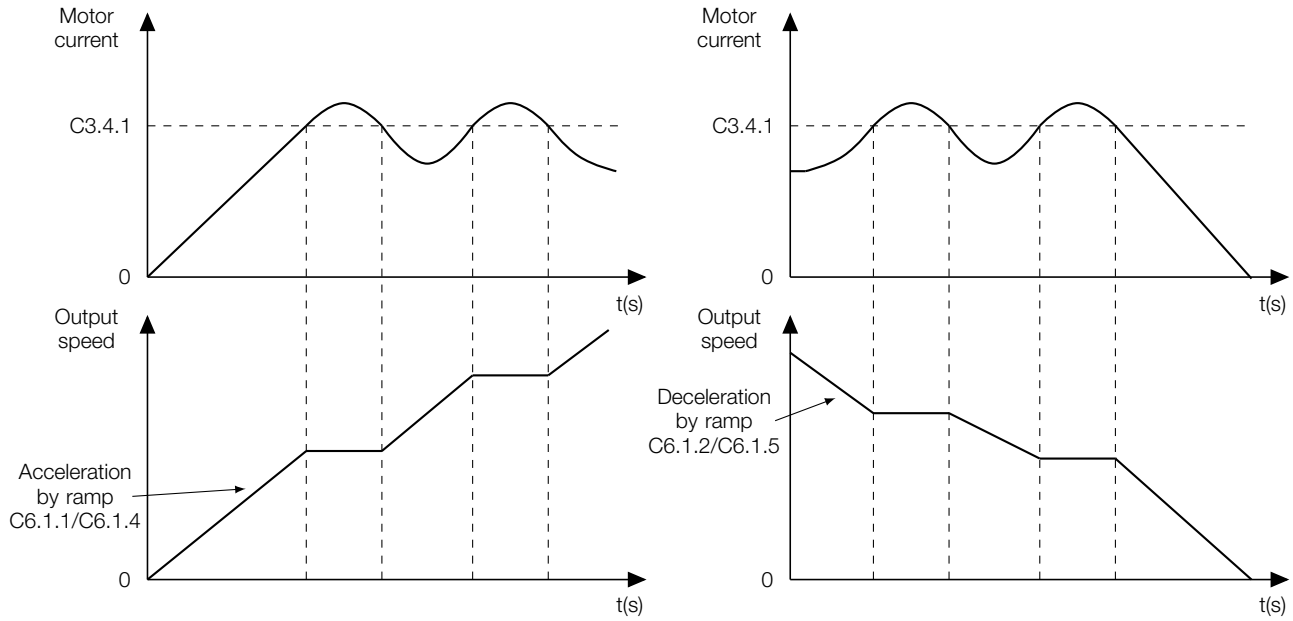


Figure 11.13: *Current limitation during the acceleration and deceleration process.*

2 - Current limitation characteristics when the motor is operating at constant speed:

During the steady state, in which the motor is operating at constant speed, the current limiting function acts on the speed reference to prevent the motor current from exceeding the value set in C3.4.1. Thus, when the system is operating under overload and the motor current exceeds the value set in C3.4.1, the motor enters a controlled deceleration process to prevent the motor current from exceeding the value of C3.4.1. When the overload process ends, the motor accelerates up to its reference speed. Figure 11.14 shows the current limiting function operation process when the motor is running at constant speed.

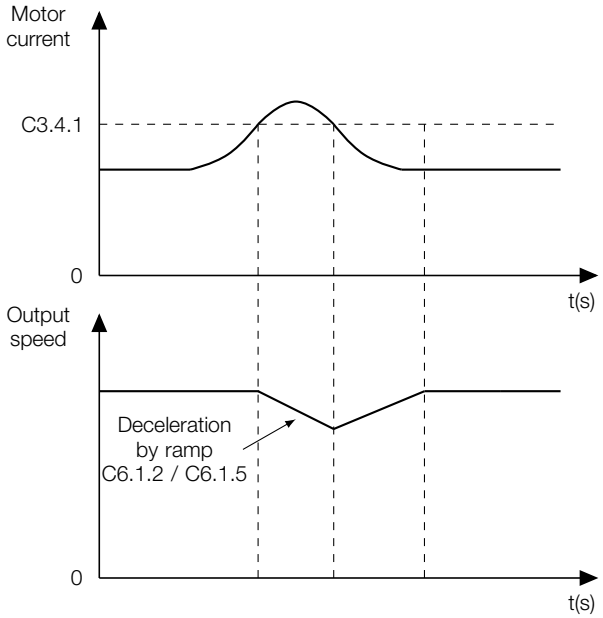


Figure 11.14: *Current limitation when the motor is running at constant speed.*

C3.4 Current Limiter		
C3.4.1 Acting Level		
Range:	0 ... 300 %	**Default:** 125 %
Properties:		

Description:
This parameter defines the maximum value of current in the motor during system operation. The full scale is the HD current of the inverter.

C3.4 Current Limiter		
C3.4.3 Proportional Gain		
Range:	0.0 ... 5.0	**Default:** -
Properties:	Model	

Description:
This parameter sets the Proportional Gain of the controller present in the current limiting function. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. For applications with very short acceleration or deceleration ramps, the gains must be set to improve the controllers response, if necessary. In this case, it is recommended to gradually increase C3.4.3.

For applications with very short acceleration or deceleration ramps, there may be a need for a small adjustment in the gains.

In this case, it is recommended that the value be gradually increased.

C3.4 Current Limiter		
C3.4.4 Integral Gain		
Range:	0.0 ... 5.0	**Default:** 1.0
Properties:		

Description:
This parameter defines the integral gain of the controller existing in the current limiting function. The gain values of this controller are automatically adjusted by the drive. No adjustment required for general purpose applications. In the case of applications with very short acceleration or deceleration ramps, there may be a need for a small adjustment in the gains. In this case, it is recommended that you gradually increase its value.

C3.5 DC Link Limiter

Allows viewing and changing the parameters related to the DC link limiting function.

During very short stops, in systems with high inertia, it is natural that the load regenerates a great amount of energy to the DC link, causing an increase in the DC voltage level. The DC link limiting function prevents the bus voltage from exceeding the value set in C3.5.2.1 for scalar control or C3.5.3.2 for vector control and causing inverter overvoltage faults.

1 - Characteristics of the DC link limiting function when the motor is decelerating:

The DC link limiting function changes the motor deceleration rate to control the increase in the bus voltage during the motor deceleration. Figure 11.15 illustrates the behavior of the function during the motor deceleration.

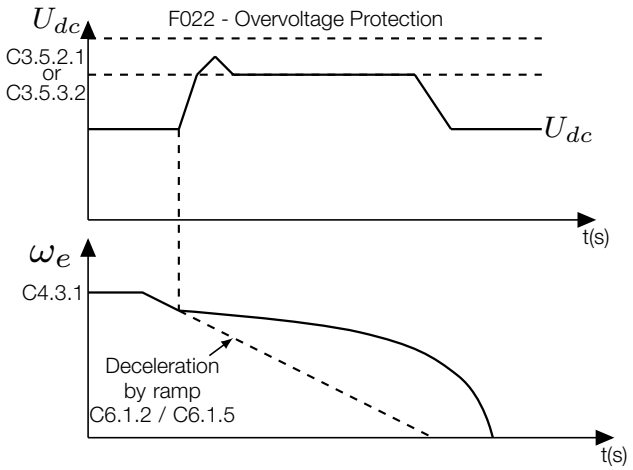


Figure 11.15: *DC link limitation during deceleration process.*

2 - Characteristics of the DC link limiting function when the motor is operating at constant speed:

In certain applications, it is common for the load to operate in regenerative mode and the motor to be operating at constant speed. In this case, the DC link limiting function protects the inverter against bus overvoltage. Figure 11.16 illustrates the behavior of the function when the motor is operating at constant speed and the load in regenerative mode. In this situation, the DC link limiting function decelerates the motor in a controlled manner to prevent the bus voltage from exceeding the value set in C3.5.2.1 for scalar control or C3.5.3.2 for control vector. After the DC link voltage level returns to its rated value, the function accelerates the motor so that it returns to the speed set in S2.1.1.

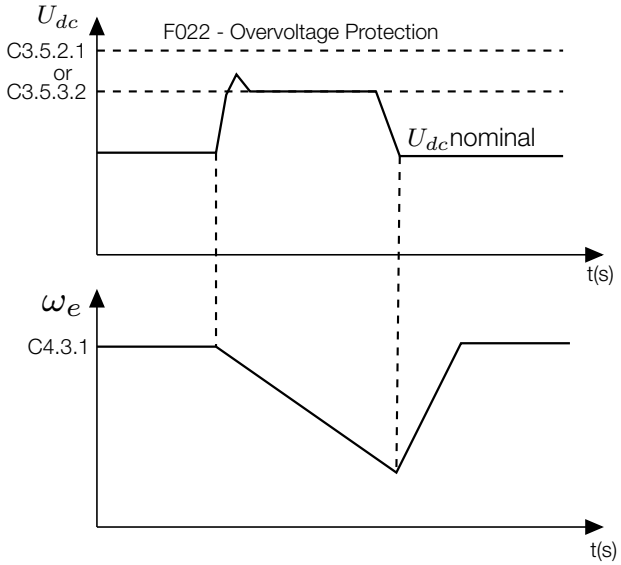


Figure 11.16: *DC link limitation when the motor is operating at constant speed.*

C3.5.1 Configuration

Allows setting the DC link voltage limiting function for both scalar and vector controls.

C3.5.1 Configuration		
C3.5.1.1 Function Enable		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
Enables the DC Link Limiting function.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.5.2 VVW+ and Scalar Control

Allows viewing and changing the parameters related to the scalar control of the DC link voltage limiting function.

C3.5.2 VVW+ and Scalar Control
C3.5.2.1 DC Link Volt.Lim.-Level
Range: 114.0 ... 160.0 % **Default:** 120.0 %
Properties:

Description:
Sets the DC link limiting function operation level in the scalar and VVW+ control types.

Setting of the value of C3.5.2.1:

The value of C3.5.2.1 corresponds to a percentage of the DC Link Nominal Voltage.

The DC Link Nominal Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.26.

Table 11.26: *DC Link Nominal Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V

If the inverter keeps locking due to DC link overvoltage (F022) during deceleration, gradually reduce the value of C3.5.2.1 or increase the deceleration ramp time C6.1.2 or C6.1.5.

If the power supply is permanently at a voltage level so that it results in a DC link voltage value above the setting of C3.5.2.1, it will not be possible to decelerate the motor. In this case, reduce the supply voltage or increase the value of C3.5.2.1.

If even with the above procedures, it is not possible to decelerate the motor in the necessary time, use the Dynamic Braking function. For more information see C3.6.

C3.5.2 VVW+ and Scalar Control
C3.5.2.2 DC Link Volt.Lim.-Kp Gain
Range: 0.00 ... 9.99 **Default:** 0.15
Properties:

Description:
Sets the value of the DC link voltage regulator proportional gain.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.2.3.

C3.5.2 VVW+ and Scalar Control

C3.5.2.3 DC Link Volt.Lim.-Ki Gain

Range: 0.000 ... 1.000 **Default:** 0.050

Properties:

Description:
Sets the value of the DC link voltage regulator integral gain.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

C3.5.2 VVW+ and Scalar Control

C3.5.2.4 DC Link Volt.Lim.-Stab.Gain

Range: 0.000 ... 9.999 **Default:** 0.000

Properties:

Description:
Sets the DC link oscillation stabilizer gain.

This function works together with the controller used in the DC link limiting function. In applications where the deceleration ramp is very short, and the system inertia is high, it is common to have consistent oscillations in the DC link. bus In this case, this parameter adjusts the stabilizer gain to dampen DC link oscillations.

Its value must be gradually increased when the system presents sustained oscillations on the DC link. If there is no consistent effect, you must increase the value of the deceleration ramp C6.1.2 or C6.1.5.

C3.5.3 Vector Control

Allows viewing and changing parameters related to vector control.

C3.5.3 Vector Control

C3.5.3.1 Optim. Braking Func. Enable

Range: 0 ... 1 **Default:** 0

Properties:

Description:
Selects the type of braking used in the vector control for induction machines. Braking with losses (Optimal Braking) increases the stator current in the motor to increase losses during the deceleration period.

NOTE!
The process carried out by this type of braking increases the acoustic noise in the environment.

Indication	Description
0 = No	Disables function.
1 = Yes	Enables function.

C3.5.3 Vector Control

C3.5.3.2 DC Link Volt.Lim.-Level

Range: 114.0 ... 160.0 % **Default:** 120.0 %

Properties:

Description:
Sets the DC link limiting function operation level in the vector control.

Setting of the value of C3.5.3.2:

The value of C3.5.2.1 corresponds to a percentage of the DC Link Nominal Voltage.

The DC Link Nominal Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.28.

Table 11.28: *DC Link Nominal Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V

If the inverter keeps locking due to DC link overvoltage (F022) during deceleration, gradually reduce the value of C3.5.3.2 or increase the deceleration ramp time C6.1.2 or C6.1.5.

If the power supply is permanently at a voltage level so that it results in a DC link voltage value above the setting of C3.5.3.2, it will not be possible to decelerate the motor. In this case, reduce the supply voltage or increase the value of C3.5.3.2.

If even with the above procedures, it is not possible to decelerate the motor in the necessary time, use the Dynamic Braking function. For more information see C3.6.

C3.5.3 Vector Control

C3.5.3.3 DC Link Volt.Lim.-Kp Gain

Range: 0.00 ... 6.39 **Default:** 0.30

Properties:

Description:
Sets the value of the DC link voltage regulator proportional gain.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.3.4.

C3.5.3 Vector Control

C3.5.3.4 DC Link Volt.Lim.-Ki Gain

Range: 0.000 ... 1.000 **Default:** 0.030

Properties:

Description:
Sets the value of the DC link voltage regulator integral gain.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.6 Dynamic Braking

The braking torque that can be obtained through the application of frequency inverters, without Dynamic Braking resistors, varies from 10% to 35% of the motor rated torque.

To obtain higher braking torques, resistors are used for Dynamic Braking. In this case, the regenerated energy is dissipated in the resistor mounted out of the inverter.

This type of braking is used in cases where short deceleration times are desired or when high inertia loads are driven.

For the vector control, it is possible to use Optimal Braking (C3.5.3.1), eliminating, in many cases, the need for Dynamic Braking.

The Dynamic Braking function can only be used if a braking resistor is connected to the CFW900, and the parameters related to it are properly set.

NOTE!
All models of frames A, B, C, D and E with fixed suffix DB have internal braking IGBT, which is available in the standard version of frames A, B and C and as an optional item in frames D and E.

C3.6 Dynamic Braking

C3.6.1 DC Link Level

Range: 0.1 ... 100.0 % **Default:** 95.0 %

Properties:

Description:
Allows viewing and changing the voltage level for the braking IGBT operation, and it must be compatible with the inverter supply voltage.

If the setting is very close to the overvoltage operation level (F022), it may occur before the braking resistor can dissipate the regenerated energy.

The value of C3.6.1 corresponds to a percentage of the maximum capacity available on the DC link (level at which the Overvoltage protection trips).

The following table shows the overvoltage operation level according to the inverter model.

Table 11.29: *Overvoltage Trip Levels (F022)*

C1.1.2	F022
200-240 V	400 V
380-480 V	800 V

NOTE!
If the level is lower than ($V_{power\ supply}$*1.35), the system will try to regulate the DC link at a voltage lower than the one that the network is imposing, that is, it will not succeed and will remain activated forever.

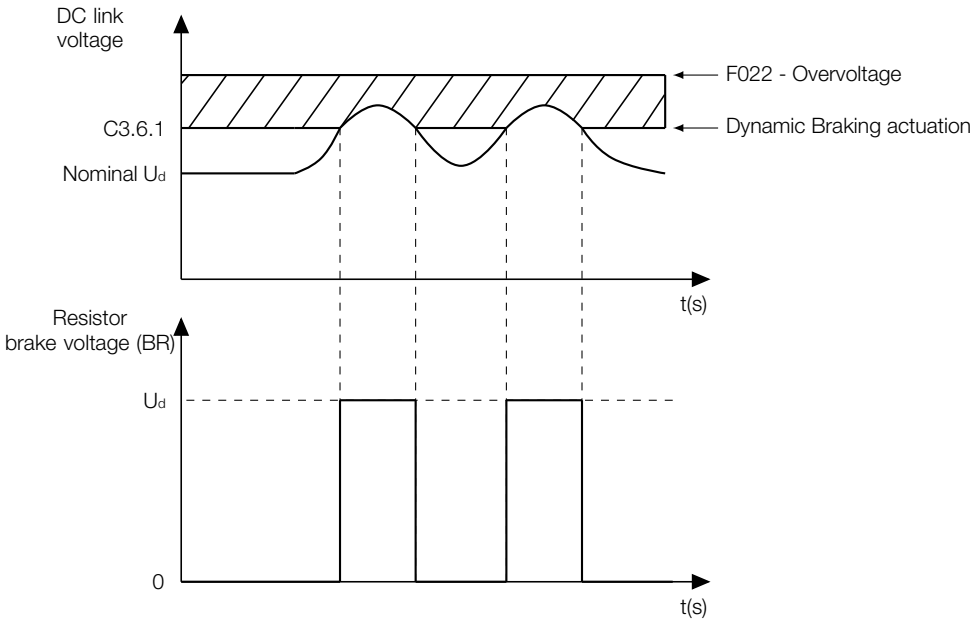


Figure 11.17: *Operation curve of the Dynamic Braking*

Steps to enable the Dynamic Braking:

1. Connect the braking resistor (See User Manual in item 3.2.3.2 - Dynamic Braking).
2. Set C3.5.2.1 or C3.5.3.2 to the maximum value, as appropriate, to prevent the DC Link Voltage Regulation from operating before the Dynamic Braking.

C3.7 DC Braking

Allows viewing and changing the parameters related to the DC Braking Function. This function injects a direct current into the motor.

NOTE!
The DC braking at start does not work when the Flying Start function is enabled (C3.8.1.1 = 1).

C3.7 DC Braking

C3.7.1 Function Enable

Range:	0 ... 4	**Default:** 0
Properties:	Stopped	

Description:
Sets the moment the DC current is applied to the motor.

NOTE!
In mode C3.7.1 = 4, the DC Braking function acts continuously and the motor will never spin.

Indication	Description
0 = Disable	Disables the DC Braking.
1 = Only Start	Enables the DC current injection only at the motor start.
2 = Only Stop	Enables the DC current injection only at the motor stop.
3 = Start and Stop	Enables the DC current injection at the motor start and stop.
4 = Allways ON	Keeps the DC current injection into the motor always enabled.

C3.7 DC Braking

C3.7.2 DC-Braking Start Time

Range: 0.0 ... 15.0 s **Default:** 0.0 s

Properties:

Description:

Defines the time that direct current will be applied at the motor start.

Figure 11.18 shows an illustrative scheme of DC braking at start.

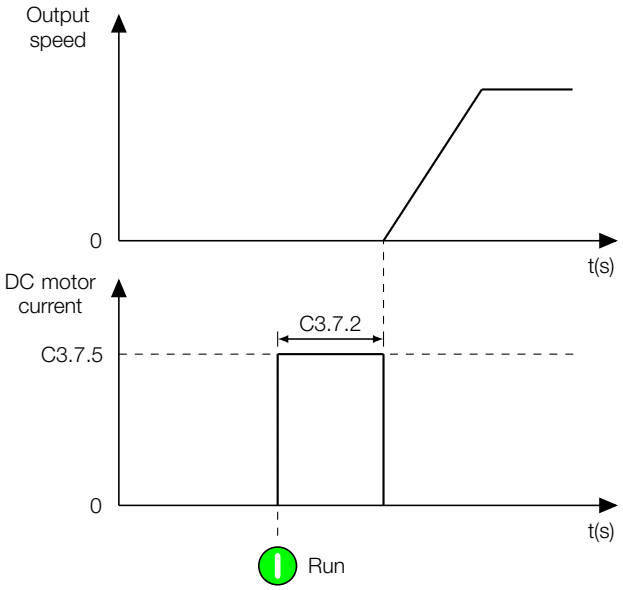


Figure 11.18: *DC braking operation at start*

C3.7 DC Braking

C3.7.3 DC-Braking Stop Time

Range: 0.0 ... 15.0 s **Default:** 0.0 s

Properties:

Description:

Defines the time that direct current will be applied at the motor stop.

Figure 11.19 shows an illustrative diagram of the DC braking at stop.

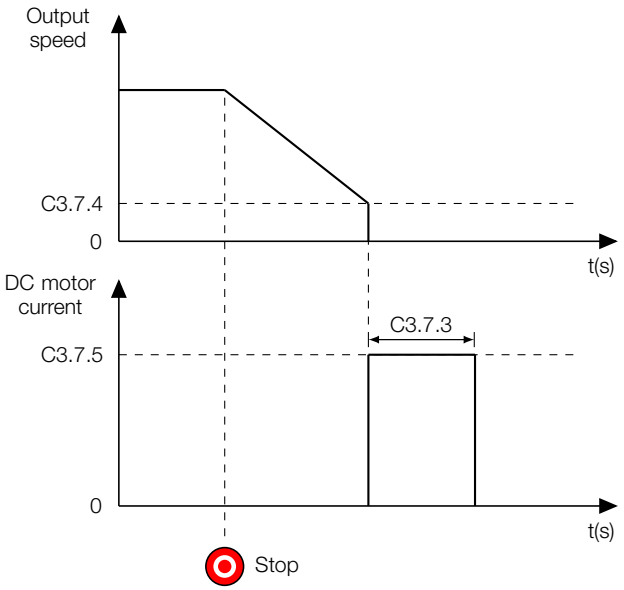


Figure 11.19: *Operation of the DC braking in the ramp locking (via ramp disable)*

During the DC braking process, if the inverter is enabled, the braking is interrupted and the inverter will start operating normally.

WARNING!
The DC Braking can continue acting even if the motor has already stopped. Be careful with the thermal dimensioning of the motor for short-period cyclic braking.

C3.7 DC Braking		
C3.7.4 DC-Braking Speed		
Range:	0 ... 450 rpm	**Default:** 30 rpm
Properties:		

Description:
Defines the starting point (speed) for applying DC braking at the stop. See Figure 11.19 for better understanding.

C3.7 DC Braking		
C3.7.5 Current		
Range:	0.0 ... 100.0 %	**Default:** 20.0 %
Properties:		

Description:
Defines the level of current (DC braking torque) applied to the motor during braking. The programmed current level is the percentage of the motor rated current.

NOTE!
If the value set in C3.7.5 is greater than the inverter current, it will automatically be limited to the maximum current capacity of the inverter.

C3.8 Flying Start

The Flying Star function allows driving a motor that is in free running, accelerating it from the rotational speed in which it is. This function is suitable for applications in which the system inertia is very high, and the time for the motor to stop is very high. In this case, if the motor is started, there may be a high energy regeneration to the DC link. Such

energy regeneration may cause a fault due to overcurrent at the start. Thus, the Flying Start function must be used to determine the current rotor speed and then start the motor from the current rotor speed. Figure 11.20 illustrates the Flying Start function operation process in a simplified way.

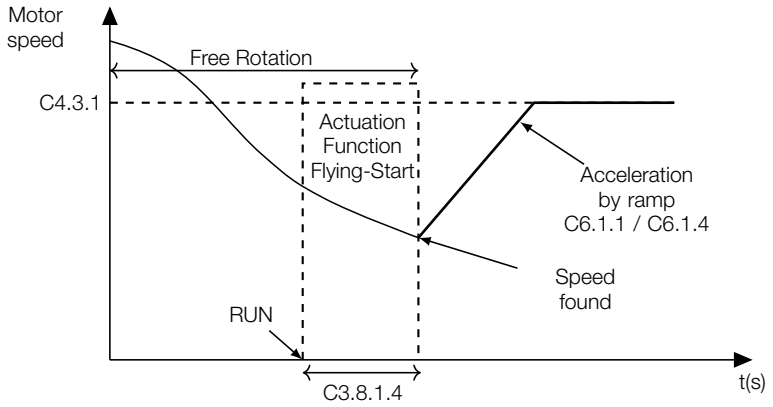


Figure 11.20: *Illustrative scheme of the Flying-Start function.*

The Flying Start function performs a scan by applying a speed reference to determine the rotor speed. Figure 11.21 illustrates the Flying Start function method to determine the rotor speed. The scan starts from the value defined in C4.3.1.1.2 (maximum speed) and ends at zero. The first scan is carried out in the same direction as the motor direction of rotation command. If the rotor speed is not determined, a second scan is performed in the opposite direction of the direction of rotation command. At the end of this process, if the rotor speed is not determined, the function considers that the motor is stopped and ends the determination process.

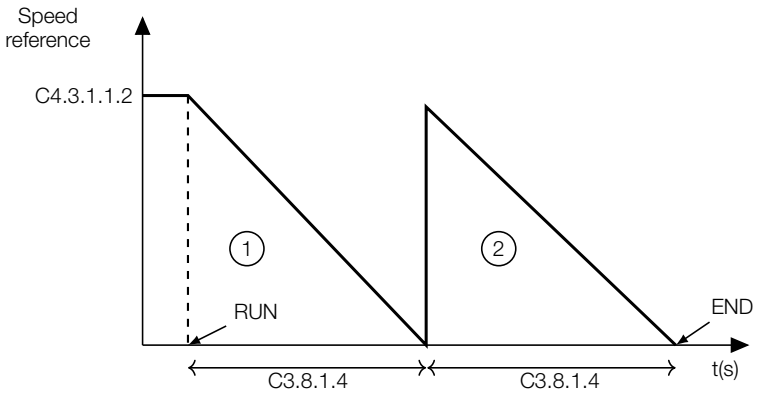


Figure 11.21: *Illustrative scheme of the Flying-Start function rotor speed determination.*

C3.8.1 Flying Start Config.

Allows configuring the Flying Start function according to the system application type.

C3.8.1 Flying Start Config.		
C3.8.1.1 Function Enable		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Enables the Flying Start function.

Indication	Description
0 = Disable	Disables function.
1 = Enable	Enables function.

C3.8.1 Flying Start Config.

C3.8.1.2 Function Reset

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:

Selects the type of Reset for the Flying Start function. Reset = Start/Stop causes the Flying Start function to act whenever the motor is started. Reset = General Enable causes the Flying Start function to act only when the inverter is general enabled.

Indication	Description
0 = General Enable	Enable Reset by General Enable.
1 = Run/Stop	Enables Reset by Run/Stop.

C3.8.1 Flying Start Config.

C3.8.1.3 Tracking

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:

Allows locking the Flying Start function to track the rotor speed in the opposite direction to that defined in the motor direction of rotation command. See Figure 11.22 for more details.

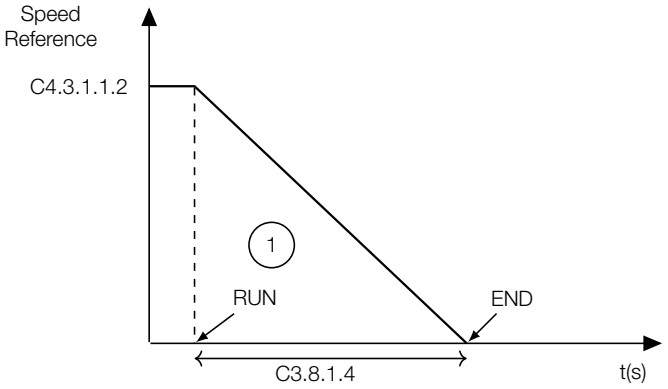


Figure 11.22: *Illustrative scheme of the Flying Start function rotor speed determination.*

Indication	Description
0 = Two Trackings	Tracks the speed in both directions of rotation.
1 = One Tracking	Tracks the speed in only one direction of rotation.

C3.8.1 Flying Start Config.

C3.8.1.4 Voltage Ramp

Range: 0.2 ... 60.0 s **Default:** 10.0 s

Properties:

Description:

Sets the rotor speed determination time. See Figure 11.21 for more details.

C3.8.1 Flying Start Config.

C3.8.1.5 Disable Flying Start

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:

Enables the use and defines the digital input that will be used to disable the Flying Start function.

C3.8.2 VVW+ and Scalar Control

Flying Start function settings for scalar and VVW+ controls.

C3.8.2 VVW+ and Scalar Control		
C3.8.2.1 Current		
Range:	0.0 ... 100.0 %	**Default:** 35.0 %
Properties:		

Description:
Defines the current level that the Flying Start function will impose on the motor during the determination process. The current level is a percentage of the motor rated current defined in C2.1.5.

C3.8.3 Vector Control

Flying Start function settings for vector control.

C3.8.3 Vector Control		
C3.8.3.1 Flux Reference		
Range:	0.0 ... 100.0 %	**Default:** 85.0 %
Properties:		

Description:
Defines the reference flux level that the Flying Start function will impose on the motor during the determination process. The flux level is a percentage of the motor rated flux.

C3.9 Ride-Through

The Ride-Through function allows recovering the inverter, without undervoltage locking, when there is a power failure for a short time.

Figure 11.23 illustrates the behavior of the Ride-Through function during a period of power failure. At this moment, the inverter DC link voltage starts to decrease. Thus, the Ride-Through function starts decelerating the motor in a controlled way to regenerate energy to the DC link and keep the inverter active for a short period of time. After the power supply is restored, the motor is accelerated to the value set in C4.3.1.

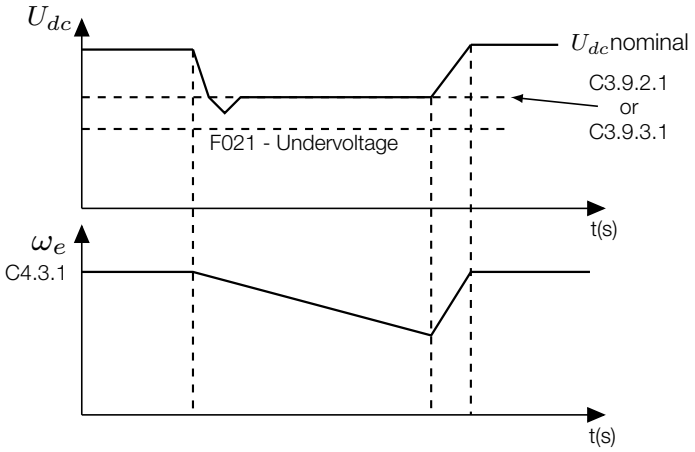


Figure 11.23: *Illustrative diagram of the Ride-Through function operation.*

C3.9.1 Ride-Through Config.

Settings of the Ride-Through function for all control types.

C3.9.1 Ride-Through Config.

C3.9.1.1 Enable

Range: 0 ... 1 **Default:** 0

Properties:

Description:

Allows enabling the Ride-Through function.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.9.2 VVW+ and Scalar Control

Settings of the Ride-Through function for V/F and VVW+ scalar control.

C3.9.2 VVW+ and Scalar Control

C3.9.2.1 DC Link-Ride-Through

Range: 76.0 ... 95.0 % **Default:** 82.5 %

Properties:

Description:

This parameter sets the Ud voltage level that the inverter will try to keep regulated, so that the motor keeps operating.

The value of C3.9.2.1 corresponds to a percentage of the DC Link Nominal Voltage.

The DC Link Nominal Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.35.

Table 11.35: *DC Link Nominal Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V

NOTE!
The DC link undervoltage fault occurs at 75% of the DC Link Nominal Voltage.

C3.9.2 VVW+ and Scalar Control

C3.9.2.2 Prop. Gain - Ride-Through

Range: 0.00 ... 2.00 **Default:** 0.50

Properties:

Description:

Sets the proportional gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.2.3.

C3.9.2 VVW+ and Scalar Control

C3.9.2.3 Int. Gain - Ride-Through

Range: 0.000 ... 1.000 **Default:** 0.050

Properties:

Description:
This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.9.3 Vector Control

Settings of the Ride-Through function for vector control.

C3.9.3 Vector Control

C3.9.3.1 DC Link-Ride-Through

Range: 76.0 ... 95.0 % **Default:** 82.5 %

Properties:

Description:
This parameter sets the Ud voltage level that the inverter will try to keep regulated, so that the motor keeps operating.

The value of C3.9.3.1 corresponds to a percentage of the DC Link Nominal Voltage.

The DC Link Nominal Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.36.

Table 11.36: *DC Link Nominal Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V

NOTE!
This parameter works together with parameters C3.9.3.2 and C3.9.3.3 for the Ride-Through function in vector control.

NOTE!
The DC link undervoltage fault occurs at 75% of the DC Link Nominal Voltage.

C3.9.3 Vector Control

C3.9.3.2 Prop. Gain - Ride-Through

Range: 0.00 ... 2.00 **Default:** 0.10

Properties:

Description:
Sets the proportional gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.3.3.

C3.9.3 Vector Control
C3.9.3.3 Int. Gain - Ride-Through
Range: 0.000 ... 1.000 **Default:** 0.050
Properties:

Description:
This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.10 Advanced Energy Saving

The Advanced Energy Saving function controls the motor stator flux so that it operates in a region of maximum energy saving. In this way, the flux ratio delivered to the motor is changed to reduce the motor losses and improve the system efficiency.

The function will be active when the load level is below the value set in (C3.10.4) and the speed is above the minimum value set in (C3.10.6). Furthermore, to prevent the motor from stalling, the reduced value of the voltage applied to the motor is limited to a minimum acceptable value (C3.10.5).

NOTE!
The Advanced Energy Saving function is only available for induction machines. For synchronous machines the MTPA function is used. For more information see C3.2.2.2.1.

C3.10 Advanced Energy Saving
C3.10.1 Function Enable
Range: 0 ... 1 **Default:** 0
Properties:

Description:
Enables the Advanced Energy Saving function.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.10 Advanced Energy Saving
C3.10.2 Adv. Optimum Flux Config.
Range: 0 ... 1 **Default:** 1
Properties:

Description:
Enables the online estimator that determines the maximum energy saving point according to the load level and motor speed.

NOTE!
When this parameter is disabled the control of the Advanced Energy Saving function will be performed using only the motor cos φ control loop, i.e. a control loop with parameter C3.10.3 (cos φ reference) as the reference. By enabling the parameter C3.10.2 the parameter C3.10.3 is not used.

Indication	Description
0 = Disabled	Disable function.
1 = Enabled	Function enable.

C3.10 Advanced Energy Saving

C3.10.3 cos phi Reference

Range: 0.50 ... 0.99 **Default:** 0.82

Properties:

Description:

Defines the cos φ value that the Advanced Energy Saving function will impose on the system. However, if C3.10.2 = 1, the value set in this parameter will not be considered.

NOTE!

It is recommended to set this parameter equal to the value of cos φ indicated in the motor nameplate C2.1.10.

C3.10 Advanced Energy Saving

C3.10.4 Maximum Torque

Range: 0 ... 150 % **Default:** 125 %

Properties:

Description:

Sets the motor torque to activate the Advanced Energy Saving function. If the motor electric torque (S2.2.3) is greater than the value defined in this parameter, the function will be disabled.

It is recommended to set this parameter to 75%, but it can be set according to the application requirements.

NOTE!

Value at 0% disables the Advanced Energy Saving function.

C3.10 Advanced Energy Saving

C3.10.5 Minimum Voltage

Range: 40 ... 80 % **Default:** 40 %

Properties:

Description:

Sets the minimum value for the voltage that will be applied to the motor when the Advanced Energy Saving function is active. This minimum value is relative to the voltage the control imposes (S2.3.2) for a given speed.

C3.10 Advanced Energy Saving

C3.10.6 Minimum Speed

Range: 0 ... 100 % **Default:** 20 %

Properties:

Description:

Sets the minimum speed at which the Advanced Energy Saving function will remain active.

C3.10 Advanced Energy Saving

C3.10.7 Torque Hysteresis

Range: 0 ... 30 % **Default:** 10 %

Properties:

Description:
Sets the torque hysteresis value used to enable and disable the Advanced Energy Saving function. If the function is enabled and the output current oscillates, it is necessary to increase the hysteresis value.

C4 COMMANDS AND REFERENCES

It allows configuring the source of the frequency inverter commands and references in local or remote command mode.

CFW900 has two command modes:

- Local Mode: When the drive is operating in local control mode, all commands and reference are made via HMI (see S1.6.2 and C4.3.1.3.1).The HMI LOC/REM key allows you to switch between Local and Remote 1 / Remote 2 command modes. It can be configured in C4.1.3.
- Remote 1 / Remote 2 Mode: In Remote 1 or Remote 2 mode you can configure the inverter reference and command source sources from the following options: communication networks, HMI, digital input and/or analog input.

C4.1 Config. LOC/REM Mode

Allows configuring what will define the local and remote operating mode. If set via digital input, you can choose the specific digital input for this function.

Options that do not depend on operating modes will be explained in details later.

C4.1 Config. LOC/REM Mode		
C4.1.1 Command mode		
Range:	0 ... 9	**Default:** 9
Properties:	Stopped	

Description:
Define a fixed command mode (Local, Remote 1 or Remote 2) or the source that can change between Remote 1 and Remote 2 modes. Local mode can be only accessed through this parameter when it is set to Always Local. All other sources can only switch between Remote 1 and Remote 2 modes.

Indication	Description
0 = Always Local	Fixed in Local command mode
1 = Remote 1	Fixed in Remote 1 command mode
2 = Remote 2	Fixed in Remote 2 command mode
3 = Serial	Change via R1/R2 command of the RS-485 Serial Control Word (S5.2.2)
4 = Not used	Not used.
5 = CAN/CO/DN	Change via R1/R2 command of the CAN/CANop/DNet Control Word
6 = SoftPLC	Change via SoftPLC command
7 = Not used	Not used.
8 = Ethernet	Change via R1/R2 command of the Ethernet Control Word
9 = DI	Change via command of the digital input chosen by the user. The digital input can be set in C4.1.2

NOTE!
Example: By selecting the command source of this parameter as Serial, the Mode R1/R2 bit of the RS-485 Serial command word in S5.2.2 will cause the drive to transition between Remote 1 and Remote 2.

C4.1 Config. LOC/REM Mode

C4.1.2 Remote 1/Remote 2 DI

Range:	0 ... 62	**Default:** 2
Properties:	Stopped	

Description:
Defines which digital input will transition between Remote 1 or Remote 2 mode or vice versa.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.40: *Values assigned to the Digital Inputs of X and A...G Slots for Remote 1 / Remote 2 mode setting.*

NOTE!
Example: To choose digital input 2 of Slot B to switch between Remote 1 / Remote 2 mode, the parameter must be assigned the value B-2 (16).

C4.1 Config. LOC/REM Mode

C4.1.3 LOC/REM HMI Key

Range:	0 ... 1	**Default:** 1
Properties:	Stopped	

Description:
Defines that all commands and references will be performed via HMI.

Defines the function for the LOC/REM key of the HMI. The LOC/REM key, when pressed, allows switching between Local (HMI) control mode and the mode defined according to the setting made in C4.1.1 (Remote 1 or Remote 2). When the selected command mode is Local, all commands and references will be made via HMI.

Indication	Description
0 = Disable	The LOC/REM key is disabled.
1 = Enable	The LOC/REM key, toggles between Local and Remote command mode.

C4.2 Commands

Allows selecting what will set the frequency inverter command source to Remote 1 or Remote 2 command mode.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands

Allows setting the source to the command mode.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.1 General Enable

Range:	0 ... 8	**Default:** 1 (C4.2.1.1) 0 (C4.2.2.1)
Properties:	Stopped	

Description:
Sets the source for the general enable command.

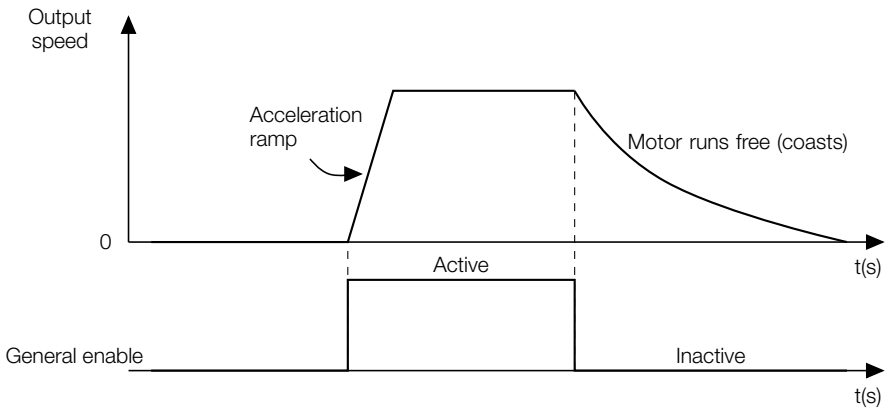


Figure 11.24: *Operation of the general enable command.*

WARNING!
The general enable command can contain a digital input (C4.2.3.1) that works together with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in the Remote 1 situation and any digital input, for the inverter to be enabled, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the inverter will be general disabled. See S1.6.1.

Indication	Description
0 = Always enabled	General Enable command is always active. Regardless of the digital input configured in C4.2.3.1
1 = HMI	General Enable command via HMI is always active
2 = Serial	General Enable command via RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	General Enable command via CAN/CANop/DNet Control Word
5 = SoftPLC	General Enable command via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	General Enable command via Ethernet Control Word
8 = General Enable DI	General Enable command via digital input chosen by the user. Digital input can be configured in C4.2.3.1

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.2 Run/Stop

Range:	0 ... 9	**Default:** 0 (C4.2.1.2) 7 (C4.2.2.2)
Properties:	Stopped	

Description:
Sets the source for the start and stop commands, which encompass run/stop and quick stop.

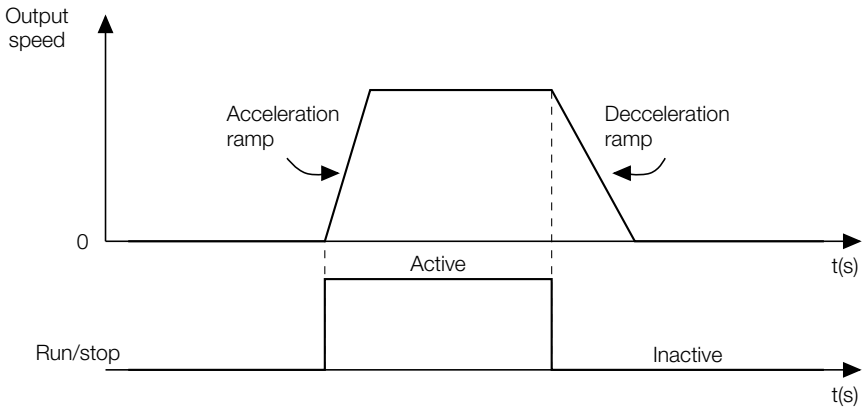


Figure 11.25: *Operation of the run/stop command.*

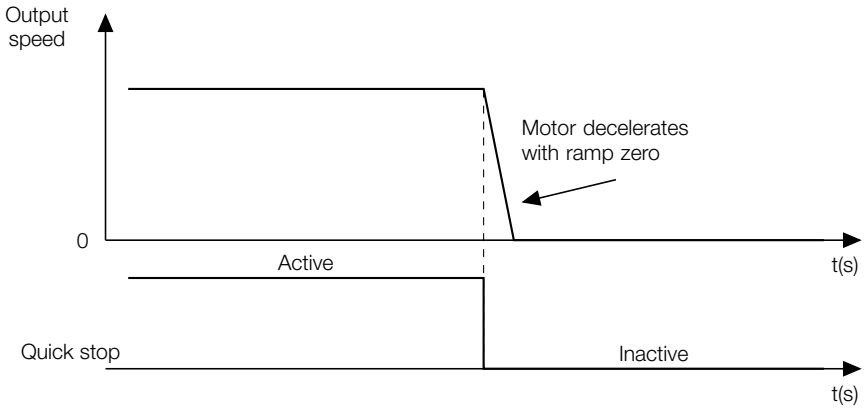


Figure 11.26: *Operation of the quick stop command.*

WARNING!
The quick stop command may contain a digital input (C4.2.3.7) which acts in conjunction with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in Remote 1 mode and any digital input, for the inverter to be without quick stop, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the quick stop command is executed. See S1.6.1.

Indication	Description
0 = HMI Keypad I / O	Run/Stop command via HMI keys I e O. In this case, the stop mode is always by ramp.
1 = Serial	Enable Ramp and Quick Stop Command via RS-485 Serial Control Word
2 = Not used	Not used.
3 = CAN/CO/DN	Enable Ramp and Quick Stop Command via CAN/CANop/DNet Control Word
4 = SoftPLC	Enable Ramp and Quick Stop Command via SoftPLC function
5 = Not used	Not used.
6 = Ethernet	Enable Ramp and Quick Stop Command via Ethernet Control Word
7 = DI Run/Stop	Run/Stop command via digital input chosen by the user. The digital input can be set in C4.2.3.2
8 = DI FWD/REV	Run/Stop command selected when using the Forward/Reverse function via digital inputs. Digital inputs can be set in C4.2.3.5 and C4.2.3.6
9 = DI 3-Wire Start/Stop	Run/Stop command selected when using the 3-Wire Start/Stop function. Digital inputs can be set in C4.2.3.3 and C4.2.3.4

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.3 Speed Direction

Range:	0 ... 10	**Default:** 1 (C4.2.1.3) 0 (C4.2.2.3)
Properties:	Stopped	

Description:
Sets the source for the direction of rotation command.

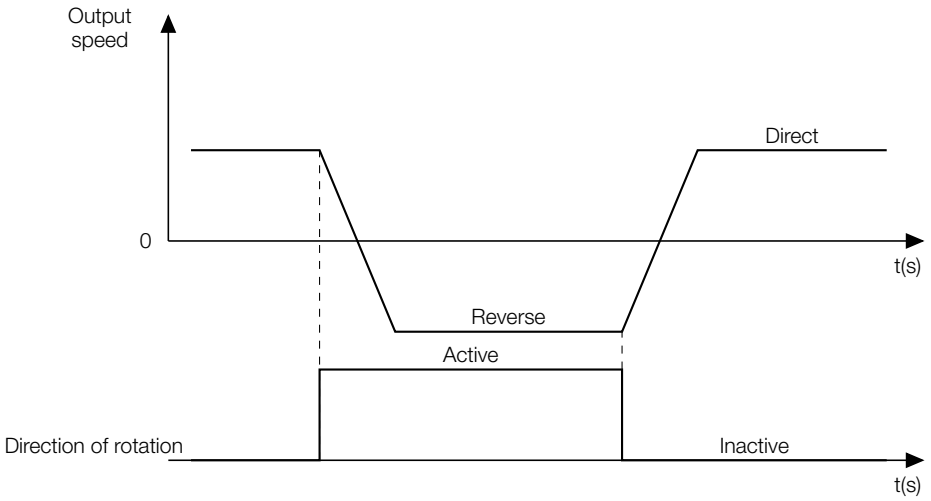


Figure 11.27: *Operation of the direction of rotation command.*

Indication	Description
0 = Direct	Direct rotation direction only. It is not possible to reverse the rotation direction.
1 = HMI Keypad SD	Rotation Direction control via HMI key . Direct Rotation Direction is assumed in energizing
2 = Serial	Reverse Command via RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	Reverse Command via CAN/CANop/DNet Control Word
5 = SoftPLC	Rotation Direction Control via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	Reverse Command via Ethernet Control Word
8 = DI Direct/Reverse	Rotation Direction command via user-selected digital input. The digital input can be configured at C4.2.3.8
9 = DI FWD/REV	Rotation Direction command selected when using the Forward/Reverse function via digital inputs. The digital inputs can be configured inC4.2.3.5 and C4.2.3.6
10 = Speed Reference	Rotation Direction command defined by the polarity of the speed reference.

NOTE!
When set to direct, if there is an attempt to set the speed reference to a negative value, the reference is limited to zero. It is possible to change direct rotation direction through parameter defined in C1.6.1.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.4 JOG

Range:	0 ... 8	**Default:** 1 (C4.2.1.4) 0 (C4.2.2.4)
Properties:	Stopped	

Description:
Sets the source for the JOG command.

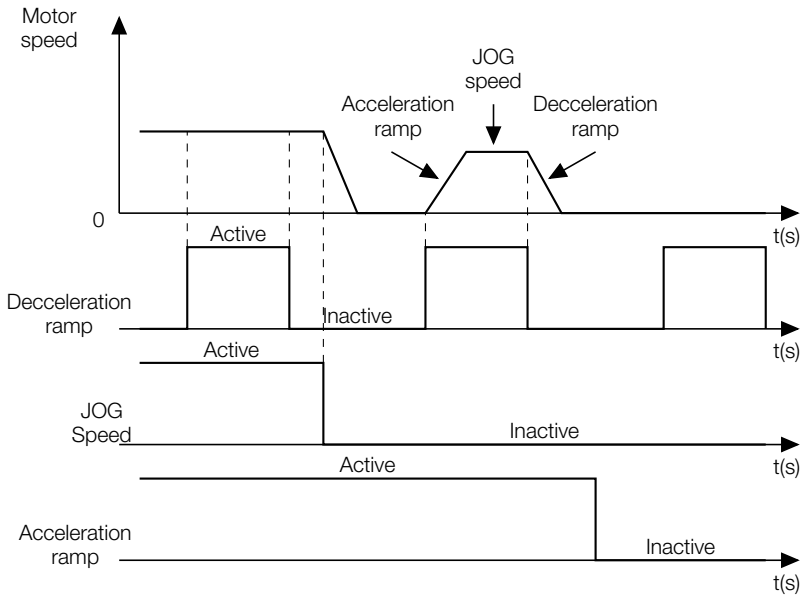


Figure 11.28: *Operation of the JOG command.*

Indication	Description
0 = Disable	JOG command disabled
1 = HMI Keypad JOG	JOG command via HMI key JOG
2 = Serial	JOG command via RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	JOG command via CAN/CANop/DNet Control Word
5 = SoftPLC	JOG command via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	JOG command via Ethernet Control Word
8 = DI JOG	JOG command via digital input chosen by the user. The digital input can be set in C4.2.3.9

C4.2.3 DIs Config. for Commands

Allows defining the digital input used for each command with source via digital input. For more information about the control word via DI see S1.6.3.

C4.2.3 DIs Config. for Commands		
C4.2.3.1 General Enable		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables use and defines the digital input that will be used to enable the drive to run. The options are shown in the Table 11.46 at page 148.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.46: *Values assigned to the Digital Inputs of X and A...G Slots for defining command activation.*

NOTE!
Example: To choose digital input 4 of Slot C to trigger a command, the parameter must be assigned the value C-4 (26).

C4.2.3 DIs Config. for Commands

C4.2.3.2 Run/Stop DI

Range:	0 ... 62	**Default:** 1
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the start and stop commands. The options are shown in Table 11.46 on page 148.

C4.2.3 DIs Config. for Commands

C4.2.3.3 3-Wire Start

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the "Start" command of the 3-wire Start/Stop function. The options are shown in Table 11.46 on page 148.

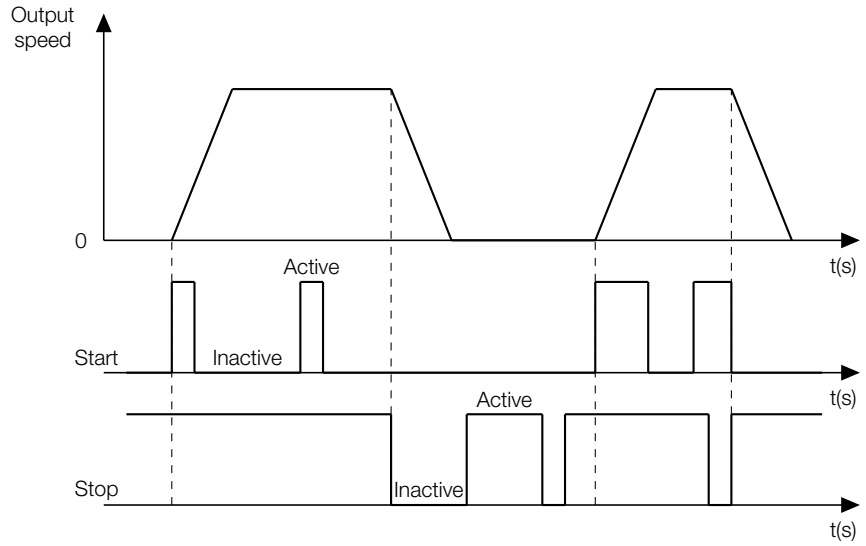


Figure 11.29: *3-wire Start/Stop function via digital input*

C4.2.3 DIs Config. for Commands		
C4.2.3.4 3-Wire Stop		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the ”Stop” command of the 3-wire Start/Stop function. The options are shown in Table 11.46 on page 148.

Figure 11.29 on page 148 illustrates the operation of the Start/Stop function.

C4.2.3 DIs Config. for Commands		
C4.2.3.5 Forward		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the ”Forward” command of the Forward/Reverse function.

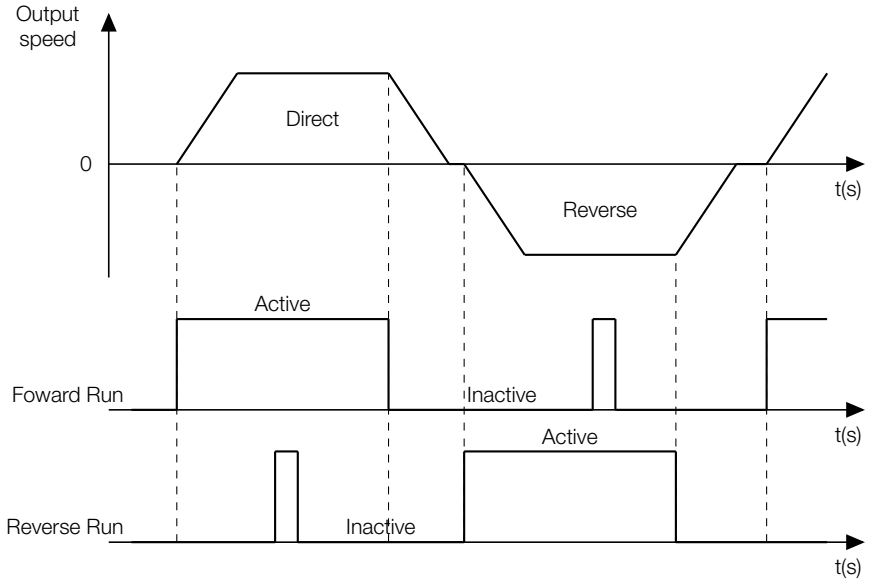


Figure 11.30: *Forward and Reverse function via digital input.*

C4.2.3 DIs Config. for Commands		
C4.2.3.6 Reverse		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the ”Reverse” command of the Forward/Reverse function. The options are shown in Table 11.46 on page 148.

Figure 11.30 on page 149 illustrate the operation of the Forward/Reverse function.

NOTE!
When you use the Forward/Reverse function, set C4.2.1.2 and C4.2.1.3= 8 or C4.2.2.2 and C4.2.2.3 = 8.

C4.2.3 DIs Config. for Commands

C4.2.3.7 Quick Stop

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and sets the digital input that will be used to execute the inverter quick stop. The options are shown in Table 11.46 on page 148.

The Quick Stop consists of executing the "Stop" with null deceleration ramp command (C6.1.6 = 0s) or close to this value, regardless of the setting in C6.1.2 or C6.1.5. It is not recommended to use it in scalar and VVW+ control types.

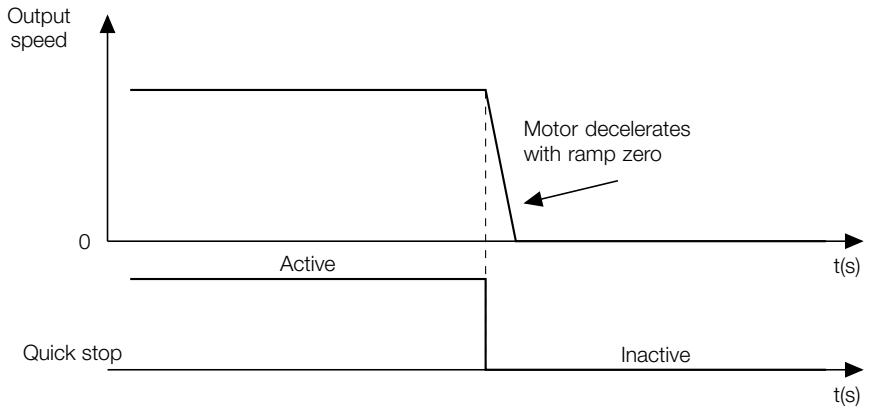


Figure 11.31: *Operation of the Quick Stop command*

C4.2.3 DIs Config. for Commands

C4.2.3.8 Speed Direction

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the direction of rotation command. The options are shown in Table 11.46 on page 148.

C4.2.3 DIs Config. for Commands

C4.2.3.9 JOG

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the JOG command. The options are shown in Table 11.46 on page 148.

C4.2.3 DIs Config. for Commands

C4.2.3.10 Ramp Selection

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to execute the Second Ramp command. The options are shown in Table 11.46 on page 148.

C4.2.3 DIs Config. for Commands

C4.2.3.11 Fault Reset

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used for the Fault Reset command. The options are shown in Table 11.46 on page 148.

When a transition from 0 to 1 occurs on the digital input programmed for Fault Reset, the present fault reset command is executed. If the fault condition is still present, the reset will not be performed. Figure 11.32 on page 151 illustrates that.

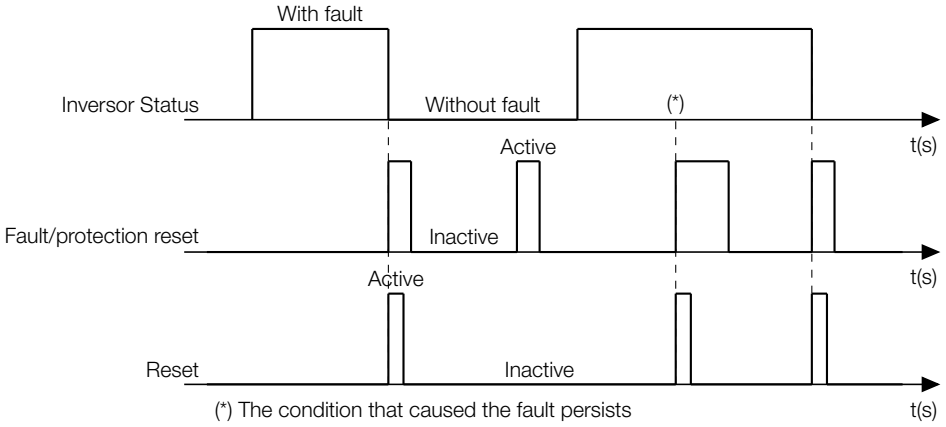


Figure 11.32: *Operation of the Fault Reset command.*

C4.2.4 HMI Config. for Commands

It allows defining the behavior of commands via HMI.

C4.2.4 HMI Config. for Commands		
C4.2.4.1 Stop Key Function		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
Sets the motor stop mode for the HMI stop keypad.

This parameter indicates the method to be performed to stop the motor when the inverter is programmed to be controlled via HMI keypad.

The available stop modes are:

- Ramp to stop: the inverter uses the time defined in parameter C6.1.2 or C6.1.5 to perform the deceleration ramp.
- General Enable to Stop: the inverter instantly deactivates the general enable. In this mode, there is no set time for the motor to stop.
- Fast stop: the inverter uses the time defined in parameter C6.1.6 to perform the deceleration ramp.

NOTE!
The general enable to stop mode works only if the general enable parameter (C4.2.1.1 for R1 mode and C4.2.2.1 for R2 mode) is set to HMI.

C4.3 References

Allows setting the source of the frequency inverter speed and torque references in the Local and Remote command mode.

C4.3.1 Speed

Allows setting the reference values for the motor speed.

C4.3.1.1 Speed Ref. Range

Allows setting minimum and maximum speed reference values for any reference signal. If the reference signal set to be followed by the inverter is less than the minimum reference setting in C4.3.1.1.1, the inverter will limit to C4.3.1.1.1. If the reference signal set to be followed by the inverter is greater than the maximum reference setting in C4.3.1.1.2, the inverter will limit to C4.3.1.1.2.

C4.3.1.1 Speed Ref. Range		
C4.3.1.1.1 Minimum		
Range:	0 ... 60000 rpm	**Default:** 90 rpm
Properties:		

Description:
Sets the minimum motor speed reference limit value when the inverter is enabled. Valid for any type of reference signal.

C4.3.1.1 Speed Ref. Range		
C4.3.1.1.2 Maximum		
Range:	1 ... 60000 rpm	**Default:** 1800 rpm
Properties:		

Description:
Sets the maximum motor speed reference limit value when the inverter is enabled. Valid for any type of reference signal.

C4.3.1.2 Speed Ref. Source

Allows setting the source for the speed reference in the Remote 1 and Remote 2 modes.

C4.3.1.2 Speed Ref. Source		
C4.3.1.2.1 Remote 1 Mode		
Range:	0 ... 10	**Default:** 0
Properties:	Stopped	

Description:
Sets the source for the speed reference for Remote 1 mode.

Indication	Description
0 = Keypad	Reference via HMI speed reference parameter (C4.3.1.3.1)
1 = E.P.	Reference via Electronic Potentiometer function
2 = Multispeed	Reference via Multispeed function
3 = Serial	Reference via RS-485 Serial speed reference parameter (S5.2.3)
4 = Not used	Not used.
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used.
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input	Reference via analog input chosen by the user. The analog input can be set in C4.3.1.3.2
10 = Frequency Input	Reference via frequency input chosen by the user. The frequency input can be set in C4.3.1.3.3

C4.3.1.2 Speed Ref. Source

C4.3.1.2.2 Remote 2 Mode

Range: 0 ... 10 **Default:** 9

Properties: Stopped

Description:

Sets the source for the speed reference for Remote 2 mode.

Indication	Description
0 = Keypad	Reference via HMI speed reference parameter (C4.3.1.3.1)
1 = E.P.	Reference via Electronic Potentiometer function
2 = Multispeed	Reference via Multispeed function
3 = Serial	Reference via RS-485 Serial speed reference parameter (S5.2.3)
4 = Not used	Not used.
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used.
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input	Reference via analog input chosen by the user. The analog input can be set in C4.3.1.3.2
10 = Frequency Input	Reference via frequency input chosen by the user. The frequency input can be set in C4.3.1.3.3

C4.3.1.3 Ref. HMI, AIs and FIs

Allows setting the speed reference value when the reference is HMI or analog input (AI) or frequency input (FI).

C4.3.1.3 Ref. HMI, AIs and FIs

C4.3.1.3.1 HMI

Range: 0 ... 60000 rpm **Default:** 90 rpm

Properties:

Description:

Sets the motor speed reference value when the reference source is the HMI.

NOTE!
You can change it by pressing keys while the main screen is being displayed.

C4.3.1.3 Ref. HMI, AIs and FIs

C4.3.1.3.2 AI Config. Speed Ref.

Range: 0 ... 30 **Default:** 1

Properties: Stopped

Description:

Defines the analog input that will be used as the motor speed reference when the reference source is the Analog Input (AI).

Analog Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)
AI4	–	A-4 (6)	B-4 (10)	C-4 (14)	D-4 (18)	E-4 (22)	F-4 (26)	G-4 (30)

Table 11.49: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.1.3 Ref. HMI, AIs and FIs		
C4.3.1.3.3 FI Config. Speed Ref.		
Range:	0 ... 2	**Default:** 1
Properties:	Stopped	

Description:
Defines the frequency input that will be used as the motor speed reference when the reference source is the Frequency Input (FI).

C4.3.1.4 Ref. E.P.-DIs Config.

The Electronic Potentiometer (E.P.) function allows the speed reference to be set via 2 digital inputs (one to increment it and the other to decrement it).

To enable this function, you must first configure the speed reference via Electronic Potentiometer by setting C4.3.1.2.1 = E.P. and/or C4.3.1.2.2 = E.P.. Next, you must also program which digital inputs will act as the “INCREASE” and “DECREASE” commands in parameters C4.3.1.4.1 and C4.3.1.4.2 respectively.

During the “INCREASE” command, the motor accelerates following the acceleration ramp until reaching the maximum speed reference defined in C4.3.1.1.2 if the command is not removed before. During command “DECREASE” the motor decelerates following the deceleration ramp until reaching the minimum speed reference defined in C4.3.1.1.1 if the command is not removed before. If the commands “INCREASE” or “DECREASE” are removed before reaching the maximum or minimum speed reference, the new speed reference will be the instantaneous value of the output speed at the instant the command is removed.

The commands “INCREASE” or “DECREASE” are effective only when the Run/Stop command is active.

Figure 11.33 on page 155 illustrates the operation of this function. The reference increment is done with the application of 24 V on the “INCREASE” digital input, while the decrement is done with the application of 0 V on the “DECREASE” digital input.

To reset the reference to zero, apply 24 V to the “INCREASE” digital input and 0 V to the “DECREASE” digital input simultaneously with the CFW900 disabled.

If no digital inputs are set to “INCREASE” and/or “DECREASE” function and the reference source selection is set to Electronic Potentiometer (C4.3.1.2.1 = E.P. and/or C4.3.1.2.2 = E.P.) the CFW900 will go to CONFIG state. See parameter S1.1.4.

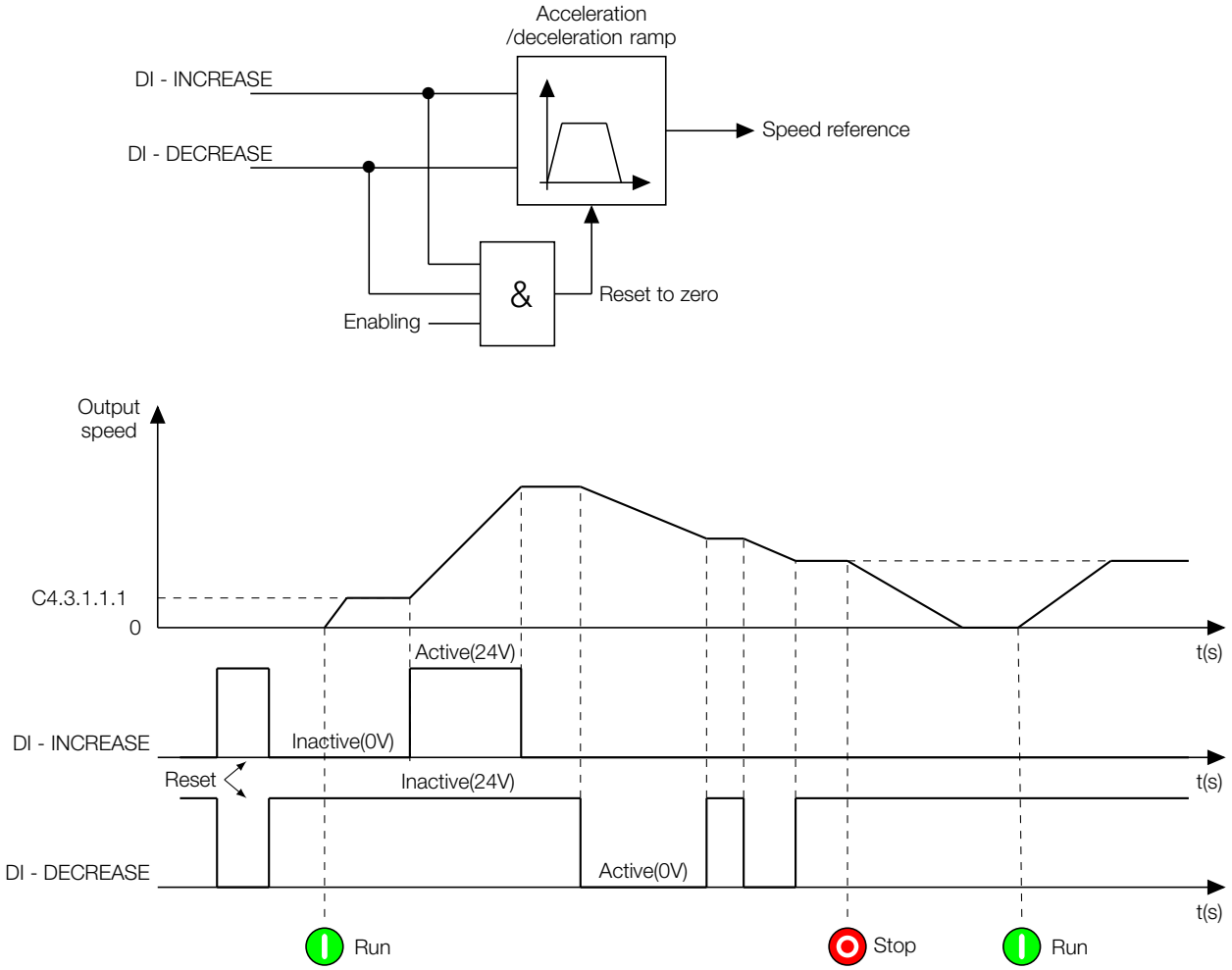


Figure 11.33: *Electronic Potentiometer (E.P.) function*

C4.3.1.4 Ref. E.P.-DIs Config.		
C4.3.1.4.1 DI Increase E.P.		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used as “INCREASE” command by the Electronic Potentiometer. Table 11.46 on page 148 shows the options.

C4.3.1.4 Ref. E.P.-DIs Config.		
C4.3.1.4.2 DI Decrease E.P.		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used as “DECREASE” command by the Electronic Potentiometer. Table 11.46 on page 148 shows the options.

C4.3.1.5 Ref. Multispeed

With the Multispeed function it is possible to select one of up to eight preset fixed speed references. The selection of one of the references is made according to the logical combination of the state of up to three digital inputs. This behavior can be seen in the Figure 11.34 and in the Table 11.50 on page 156.

To activate the Multispeed function it is necessary to configure the parameter C4.3.1.2.1 = Multispeed and/or C4.3.1.2.2 = Multispeed (reference source selection).

It is possible to use only one or two digital inputs and thus select between up to two or four references Multispeed respectively. Digital inputs not configured for the Multispeed function are considered as 0V in the Table 11.50.

If no digital inputs are set to Multispeed function and the reference source selection is set to Multispeed (C4.3.1.2.1 = Multispeed and/or C4.3.1.2.2 = Multispeed) the CFW900 will go to CONFIG state. See parameter S1.1.4.

The Multispeed function has the advantages of the stability of preset fixed references and immunity against electrical noise (isolated digital inputs).

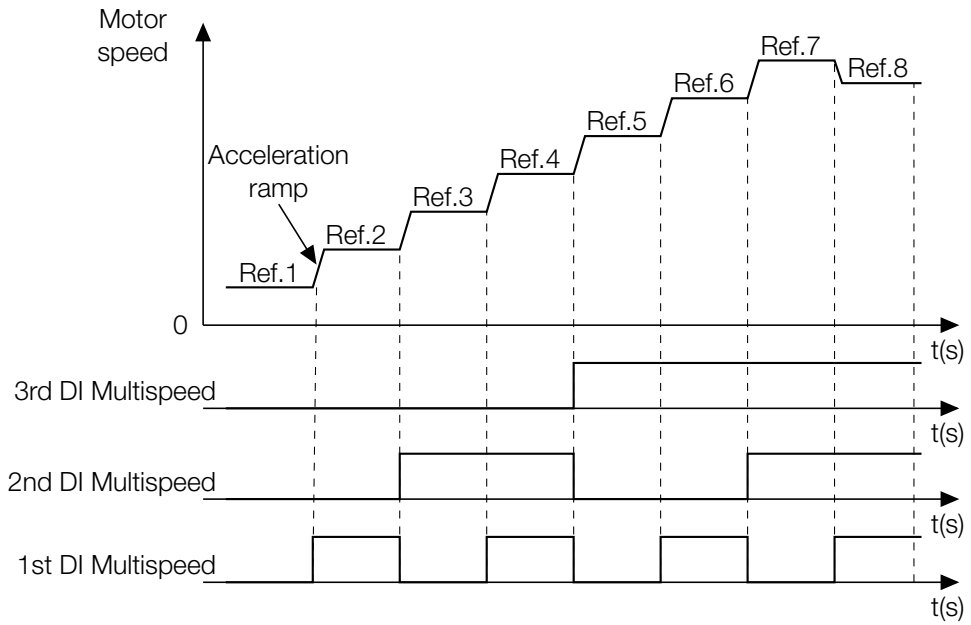


Figure 11.34: *Multispeed*

Below is a table with the selection of the speed reference according to the logical state of the digital inputs:

8 speed references			
	4 speed references		
		2 speed references	
3rd DI	**2nd DI**	**1st DI**	**Speed Reference**
0 V	0 V	0 V	C4.3.1.5.1
0 V	0 V	24 V	C4.3.1.5.2
0 V	24 V	0 V	C4.3.1.5.3
0 V	24 V	24 V	C4.3.1.5.4
24 V	0 V	0 V	C4.3.1.5.5
24 V	0 V	24 V	C4.3.1.5.6
24 V	24 V	0 V	C4.3.1.5.7
24 V	24 V	24 V	C4.3.1.5.8

Table 11.50: *Multispeed reference*

C4.3.1.5 Ref. Multispeed		
C4.3.1.5.1 Multispeed Ref. 1 **C4.3.1.5.2 Multispeed Ref. 2** **C4.3.1.5.3 Multispeed Ref. 3** **C4.3.1.5.4 Multispeed Ref. 4** **C4.3.1.5.5 Multispeed Ref. 5** **C4.3.1.5.6 Multispeed Ref. 6** **C4.3.1.5.7 Multispeed Ref. 7** **C4.3.1.5.8 Multispeed Ref. 8**		
Range:	0 ... 60000 rpm	**Default:** 90 rpm (C4.3.1.5.1) 300 rpm (C4.3.1.5.2) 600 rpm (C4.3.1.5.3) 900 rpm (C4.3.1.5.4) 1200 rpm (C4.3.1.5.5) 1500 rpm (C4.3.1.5.6) 1800 rpm (C4.3.1.5.7) 1650 rpm (C4.3.1.5.8)
Properties:		

Description:
Sets the value of the multispeed speed reference according to the logical combination of the digital inputs. The digital inputs logics are presented in the Table 11.50.

C4.3.1.5 Ref. Multispeed		
C4.3.1.5.9 DI Selection 1 MultiSpeed **C4.3.1.5.10 DI Selection 2 MultiSpeed** **C4.3.1.5.11 DI Selection 3 MultiSpeed**		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used for selecting the multispeed speed reference. Table 11.46 on page 148 shows the options.

C4.3.1.6 Skip Speed

Allows setting up to three speeds bands in which the motor cannot operate continuously, such as in a mechanical system that goes into resonance (causing excessive vibration or noise), for example. Figure 11.35 on page 157 details the operation of this function.

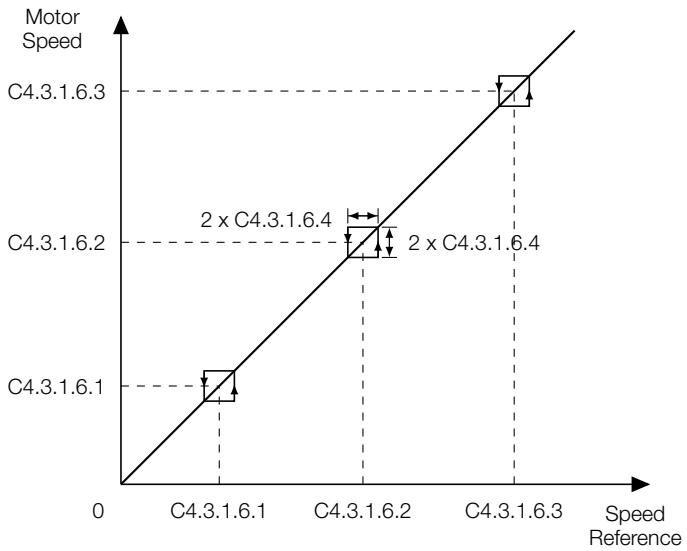


Figure 11.35: *Operation curve of the "Skip Speeds"*

The function is disabled for C4.3.1.6.4=0.

The passage through the skip speed band (2 x C4.3.1.6.4) is done following the acceleration or deceleration ramp.

If the speed reference is within the band to be avoided, the new reference will go to the lower limit of the band in question.

If 2 or 3 bands overlap, a single band will be considered with the limits defined by the lowest lower limit and the higher upper limit.

If the band limits exceed the minimum and/or maximum reference values (C4.3.1.1.1 and C4.3.1.1.2) these limits will be saturated in the values of C4.3.1.1.1 and/or C4.3.1.1.2.

NOTE!
If only one or two of the avoided speed bands are to be used, two or one of the bands must be overlaped. For example, to use only one avoided speed range, set parameters C4.3.1.6.1, C4.3.1.6.2 and C4.3.1.6.3 to the same value (overlapping ranges 1, 2 and 3).

C4.3.1.6 Skip Speed
C4.3.1.6.1 Speed 1
Range: 0 ... 60000 rpm **Default:** 600 rpm
Properties:

Description:
Sets the value of skip speed 1.

C4.3.1.6 Skip Speed
C4.3.1.6.2 Speed 2
Range: 0 ... 60000 rpm **Default:** 900 rpm
Properties:

Description:
Sets the value of skip speed 2.

C4.3.1.6 Skip Speed
C4.3.1.6.3 Speed 3
Range: 0 ... 60000 rpm **Default:** 1200 rpm
Properties:

Description:
Sets the value of skip speed 3.

C4.3.1.6 Skip Speed
C4.3.1.6.4 Skip Band
Range: 0 ... 750 rpm **Default:** 0 rpm
Properties:

Description:
Sets the value of the speed band that should be skipped. This value is subtracted and added to the value of the skipped speed, thus setting a band around the defined speed.

C4.3.2 JOG Speed

Allows setting the speed reference for the JOG command.

C4.3.2 JOG Speed

C4.3.2.1 JOG Reference

Range: 0 ... 60000 rpm **Default:** 150 rpm
Properties:

Description:
Sets the motor speed reference value when the JOG command is executed.

During the JOG command, the motor accelerates following the acceleration ramp set until reaching the speed defined in this reference. The JOG command is only effective when the Run/Stop command is inactive.

C4.3.3 Torque

Allows the torque reference configuration for operation in Torque Control mode.

NOTE!
The torque reference is only active when the control type is set to Vector with Encoder (C3.1.1 = 2) and the control mode is set to Torque (C3.3.1.1 = 1).

C4.3.3 Torque

C4.3.3.1 Torque Reference via HMI

Range: -400.0 ... 400.0 % **Default:** 0.0 %
Properties:

Description:
Sets the torque reference value when the reference source is the HMI.

C4.3.3 Torque

C4.3.3.2 Maximum Torque

Range: 0.0 ... 400.0 % **Default:** 400.0 %
Properties:

Description:
Allows you to set maximum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is greater than the maximum reference set in C4.3.3.2, the inverter will limit in C4.3.3.2.

C4.3.3 Torque

C4.3.3.3 Minimum Torque

Range: 0.0 ... 400.0 % **Default:** 0.0 %
Properties:

Description:
Allows you to set minimum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is less than the minimum reference set in C4.3.3.3, the inverter will limit in C4.3.3.3.

C4.3.3 Torque

C4.3.3.4 Torque Ref. Source

Range: 0 ... 2 **Default:** 0
Properties: Stopped

Description:
Defines which source will determine the reference for torque control.

Indication	Description
0 = Keypad	Torque Reference via HMI parameter (C4.3.3.1)
1 = Analog Input	Torque Reference via analog input chosen by the user. The analog input can be set in C4.3.3.5
2 = Frequency Input	Torque Reference via frequency input chosen by the user. The frequency input can be set in C4.3.3.6

NOTE!
If it is necessary to set the torque reference via Communication Networks or SoftPLC, this parameter must be set to HMI and the reference value set in C4.3.3.1.

C4.3.3 Torque
C4.3.3.5 Torque Ref. AI Config.
Range: 0 ... 30 **Default:** 0
Properties: Stopped

Description:
Defines which analog input will be used as reference for torque control. Table 11.52 on page 160 shows the options.

Analog Inputs options for X and A...G Slots

Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)
AI4	–	A-4 (6)	B-4 (10)	C-4 (14)	D-4 (18)	E-4 (22)	F-4 (26)	G-4 (30)

Table 11.52: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.3 Torque
C4.3.3.6 Torque Ref. FI Config.
Range: 0 ... 2 **Default:** 0
Properties: Stopped

Description:
Defines which frequency input will be used as reference for torque control.

Indication	Description
0 = Inactive	Disables the use of the frequency input in this function
1 = FI X-5	Enables the use of frequency input FI5 of Slot X
2 = FI X-6	Enables the use of frequency input FI6 of Slot X

C5 I/OS

Allows configuring the I/O accessories installed on the CFW900.

C5.1 Slot X

Allows viewing the state of the configuration parameters of slot.

C5.1.1 Slot X - Analog Inputs

Allows to configure the analog inputs of the accessory connected to the slot.

The Figure 11.36 on page 161 illustrates how the analog input works.

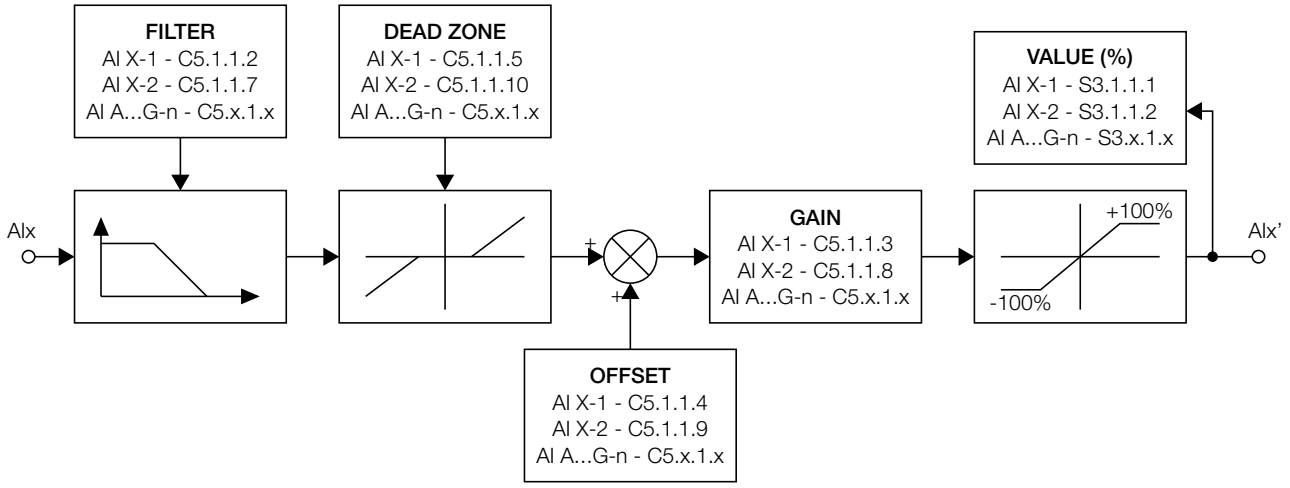


Figure 11.36: *Analog input block diagram*

The Figure 11.37 on page 161 illustrates the analog input behavior for different configurations of gain, offset and deadzone with signal type set to 0 to 10 V. Also, it is presented how the saturation work for each configuration. The signal behavior can change a little according selected signal type, but the shown configurations effects keep the same.

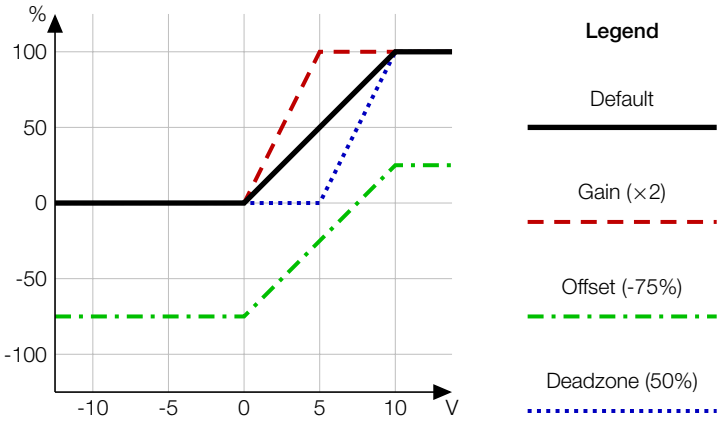


Figure 11.37: *Analog input signal types*

C5.1.1 Slot X - Analog Inputs		
C5.1.1.1 AI1 Settings **C5.1.1.6 AI2 Settings**		
Range:	0 ... 5 Bit	**Default:** 16
Properties:		

Description:
Allows to configure the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling of broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 2 … 5 Signal Setting	Selection of the analog input signal type. **0 = 0mA to 20mA**: Indicates that the analog input signal is of type 0 to 20 mA. **1 = 4mA to 20mA**: Indicates that the analog input signal is of type 4 to 20 mA. **2 = 20mA to 0mA**: Indicates that the analog input signal is of type 20 to 0 mA. **3 = 20mA to 4mA**: Indicates that the analog input signal is of type 20 to 4 mA. **4 = 0V to 10V**: Indicates that the analog input signal is of type 0 to 10 V. **5 = 10V to 0V**: Indicates that the analog input signal is of type 10 to 0 V. **6 = -10V to 10V**: Indicates that the analog input signal is of type -10 to 10 V. **7 = 10V to -10V**: Indicates that the analog input signal is of type 10 to -10 V. **8 = PTC**: Indicates that the analog input signal is of the PTC type.

C5.1.1 Slot X - Analog Inputs

C5.1.1.2 AI1 Filter
C5.1.1.7 AI2 Filter

Range: 0.00 ... 16.00 s **Default:** 0.10 s
Properties:

Description:
Allows to configure the RC constant of the low pass filter present at the analog input.

NOTE!
The analog input signal is filtered before applying gain and offset to the signal.

C5.1.1 Slot X - Analog Inputs

C5.1.1.3 AI1 Gain
C5.1.1.8 AI2 Gain

Range: 0.000 ... 9.999 **Default:** 1.000
Properties:

Description:
Gain setting for analog input.

C5.1.1 Slot X - Analog Inputs

C5.1.1.4 AI1 Offset
C5.1.1.9 AI2 Offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %
Properties:

Description:
Offset setting for analog input.

C5.1.1 Slot X - Analog Inputs

C5.1.1.5 AI1 Deadzone
C5.1.1.10 AI2 Deadzone

Range: 0.00 ... 100.00 % **Default:** 0.00 %
Properties:

Description:
Dead zone setting for analog input.

C5.1.2 Slot X - Analog Outputs

Allows to configure the analog outputs of the accessory connected to the slot.

The Figure 11.38 on page 163 illustrates how the analog output works.

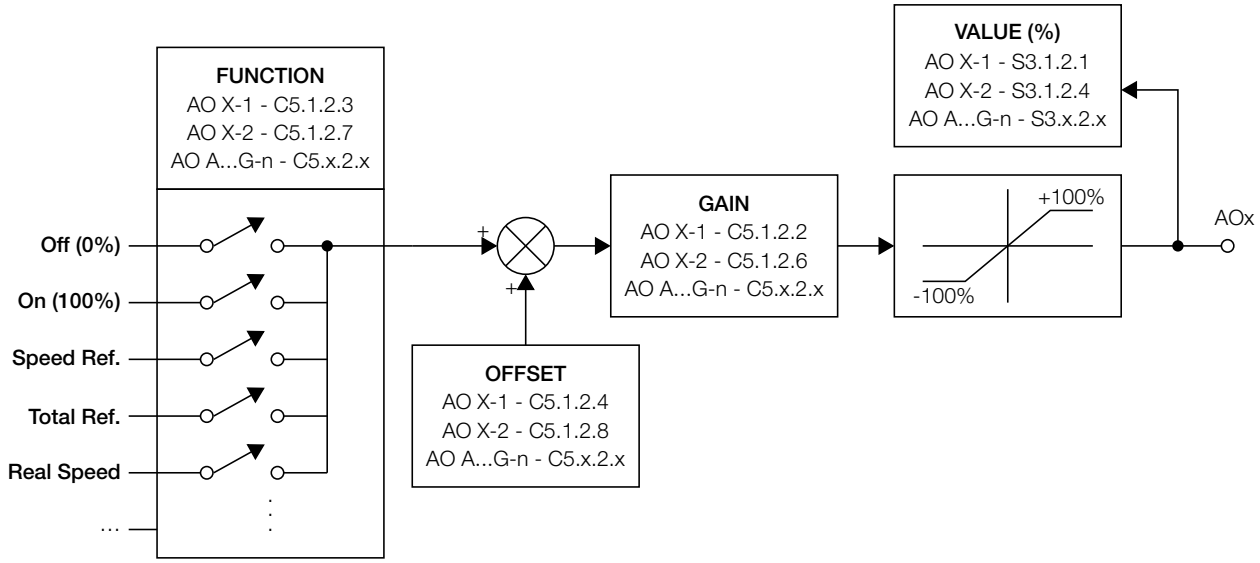


Figure 11.38: *Analog output block diagram*

C5.1.2 Slot X - Analog Outputs

C5.1.2.1 AO1 Signal Type
C5.1.2.5 AO2 Signal Type

Range: 0 ... 5 **Default:** 4
Properties:

Description:
Allows to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the ”DIP switches” present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	Indicates that the Analog Output signal of Slot X is type 0 to 20 mA.
1 = 4 to 20 mA	Indicates that the Analog Output signal of Slot X is type 4 to 20 mA.
2 = 20 to 0 mA	Indicates that the Analog Output signal of Slot X is type 20 to 0 mA.
3 = 20 to 4 mA	Indicates that the Analog Output signal of Slot X is type 20 to 4 mA.
4 = 0 to 10 V	Indicates that the Analog Output signal of Slot X is type 0 to 10 V.
5 = 10 to 0 V	Indicates that the Analog Output signal of Slot X is type 10 to 0 V.

C5.1.2 Slot X - Analog Outputs

C5.1.2.2 AO1 Gain
C5.1.2.6 AO2 Gain

Range: 0.000 ... 9.999 **Default:** 1.000
Properties:

Description:
Gain setting for analog output.

C5.1.2 Slot X - Analog Outputs

C5.1.2.3 AO1 Function
C5.1.2.7 AO2 Function

Range: 0 ... 21 **Default:** 4 (C5.1.2.3)
7 (C5.1.2.7)
Properties:

Description:
Setting the function to be used for the analog output.

Indication	Description
0 = Off (0%)	Imposes 0% on the output, regardless of the set gain and offset values.
1 = On (100%)	Imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	Imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	Imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	Imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.
7 = Output Current	Imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1).
8 ... 9 = Not used	Not used.
10 = Output Power	Imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 ... 12 = Not used	Not used.
13 = Motor Torque	Imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	Imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = PTC	Imposes on the output the recommended value for powering a PTC temperature sensor (10%). Gain and offset values do not affect the output.
16 = Motor Ixt	Imposes a value proportional to the motor overload level on the output (D4.1.5.1).
17 = Encoder Speed	Imposes on the output a value proportional to the current speed of the encoder (S2.1.4).
18 = Network	Imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	Imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	Imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

The Table 11.56 on page 164 illustrates the full-scale of the analog output functions.

Scale of the analog outputs indications	
Variable	**Full-scale**
Speed Ref. Total Speed Ref.	Maximum Speed Reference (C4.3.1.1.2)
Real Speed Encoder Speed	2.0 × [Maximum Speed Reference (C4.3.1.1.2)]
Output Current	1.5 × [Rated Current (S1.3.5)]
Output Power	1.5 × $\sqrt{3}$ × [Rated Current (S1.3.5)] × [Rated Voltage (C1.1.2)]
Torque Ref. Total Torque Ref.	Maximum Torque Reference (C4.3.3.2)
Motor Torque	400%
Motor Ixt Network	100%
SoftPLC	32767

Table 11.56: *AO function full-scale*

Analog outputs can not reproduce negative values on its terminals even though the HMI status shows negative values. It happens because all analog output signal types is not bipolar. If it is necessary to represent theses negative values using analog outputs, it is possible to set an offset of +100% and a gain set to 0.500. The analog output will remain to reproduce only non negative values, but it will possible to differentiate positive from negative values. The Figure 11.39 on page 165 illustrates this behavior for torque reference function and signal type set to 0 to 10 V. This setup

can be useful when analog output function is set to any function that can return negative value, such as motor torque and torque reference.

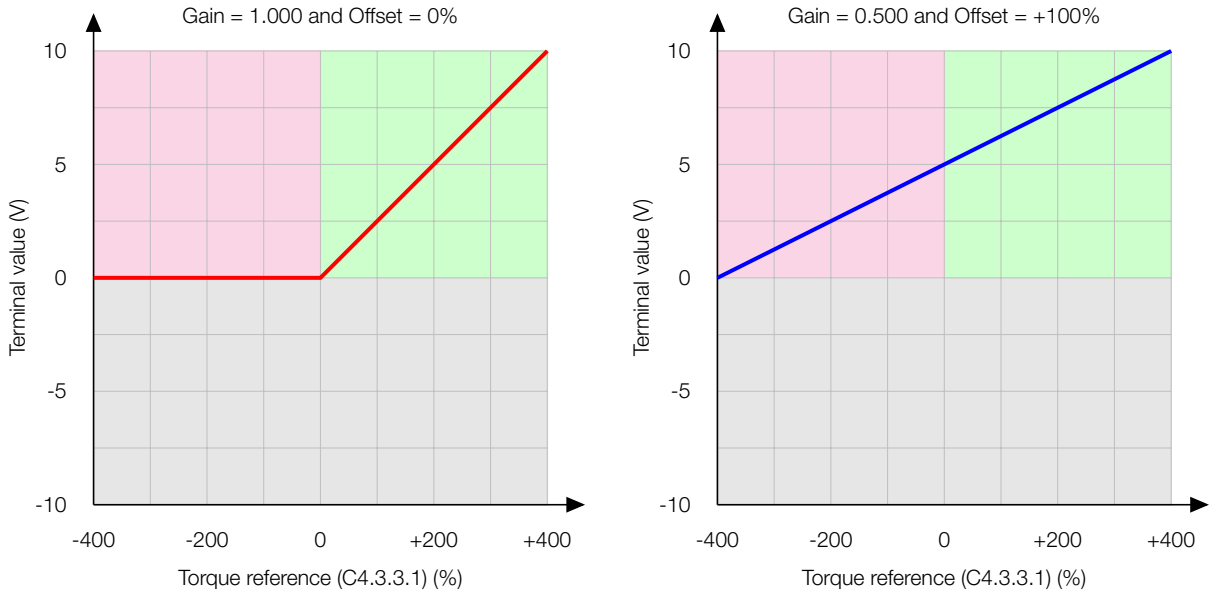


Figure 11.39: *AO configurations to represent negative values*

C5.1.2 Slot X - Analog Outputs		
C5.1.2.4 AO1 Offset		
C5.1.2.8 AO2 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Offset setting for analog output.

C5.1.3 Slot X - Digital Inputs

Allows to configure the digital inputs of the accessory connected to the slot.

The Figure 11.40 on page 166 illustrates how the frequency input works.

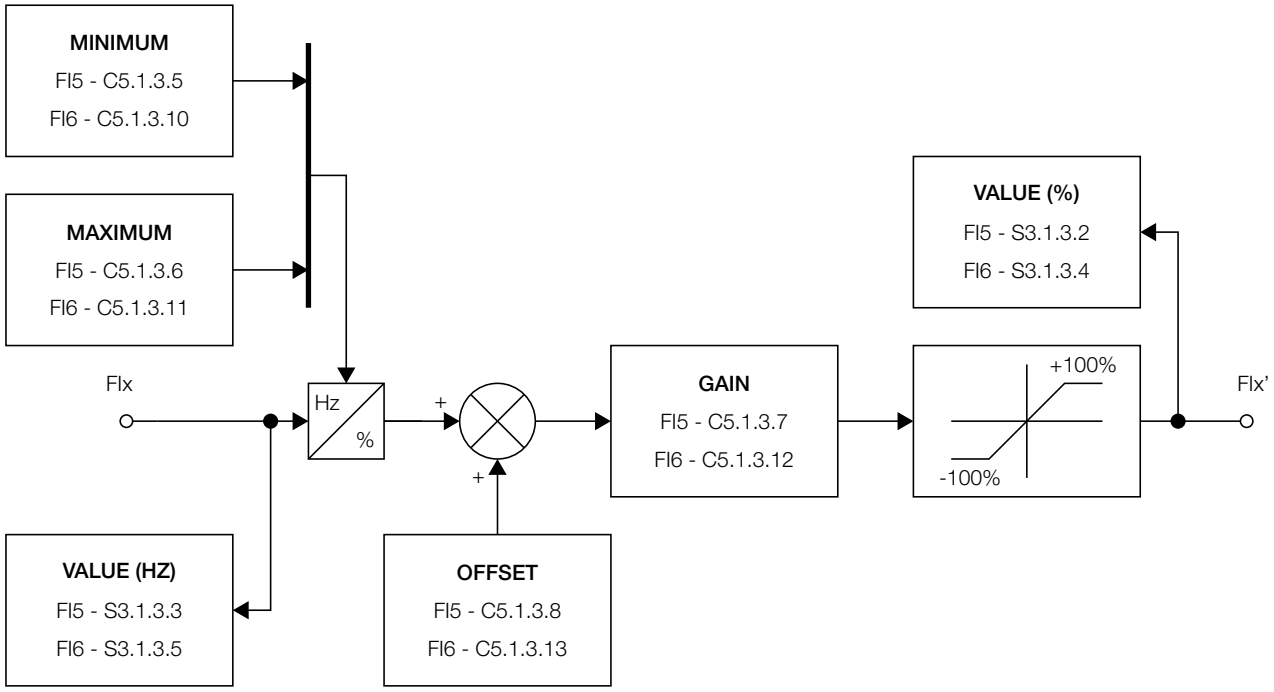


Figure 11.40: *Frequency input block diagram*

C5.1.3 Slot X - Digital Inputs

C5.1.3.4 DI5 Operation Mode
C5.1.3.9 DI6 Operation Mode

Range: 0 ... 3 **Default:** 0
Properties: Stopped

Description:
Allows to configure the operation mode settings for the digital input.

NOTE!
When the digital input is configured as a frequency input, it must be ensured that no command via DI is configured to use this same input. An example of a configuration that should be avoided would be to set the DI5 parameter of the Slot-X (C5.1.3.4) as frequency input and then set the general enable via DI command parameter (C4.2.3.1) to use this same input.

Indication	Description
0 = Polling	Indicates that the Digital Input is set to read via scan.
1 = Not used	Not used.
2 = Frequency	Indicates that the Digital Input is set to frequency input.
3 = Encoder	Indicates that the Digital Input is set to read the input signal frequency.

C5.1.3 Slot X - Digital Inputs

C5.1.3.5 FI5 Min Frequency
C5.1.3.10 FI6 Min Frequency

Range: 0 ... 32000 Hz **Default:** 0 Hz
Properties: Stopped

Description:
Allows to configure the zero scale for frequency input.

C5.1.3 Slot X - Digital Inputs		
C5.1.3.6 FI5 Max Frequency **C5.1.3.11 FI6 Max Frequency**		
Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
Allows to configure the full scale for frequency input.

C5.1.3 Slot X - Digital Inputs		
C5.1.3.7 FI5 Gain **C5.1.3.12 FI6 Gain**		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:	Stopped	

Description:
Gain setting for frequency input.

C5.1.3 Slot X - Digital Inputs		
C5.1.3.8 FI5 Offset **C5.1.3.13 FI6 Offset**		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:	Stopped	

Description:
Offset setting for frequency input.

C5.1.4 Slot X - Digital Outputs

Allows to configure the digital outputs of the accessory connected to the slot.

The Figure 11.41 on page 167 illustrates how the frequency output works.

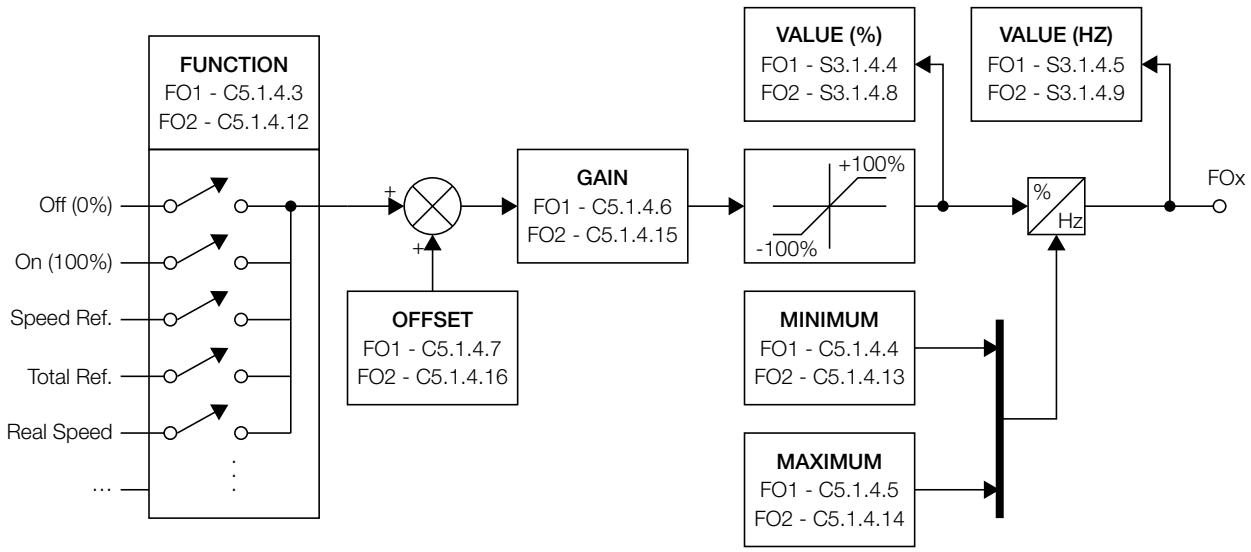


Figure 11.41: *Frequency output block diagram*

C5.1.4 Slot X - Digital Outputs		
C5.1.4.1 DO1 Operation Mode **C5.1.4.10 DO2 Operation Mode**		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
Allows to configure the operation mode settings for the digital output.

Indication	Description
0 = Polling	Indicates that the Digital Output is set to the ON/OFF mode.
1 = Frequency	Indicates the the Digital Output is set to the Frequency Output mode.

C5.1.4 Slot X - Digital Outputs

C5.1.4.2 DO1 Function
C5.1.4.11 DO2 Function

Range: 0 ... 30 **Default:** 22 (C5.1.4.2)
19 (C5.1.4.11)

Properties:

Description:
Setting the function to be used for the digital output.

Indication	Description
0 = OFF	The Digital Output will always go to the inactive state.
1 = Allways ON	The Digital Output will always go to the active state.
2 = N* > Nx	The Digital Output will go to the active state when the speed reference (N*) is greater than the value set in Nx.
3 = N > Nx	The Digital Output will go to the active state when the motor speed (N) is greater than the value set in Nx.
4 = N < Ny	The Digital Output will go to the active state when the motor speed (N) is smaller than the value set in Ny.
5 = N = N*	The Digital Output will go to the active state when the motor speed (N) equals the speed reference value (N*).
6 ... 7 = Not used	Not used.
8 = F > Fx	The Digital Output will go to the active state when the motor frequency (F) is greater than the value set in Fx.
9 = Is > Ix	The Digital Output will go to the active state when the output current (Is) is greater than the value set in Ix.
10 = Is < Ix	The Digital Output will go to the active state when the output current (Is) is smaller than the value set in Ix.
11 = Torque > Tx	The Digital Output will go to the active state when the motor torque (Torque) is greater than the value set in Tx.
12 = Torque < Tx	The Digital Output will go to the active state when the motor torque (Torque) is smaller than the value set in Tx.
13 = Time Enabled > Hx	The Digital Output will go to the active state when the enabled hour counter is greater than the value set in Hx.
14 ... 15 = Not used	Not used.
16 = Local Mode	The Digital Output will go to the active state when the commands and references are defined by the Local mode.
17 = Remote 1 Mode	The Digital Output will go to the active state when the commands and references are defined by the Remote 1 mode.
18 = Remote 2 Mode	The Digital Output will go to the active state when the commands and references are defined by the Remote 2 mode.
19 = Run	The Digital Output will go to the active state when the inverter is in the Run state.
20 = Ready	The Digital Output will go to the active state when the inverter is in the Ready state.
21 = STO	The Digital Output will go to the active state when the inverter is in the STO state.
22 = No Fault	The Digital Output will go to the active state when the inverter is not in the Fault state.
23 = Fault	The Digital Output will go to the the active state when the inverter is in the Fault state.
24 = No Alarm	The Digital Output will go to the active state when the inverter is not indicating an Alarm.
25 = No Fault/Alarm	The Digital Output will go to the active state when the inverter is not in the Fault state and is not indicating an Alarm.
26 = Network	The Digital Output will go to the active state when the command received via Network is active.
27 = SoftPLC	The Digital Output will go to the active state when the command received via SoftPLC is active.
28 = Forward	The Digital Output will go to the active state when the inverter is running in the forward direction.
29 = Ride-Through	The Digital Output will go to the active state when the Ride-Through function is acting.

Indication	Description
30 = Pre-Charge OK	The Digital Output will go to the active state when the Pre-charge function indicates that it was executed successfully.

C5.1.4 Slot X - Digital Outputs

C5.1.4.3 FO1 Function
C5.1.4.12 FO2 Function

Range: 0 ... 21 **Default:** 0
Properties: Stopped

Description:
Setting the function to be used for the frequency output.

Indication	Description
0 = Off (0%)	Imposes 0% on the output, regardless of the set gain and offset values.
1 = On (100%)	Imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	Imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	Imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	Imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.
7 = Output Current	Imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1).
8 ... 9 = Not used	Not used.
10 = Output Power	Imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 ... 12 = Not used	Not used.
13 = Motor Torque	Imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	Imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = Not used	Not used.
16 = Motor Ixt	Imposes a value proportional to the motor overload level on the output (D4.1.5.1).
17 = Encoder Speed	Imposes on the output a value proportional to the current speed of the encoder (S2.1.4).
18 = Network	Imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	Imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	Imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

The Table 11.61 on page 171 illustrates the full-scale of the frequency output functions.

Scale of the frequency outputs indications	
Variable	**Full-scale**
Speed Ref. Total Speed Ref.	Maximum Speed Reference (C4.3.1.1.2)
Real Speed Encoder Speed	2.0 × [Maximum Speed Reference (C4.3.1.1.2)]
Output Current	1.5 × [Rated Current (S1.3.5)]
Output Power	1.5 × $\sqrt{3}$ × [Rated Current (S1.3.5)] × [Rated Voltage (C1.1.2)]
Torque Ref. Total Torque Ref.	Maximum Torque Reference (C4.3.3.2)
Motor Torque	400%
Motor Ixt Network	100%
SoftPLC	32767

Table 11.61: *FO function full-scale*

Frequency outputs can not reproduce negative values on its terminals even though the HMI status shows negative values. It happens because all frequency outputs respect their minimum value and this value is reached at 0%. If it is necessary to represent theses negative values using frequency outputs, it is possible to set an offset of +100% and a gain set to 0.500. The frequency output will remain to reproduce only non negative values, but it will possible to differentiate positive from negative values. The Figure 11.42 on page 171 illustrates this behavior for the torque reference function. The minimum and maximum frequency limits are set according to the default value setup. This setup can be useful when frequency output function is set to any function that can return negative value, such as motor torque and torque reference.

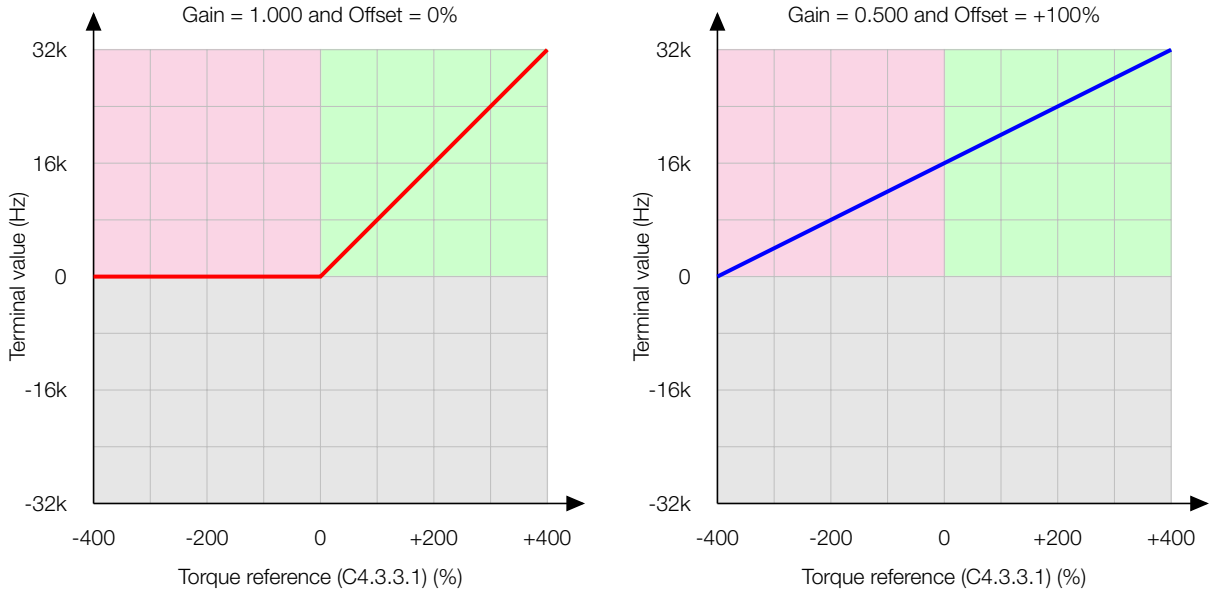


Figure 11.42: *FO configurations to represent negative values*

C5.1.4 Slot X - Digital Outputs

C5.1.4.4 FO1 Min Frequency
C5.1.4.13 FO2 Min Frequency

Range:	0 ... 32000 Hz	**Default:** 0 Hz
Properties:	Stopped	

Description:
Allows to configure the zero scale for frequency output.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.5 FO1 Max Frequency **C5.1.4.14 FO2 Max Frequency**		
Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
Allows to configure the full scale for frequency output.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.6 FO1 Gain **C5.1.4.15 FO2 Gain**		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:	Stopped	

Description:
Gain setting for frequency output.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.7 FO1 Offset **C5.1.4.16 FO2 Offset**		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:	Stopped	

Description:
Offset setting for frequency output.

C5.1.5 Slot X - Encoder

Allows to configure the encoder accessory connected to the slot.

C5.1.5 Slot X - Encoder		
C5.1.5.1 Pulses Number		
Range:	1 ... 65535 ppr	**Default:** 1024 ppr
Properties:	Stopped	

Description:
Setting the number of pulses that the connected encoder generates during one full revolution.

C5.2 Slot A

Allows viewing the status of the configuration parameters of slot.

C5.2.1 Slot A - Analog Inputs to C5.8.1 Slot G - Analog Inputs

Allows to configure the analog inputs of the accessory connected to the slot.

C5.2.1 Slot A - Analog Inputs
C5.3.1 Slot B - Analog Inputs
C5.4.1 Slot C - Analog Inputs
C5.5.1 Slot D - Analog Inputs
C5.6.1 Slot E - Analog Inputs
C5.7.1 Slot F - Analog Inputs
C5.8.1 Slot G - Analog Inputs
.1 AI1 Settings
.6 AI2 Settings
.11 AI3 Settings

Range: 0 ... 5 Bit **Default:** 16
Properties:

Description:
Allows to configure the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling of broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 2 … 5 Signal Setting	Selection of the analog input signal type. **0 = 0mA to 20mA**: Indicates that the analog input signal is of type 0 to 20 mA. **1 = 4mA to 20mA**: Indicates that the analog input signal is of type 4 to 20 mA. **2 = 20mA to 0mA**: Indicates that the analog input signal is of type 20 to 0 mA. **3 = 20mA to 4mA**: Indicates that the analog input signal is of type 20 to 4 mA. **4 = 0V to 10V**: Indicates that the analog input signal is of type 0 to 10 V. **5 = 10V to 0V**: Indicates that the analog input signal is of type 10 to 0 V. **6 = -10V to 10V**: Indicates that the analog input signal is of type -10 to 10 V. **7 = 10V to -10V**: Indicates that the analog input signal is of type 10 to -10 V. **8 = PTC**: Indicates that the analog input signal is of the PTC type.

C5.2.1 Slot A - Analog Inputs
C5.3.1 Slot B - Analog Inputs
C5.4.1 Slot C - Analog Inputs
C5.5.1 Slot D - Analog Inputs
C5.6.1 Slot E - Analog Inputs
C5.7.1 Slot F - Analog Inputs
C5.8.1 Slot G - Analog Inputs
.2 AI1 Filter
.7 AI2 Filter
.12 AI3 Filter

Range: 0.00 ... 16.00 s **Default:** 0.10 s
Properties:

Description:
Allows to configure the RC constant of the low pass filter present at the analog input.

NOTE!
The analog input signal is filtered before applying gain and offset to the signal.

C5.2.1 Slot A - Analog Inputs		
C5.3.1 Slot B - Analog Inputs		
C5.4.1 Slot C - Analog Inputs		
C5.5.1 Slot D - Analog Inputs		
C5.6.1 Slot E - Analog Inputs		
C5.7.1 Slot F - Analog Inputs		
C5.8.1 Slot G - Analog Inputs		
.3 AI1 Gain		
.8 AI2 Gain		
.13 AI3 Gain		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:		

Description:
Gain setting for analog input.

C5.2.1 Slot A - Analog Inputs		
C5.3.1 Slot B - Analog Inputs		
C5.4.1 Slot C - Analog Inputs		
C5.5.1 Slot D - Analog Inputs		
C5.6.1 Slot E - Analog Inputs		
C5.7.1 Slot F - Analog Inputs		
C5.8.1 Slot G - Analog Inputs		
.4 AI1 Offset		
.9 AI2 Offset		
.14 AI3 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Offset setting for analog input.

C5.2.1 Slot A - Analog Inputs		
C5.3.1 Slot B - Analog Inputs		
C5.4.1 Slot C - Analog Inputs		
C5.5.1 Slot D - Analog Inputs		
C5.6.1 Slot E - Analog Inputs		
C5.7.1 Slot F - Analog Inputs		
C5.8.1 Slot G - Analog Inputs		
.5 AI1 Dead Zone		
.10 AI2 Dead Zone		
.15 AI3 Dead Zone		
Range:	0.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Dead zone setting for analog input.

C5.2.2 Slot A - Analog Outputs to C5.8.2 Slot G - Analog Outputs

Allows to configure the analog outputs of the accessory connected to the slot.

C5.2.2 Slot A - Analog Outputs
C5.3.2 Slot B - Analog Outputs
C5.4.2 Slot C - Analog Outputs
C5.5.2 Slot D - Analog Outputs
C5.6.2 Slot E - Analog Outputs
C5.7.2 Slot F - Analog Outputs
C5.8.2 Slot G - Analog Outputs
.1 AO1 Signal Type
.5 AO2 Signal Type
Range: 0 ... 7 **Default:** 4
Properties:

Description:
Allows to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the ”DIP switches” present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	Indicates that the Analog Output signal is type 0 to 20 mA.
1 = 4 to 20 mA	Indicates that the Analog Output signal is type 4 to 20 mA.
2 = 20 to 0 mA	Indicates that the Analog Output signal is type 20 to 0 mA.
3 = 20 to 4 mA	Indicates that the Analog Output signal is type 20 to 4 mA.
4 = 0 to 10 V	Indicates that the Analog Output signal is type 0 to 10 V.
5 = 10 to 0 V	Indicates that the Analog Output signal is type 10 to 0 V.
6 ... 7 = Not used	Not used.

C5.2.2 Slot A - Analog Outputs
C5.3.2 Slot B - Analog Outputs
C5.4.2 Slot C - Analog Outputs
C5.5.2 Slot D - Analog Outputs
C5.6.2 Slot E - Analog Outputs
C5.7.2 Slot F - Analog Outputs
C5.8.2 Slot G - Analog Outputs
.2 AO1 Gain
.6 AO2 Gain
Range: 0.000 ... 9.999 **Default:** 1.000
Properties:

Description:
Gain setting for analog output.

C5.2.2 Slot A - Analog Outputs
C5.3.2 Slot B - Analog Outputs
C5.4.2 Slot C - Analog Outputs
C5.5.2 Slot D - Analog Outputs
C5.6.2 Slot E - Analog Outputs
C5.7.2 Slot F - Analog Outputs
C5.8.2 Slot G - Analog Outputs
.3 AO1 Function
.7 AO2 Function
Range: 0 ... 21 **Default:** 0
Properties:

Description:
Setting the function to be used for the analog output.

Indication	Description

Indication	Description
0 = Off (0%)	Imposes 0% on the output, regardless of the set gain and offset values.
1 = On (100%)	Imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	Imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	Imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	Imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.
7 = Output Current	Imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1).
8 ... 9 = Not used	Not used.
10 = Output Power	Imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 ... 12 = Not used	Not used.
13 = Motor Torque	Imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	Imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = PTC	Imposes on the output the recommended value for powering a PTC temperature sensor (10%). Gain and offset values do not affect the output.
16 = Motor Ixt	Imposes a value proportional to the motor overload level on the output (D4.1.5.1).
17 = Encoder Speed	Imposes on the output a value proportional to the current speed of the encoder (S2.1.4).
18 = Network	Imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	Imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	Imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

C5.2.2 Slot A - Analog Outputs
C5.3.2 Slot B - Analog Outputs
C5.4.2 Slot C - Analog Outputs
C5.5.2 Slot D - Analog Outputs
C5.6.2 Slot E - Analog Outputs
C5.7.2 Slot F - Analog Outputs
C5.8.2 Slot G - Analog Outputs

.4 AO1 Offset
.8 AO2 Offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %
Properties:

Description:
Offset setting for analog output.

C5.2.4 Slot A - Digital Outputs to C5.8.4 Slot G - Digital Outputs

Allows to configure the digital outputs of the accessory connected to the slot.

C5.2.4 Slot A - Digital Outputs
C5.3.4 Slot B - Digital Outputs
C5.4.4 Slot C - Digital Otputs
C5.5.4 Slot D - Digital Outputs
C5.6.4 Slot E - Digital Outputs
C5.7.4 Slot F - Digital Outputs
C5.8.4 Slot G - Digital Outputs

.1 DO1 Function
.4 DO2 Function
.7 DO3 Function
.10 DO4 Function
.13 DO5 Function
.16 DO6 Function
.19 DO7 Function
.22 DO8 Function

Range: 0 ... 30 **Default:** 22 (C5.2.4.1)
3 (C5.2.4.4)
2 (C5.2.4.7)
0 (Others)

Properties: Stopped

Description:
Setting the function to be used for the digital output.

Indication	Description
0 = OFF	The Digital Output will always go to the inactive state.
1 = Allways ON	The Digital Output will always go to the active state.
2 = N* > Nx	The Digital Output will go to the active state when the speed reference (N*) is greater than the value set in Nx.
3 = N > Nx	The Digital Output will go to the active state when the motor speed (N) is greater than the value set in Nx.
4 = N < Ny	The Digital Output will go to the active state when the motor speed (N) is smaller than the value set in Ny.
5 = N = N*	The Digital Output will go to the active state when the motor speed (N) equals the speed reference value (N*).
6 ... 7 = Not used	Not used.
8 = F > Fx	The Digital Output will go to the active state when the motor frequency (F) is greater than the value set in Fx.
9 = Is > Ix	The Digital Output will go to the active state when the output current (Is) is greater than the value set in Ix.
10 = Is < Ix	The Digital Output will go to the active state when the output current (Is) is smaller than the value set in Ix.
11 = Torque > Tx	The Digital Output will go to the active state when the motor torque (Torque) is greater than the value set in Tx.
12 = Torque < Tx	The Digital Output will go to the active state when the motor torque (Torque) is smaller than the value set in Tx.
13 = Time Enabled > Hx	The Digital Output will go to the active state when the enabled hour counter is greater than the value set in Hx.
14 ... 15 = Not used	Not used.
16 = Local Mode	The Digital Output will go to the active state when the commands and references are defined by the Local mode.
17 = Remote 1 Mode	The Digital Output will go to the active state when the commands and references are defined by the Remote 1 mode.
18 = Remote 2 Mode	The Digital Output will go to the active state when the commands and references are defined by the Remote 2 mode.
19 = Run	The Digital Output will go to the active state when the inverter is in the Run state.
20 = Ready	The Digital Output will go to the active state when the inverter is in the Ready state.
21 = STO	The Digital Output will go to the active state when the inverter is in the STO state.
22 = No Fault	The Digital Output will go to the active state when the inverter is not in the Fault state.
23 = Fault	The Digital Output will go to the the active state when the inverter is in the Fault state.
24 = No Alarm	The Digital Output will go to the active state when the inverter is not indicating an Alarm.

Indication	Description
25 = No Fault/Alarm	The Digital Output will go to the active state when the inverter is not in the Fault state and is not indicating an Alarm.
26 = Network	The Digital Output will go to the active state when the command received via Network is active.
27 = SoftPLC	The Digital Output will go to the active state when the command received via SoftPLC is active.
28 = Forward	The Digital Output will go to the active state when the inverter is running in the forward direction.
29 = Ride-Through	The Digital Output will go to the active state when the Ride-Through function is acting.
30 = Pre-Charge OK	The Digital Output will go to the active state when the Pre-charge function indicates that it was executed successfully.

C5.2.5 Slot A - Encoder to C5.8.5 Slot G - Encoder

Allows to configure the encoder accessory connected to the slot.

C5.2.5 Slot A - Encoder
C5.3.5 Slot B - Encoder
C5.4.5 Slot C - Encoder
C5.5.5 Slot D - Encoder
C5.6.5 Slot E - Encoder
C5.7.5 Slot F - Encoder
C5.8.5 Slot G - Encoder

.1 Numb. Pulses

Range: 1 ... 65535 ppr **Default:** 1024 ppr
Properties: Stopped

Description:
Setting the number of pulses that the connected encoder generates during one full revolution.

C5.2.5 Slot A - Encoder
C5.3.5 Slot B - Encoder
C5.4.5 Slot C - Encoder
C5.5.5 Slot D - Encoder
C5.6.5 Slot E - Encoder
C5.7.5 Slot F - Encoder
C5.8.5 Slot G - Encoder

.2 Settings

Range: 0 ... 7 Bit **Default:** 0
Properties:

Description:
Allows to configure the broken cable detection, zero search function, and encoder signal direction.

Bit	Value/Description
Bit 0 … 1 Broken Cable A	Allows setting the fault/alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 2 … 3 Broken Cable B	Allows setting the fault/alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 4 … 5 Broken Cable Z	Allows setting the fault/alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 6 Search Zero	Allows starting the execution of the search zero function. When the search zero function is activated, the number of revolutions and the fraction of revolution measured will be zeroed at the next occurrence of a pulse in the encoder Z signal. This bit will be changed to 0 after the function has been completed. **0 = Disabled**: Function disabled **1 = Enabled**: Function enabled
Bit 7 Signal Direction	Allows selecting the sequence of signals A and B that represent the direct rotation direction **0 = A/B**: Direct direction when A rising edge occurs before B rising edge **1 = B/A**: Direct direction when B rising edge occurs before A rising edge

C5.2.6 Slot A - Temperatures to C5.8.6 Slot G-Temperatures

Allows to configure the temperature accessory connected to the slot.

C5.2.6 Slot A - Temperatures
C5.3.6 Slot B - Temperatures
C5.4.6 Slot C - Temperatures
C5.5.6 Slot D - Temperatures
C5.6.6 Slot E - Temperatures
C5.7.6 Slot F - Temperatures
C5.8.6 Slot G-Temperatures

.1 Sensor Type

Range: 0 ... 3 **Default:** 0
Properties: Stopped

Description:
Sets the sensor type that will be connected to the accessory.

NOTE!
Individual selection by sensor is not possible. All sensors connected to the same accessory must be of the same type.

Indication	Description
0 = PT100	PT100 Sensor.
1 = PT1000	PT1000 Sensor.
2 = Single PTC	Single PTC Sensor.
3 = Triple PTC	Triple PTC Sensor.

C5.2.6 Slot A - Temperatures
C5.3.6 Slot B - Temperatures
C5.4.6 Slot C - Temperatures
C5.5.6 Slot D - Temperatures
C5.6.6 Slot E - Temperatures
C5.7.6 Slot F - Temperatures
C5.8.6 Slot G-Temperatures

.2 Overtemperature Config.

Range:	0 ... 11 Bit	**Default:** 0
Properties:	Stopped	

Description:
Enables the overtemperature protections for each temperature sensor.

Bit	Value/Description
Bit 0 ... 1 S1 Sensor F/A	Enables the overtemperature protections for temperature sensor 1. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.
Bit 2 ... 3 S2 Sensor F/A	Enables the overtemperature protections for temperature sensor 2. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.
Bit 4 ... 5 S3 Sensor F/A	Enables the overtemperature protections for temperature sensor 3. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.
Bit 6 ... 7 S4 Sensor F/A	Enables the overtemperature protections for temperature sensor 4. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.
Bit 8 ... 9 S5 Sensor F/A	Enables the overtemperature protections for temperature sensor 5. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.
Bit 10 ... 11 S6 Sensor F/A	Enables the overtemperature protections for temperature sensor 6. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Alarm and Fault**: Alarm and fault enabled. **3 = Inactive**: Protections disabled.

C5.2.6 Slot A - Temperatures
C5.3.6 Slot B - Temperatures
C5.4.6 Slot C - Temperatures
C5.5.6 Slot D - Temperatures
C5.6.6 Slot E - Temperatures
C5.7.6 Slot F - Temperatures
C5.8.6 Slot G-Temperatures

.3 Measur. Error Config.

Range:	0 ... 11 Bit	**Default:** 0
Properties:	Stopped	

Description:
Enables measurement error protections (broken sensor cable, short-circuit sensor) for each temperature sensor.

NOTE!
Protections and alarms will occur when the temperature read on the sensors is less than or equal to -20 °C during a 5 minute interval. Resetting of protections and alarms is enabled for temperature values greater than -15 °C.

Bit	Value/Description
Bit 0 ... 1 S1 Sensor F/A	Enables the measurement error protections for temperature sensor 1. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 2 ... 3 S2 Sensor F/A	Enables the measurement error protections for temperature sensor 2. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 4 ... 5 S3 Sensor F/A	Enables the measurement error protections for temperature sensor 3. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 6 ... 7 S4 Sensor F/A	Enables the measurement error protections for temperature sensor 4. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 8 ... 9 S5 Sensor F/A	Enables the measurement error protections for temperature sensor 5. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.
Bit 10 ... 11 S6 Sensor F/A	Enables the measurement error protections for temperature sensor 6. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Protections disabled.

C5.2.6 Slot A - Temperatures
C5.3.6 Slot B - Temperatures
C5.4.6 Slot C - Temperatures
C5.5.6 Slot D - Temperatures
C5.6.6 Slot E - Temperatures
C5.7.6 Slot F - Temperatures
C5.8.6 Slot G-Temperatures
.4 Sensor Temp1 Setpoint
.5 Sensor Temp2 Setpoint
.6 Sensor Temp3 Setpoint
.7 Sensor Temp4 Setpoint
.8 Sensor Temp5 Setpoint
.9 Sensor Temp6 Setpoint

Range:	-100.0 ... 250.0 °C	**Default:** 0.0 °C
Properties:	Stopped	

Description:
Allows to configure the sensor overtemperature protection setpoint.

C5.3 Slot B

Allows viewing the status of the configuration parameters of slot.

C5.4 Slot C

Allows viewing the status of the configuration parameters of slot.

C5.5 Slot D

Allows viewing the status of the configuration parameters of slot.

C5.6 Slot E

Allows viewing the status of the configuration parameters of slot.

C5.7 Slot F

Allows viewing the status of the configuration parameters of slot.

C5.8 Slot G

Allows viewing the status of the configuration parameters of slot.

C5.9 Levels Operation DOs

Allows viewing and configuring the operation conditions of the digital outputs (DOs).

C5.9 Levels Operation DOs
C5.9.1 Fx Frequency
Range: 0.0 ... 300.0 Hz **Default:** 4.0 Hz
Properties:

Description:
Allows viewing and setting the frequency level (Fx) used in function (F > Fx) for Digital Outputs.

C5.9 Levels Operation DOs
C5.9.2 Fx Hysteresis
Range: 0.0 ... 15.0 Hz **Default:** 2.0 Hz
Properties:

Description:
Allows viewing and setting the frequency hysteresis level used in function (F > Fx) for Digital Outputs.

C5.9 Levels Operation DOs
C5.9.3 Nx/Ny Hysteresis
Range: 0 ... 900 rpm **Default:** 18 rpm
Properties:

Description:
Allows viewing and setting the speed hysteresis level used in functions (N* > Nx), (N > Nx), (N < Ny) and (N > Nx and Nt > Nx) for Digital Outputs.

C5.9 Levels Operation DOs
C5.9.4 Nx Speed
Range: 0 ... 18000 rpm **Default:** 120 rpm
Properties:

Description:
Allows viewing and setting the speed level (Nx) used in function (N > Nx) for Digital Outputs.

C5.9 Levels Operation DOs
C5.9.5 Ny Speed
Range: 0 ... 18000 rpm **Default:** 1800 rpm
Properties:

Description:
Allows viewing and setting the speed level (Ny) used in function (N < Ny) for Digital Outputs.

C5.9 Levels Operation DOs
C5.9.6 Ix Current
Range: 0.0 ... 200.0 % **Default:** 100.0 %
Properties:

Description:
Allows viewing and setting the current level (Ix) used in functions (I > ix) and (I < ix) for Digital Outputs.

C5.9 Levels Operation DOs		
C5.9.8 N = N* Band		
Range:	0 ... 18000 rpm	**Default:** 18 rpm
Properties:		

Description:
Allows viewing and setting the speed range within which the reference and speed will be considered to be at the same value. Used in function (N* = N) for Digital Outputs.

C5.9 Levels Operation DOs		
C5.9.9 Tx Torque		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:		

Description:
Allows viewing and setting the torque level (Tx) used in functions (T > Tx) and (T < Tx) for Digital Outputs.

C5.9 Levels Operation DOs		
C5.9.10 Hx Time		
Range:	0 ... 65536 h	**Default:** 4320 h
Properties:		

Description:
Allows viewing and setting the number of hours (Hx) used in function (Hours enabled > Hx) for Digital Outputs.

C6 RAMPS

Allows setting the acceleration and deceleration times of the speed references, as well as selecting between "1ª Ramp" and "2ª Ramp".

C6.1 Speed Control Ramps

Settings of the speed ramps.

C6.1 Speed Control Ramps		
C6.1.1 Acceleration Time		
Range:	0.1 ... 999.9 s	**Default:** 20.0 s
Properties:		

Description:
Sets the acceleration time for the speed reference "1ª Ramp" . This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed Control Ramps		
C6.1.2 Deceleration Time		
Range:	0.1 ... 999.9 s	**Default:** 20.0 s
Properties:		

Description:
Adjusts the deceleration time of the 1st speed reference ramp. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.2 to 0 rpm.

C6.1 Speed Control Ramps

C6.1.3 1st/2nd Ramp

Range:	0 ... 8	**Default:** 0
Properties:	Stopped	

Description:
This parameter sets the source of the command that will select between the Ramp 1 and the Ramp 2.

- "1ª Ramp" means that the acceleration and deceleration ramps are following the values set in C6.1.1 and C6.1.2 respectively;
- "2ª Ramp" means that the acceleration and deceleration ramps are following the values set in C6.1.4 and C6.1.5 respectively;

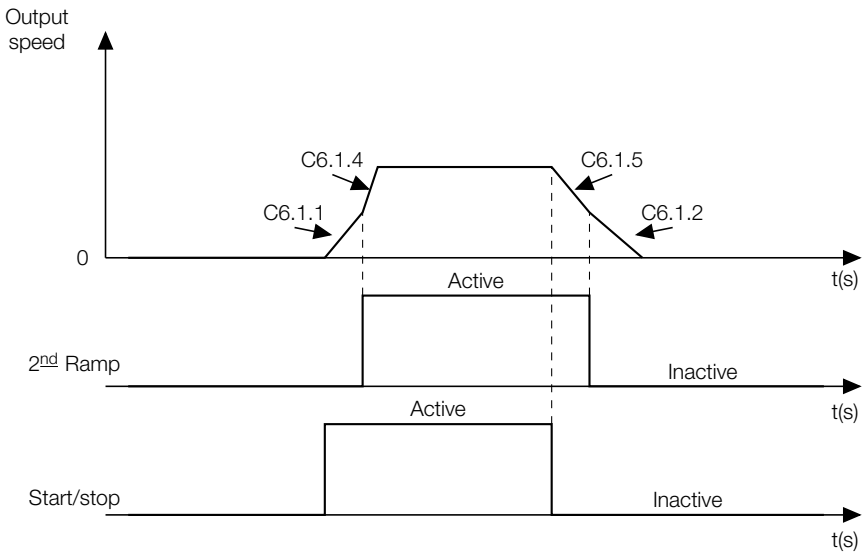


Figure 11.43: *Operation of command 1ª/2ª ramp*

Indication	Description
0 = 1st Ramp	Fixed at 1ª Ramp
1 = 2nd Ramp	Fixed at 2ª Ramp
2 = Serial	Change via 2ª Ramp command of the RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	Change via 2ª Ramp command of the CAN/CANop/DNet Control Word
5 = SoftPLC	Change via SoftPLC function command
6 = Not used	Not used.
7 = Ethernet	Change via 2ª Ramp command of the Ethernet Control Word
8 = DI Ramp Selection	Change via command of the digital input chosen by the user. The digital input can be set in C4.2.3.10

C6.1 Speed Control Ramps

C6.1.4 2nd. Ramp. Accel. Time

Range:	0.1 ... 999.9 s	**Default:** 10.0 s
Properties:		

Description:
Adjusts the aceleration time of the 2nd speed reference ramp. This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed Control Ramps
C6.1.5 2nd. Ramp Decel. Time
Range: 0.1 ... 999.9 s **Default:** 10.0 s
Properties:

Description:
Adjusts the deceleration time of the 2nd speed reference ramp. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.1 to 0 rpm.

C6.1 Speed Control Ramps
C6.1.6 Quick Stop Time
Range: 0.1 ... 999.9 s **Default:** 5.0 s
Properties:

Description:
Sets the time in seconds to linearly decelerate from the maximum speed (defined in C4.3.1.1.2) to 0 when the ”Quick Stop” function is activated.

C6.2 Torque Control Ramps

Sets the acceleration and deceleration times of the torque reference signal.

C6.2 Torque Control Ramps
C6.2.1 Increment Ramp
Range: 0.1 ... 999.9 s **Default:** 20.0 s
Properties:

Description:
Sets the acceleration time for the torque reference ramp. This value corresponds to the time that the ramp varies from the minimum value C4.3.3.3 to the maximum value C4.3.3.2.

C6.2 Torque Control Ramps
C6.2.2 Decrement Ramp
Range: 0.1 ... 999.9 s **Default:** 20.0 s
Properties:

Description:
Sets the deceleration time for the torque reference ramp. This value corresponds to the time that the ramp varies from the maximum value C4.3.3.2 to the minimum value C4.3.3.3.

C7 PROTECTIONS

Allows configuring the operation, levels and tripping time of the CFW900 and motor protections.

C7.1 Missing Phase Pow.Supply

Allows configuring the Power Supply Phase Loss protection.

C7.1 Missing Phase Pow.Supply
C7.1.1 Line Phase Loss Time
Range: 0 ... 60 s **Default:** 3 s
Properties:

Description:
Sets the time to indicate the CFW900 power supply phase loss fault (F006).

C7.1 Missing Phase Pow.Supply		
C7.1.2 Line Phase Loss Trigger		
Range:	0.1 ... 5.0	**Default:** 1.0
Properties:		

Description:
Sets the power supply phase loss protection tripping level.

C7.2 Ground Fault

Allows setting the Ground Fault protection.

C7.2 Ground Fault		
C7.2.1 Ground Fault Setting		
Range:	0 ... 2	**Default:** 1
Properties:	Stopped	

Description:
Disables or sets the current level for earth fault protection (F074).

Once enabled, you can choose between two levels of fault tripping:

- Standard level: 50% of rated HD current;
- Extended level: 150% of rated HD current.

Indication	Description
0 = Disabled	Ground fault protection disabled.
1 = Fault Enab.; Stand.Level	Ground fault protection enabled with default level.
2 = Fault Enab.; Extend.Level	Ground fault protection enabled with extended level.

C7.4 Motor Overload Protection

Allows setting the Motor Overload protection.

C7.4 Motor Overload Protection		
C7.4.1 Protection Enable		
Range:	0 ... 3	**Default:** 1
Properties:	Stopped	

Description:
Enables the motor overload function protection and alarm.

Indication	Description
0 = Disable	Overload protection is disabled. No faults or alarms will be generated for the motor operation in the overload condition.
1 = Fault/Alarm	The inverter will display an alarm (A046) when the motor overload reaches the level set in C7.4.2 and will generate fault (F072) when the motor overcurrent reaches the overload protection tripping value. Once the fault is generated, the inverter will be disabled.
2 = Fault	Only fault (F072) will be generated when the motor overload reaches the overload protection tripping level, and the inverter will be disabled.
3 = Alarm	Only alarm (A046) will be generated when the motor current reaches the value set in C7.4.2; the inverter will continue operating.

C7.4 Motor Overload Protection		
C7.4.2 Ixt Alarm Level		
Range:	10 ... 100 %	**Default:** 70 %
Properties:	Stopped	

Description:
Defines the motor overload protection alarm tripping level (A046). It is expressed as a percentage of the Overload time limit value.

It will only be effective when C7.4.1 is set to 1 (Fault/Alarm) or 3 (Alarm).

C7.4 Motor Overload Protection		
C7.4.3 Overl.Curr.100% Speed		
Range:	0 ... 200 %	**Default:** 100 %
Properties:		

Description:
Sets the value of the motor current used for the motor overload protection with 100% of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor Overload Protection		
C7.4.4 Overl.Curr. 50% Speed		
Range:	0 ... 200 %	**Default:** 86 %
Properties:		

Description:
Sets the value of the motor current used for the motor overload protection with 50% of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor Overload Protection		
C7.4.5 Overl.Curr. 5% Speed		
Range:	0 ... 200 %	**Default:** 62 %
Properties:		

Description:
Sets the value of the motor current used for the motor overload protection with 5% of the rated speed.The full scale of this parameter is the rated motor current C2.1.5.

The motor overload current is the current value at which the inverter will understand that the motor is operating under overload, and it is given as a function of the speed being applied to the motor. Parameters C7.4.3, C7.4.4 and C7.4.5 are the three points used to form this curve, as shown in Figure 11.44 on page 188.

By adjusting the overload current curve, it is possible to set an overload value that varies according to the motor operating speed (this is the factory default setting), improving the protection for self-ventilated motors. It is also possible to set a constant overload level for any speed applied to the motor for motors with independent ventilation.

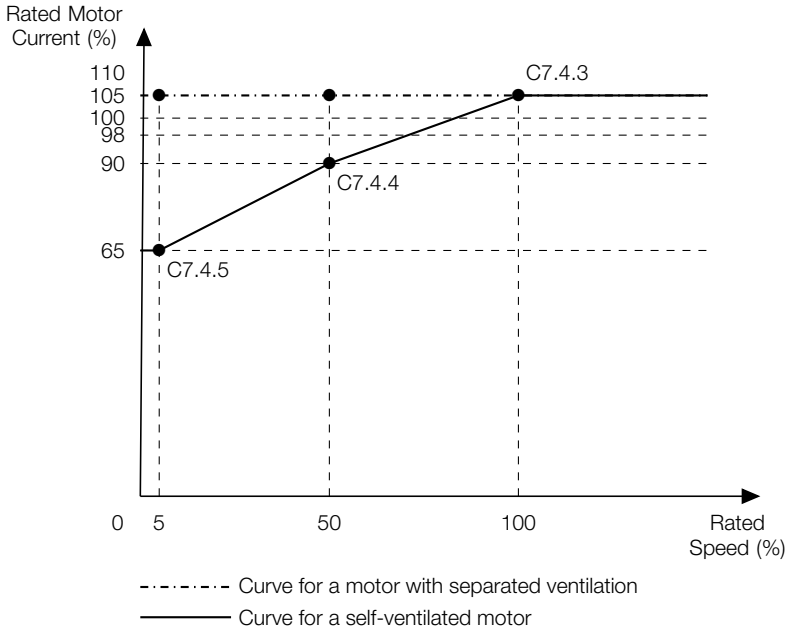


Figure 11.44: *Overload protection levels*

NOTE!
The greater the difference between the motor current and the overload current, the faster the fault is activated F072.

C7.4 Motor Overload Protection

C7.4.6 Motor Thermal Class

Range:	0 ... 8	**Default:** 1
Properties:	Stopped	

Description:
Sets the motor thermal class.

Indication	Description
0 = Class 5E	Time x Current Curve Class 5.
1 = Class 10E	Time x Current Curve Class 10.
2 = Class 15	Time x Current Curve Class 15.
3 = Class 20E	Time x Current Curve Class 20.
4 = Class 25	Time x Current Curve Class 25.
5 = Class 30E	Time x Current Curve Class 30.
6 = Class 35	Time x Current Curve Class 35.
7 = Class 40	Time x Current Curve Class 40.
8 = Class 45	Time x Current Curve Class 45.

WARNING!
Incorrect selection of thermal protection class may cause the motor to burn out.

The data needed to choose the thermal class are the following:

- Motor rated current (I_n).
- Locked-rotor current (I_p).

- Locked rotor time (T_{RB}).
- Service factor (SF).

NOTE!
It must be checked whether the locked rotor time is set for the hot or cold motor, so that the corresponding thermal class curves are used.

With these values, the motor overload time and current must be calculated, determined by the following relationships:

Overload Current = $\frac{I_p}{I_n \times FS} \times 100(\%)$

Overload Time = T_{RB} (s)

These equations provide the limit conditions to activate the error, that is, the motor will not be able to work with a fault tripping time greater than this, as it will run the risk of burning out. Therefore, a thermal class immediate below must be chosen to guarantee the motor protection.

E.g.: For a motor with the following characteristics,

I_n = 10.8 A
T_{RB} = 4 s (locked rotor time with the motor hot)
$I_p / I_n = 7.8A \Rightarrow I_p = 7.8 \times 10.8A = 84.2A$
FS = 1,15

one has,

Overload Current = $\frac{I_p}{I_n \times FS} = \frac{84.2}{10.8 \times 1.15} \times 100(\%)$ = 678 %

Overload Time = T_{RB} = 4 s

Once this is done, just consider the calculated values in the motor overload chart (Figure 11.45 on page 190 or Figure 11.46 on page 191), and select the thermal class curve immediately below the point found.

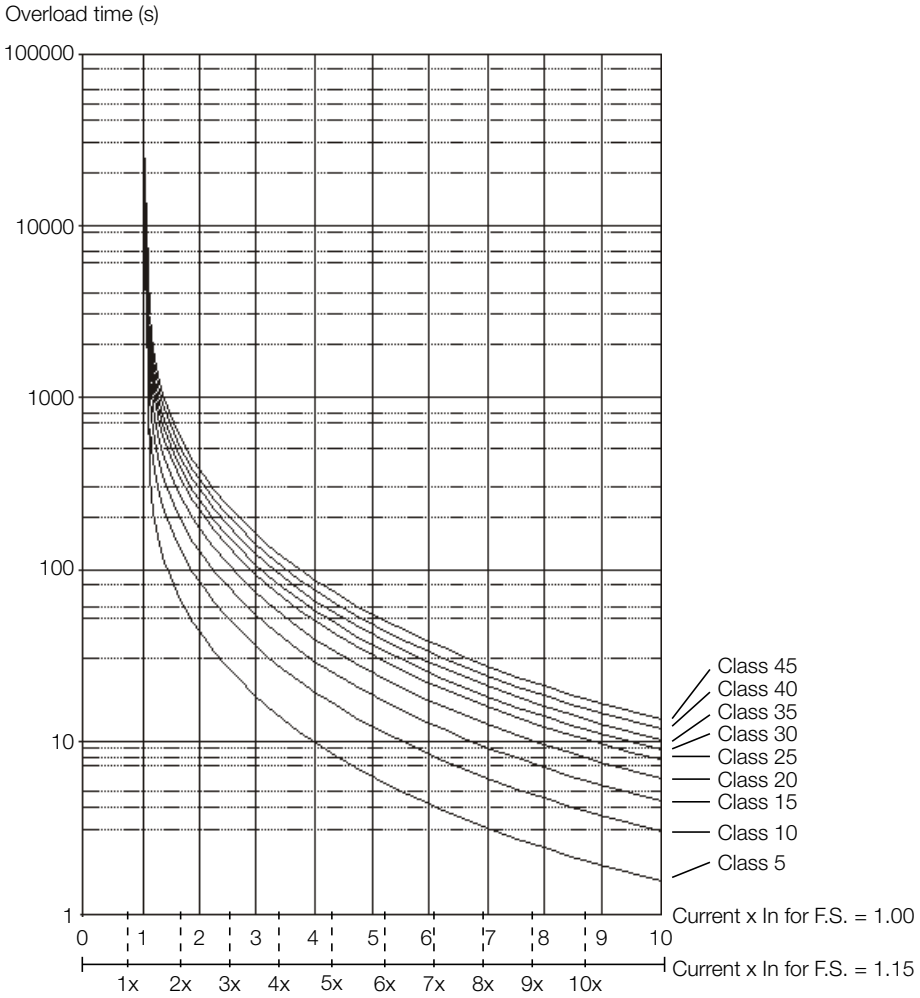


Figure 11.45: *Cold motor overload curves for HD and ND loads.*

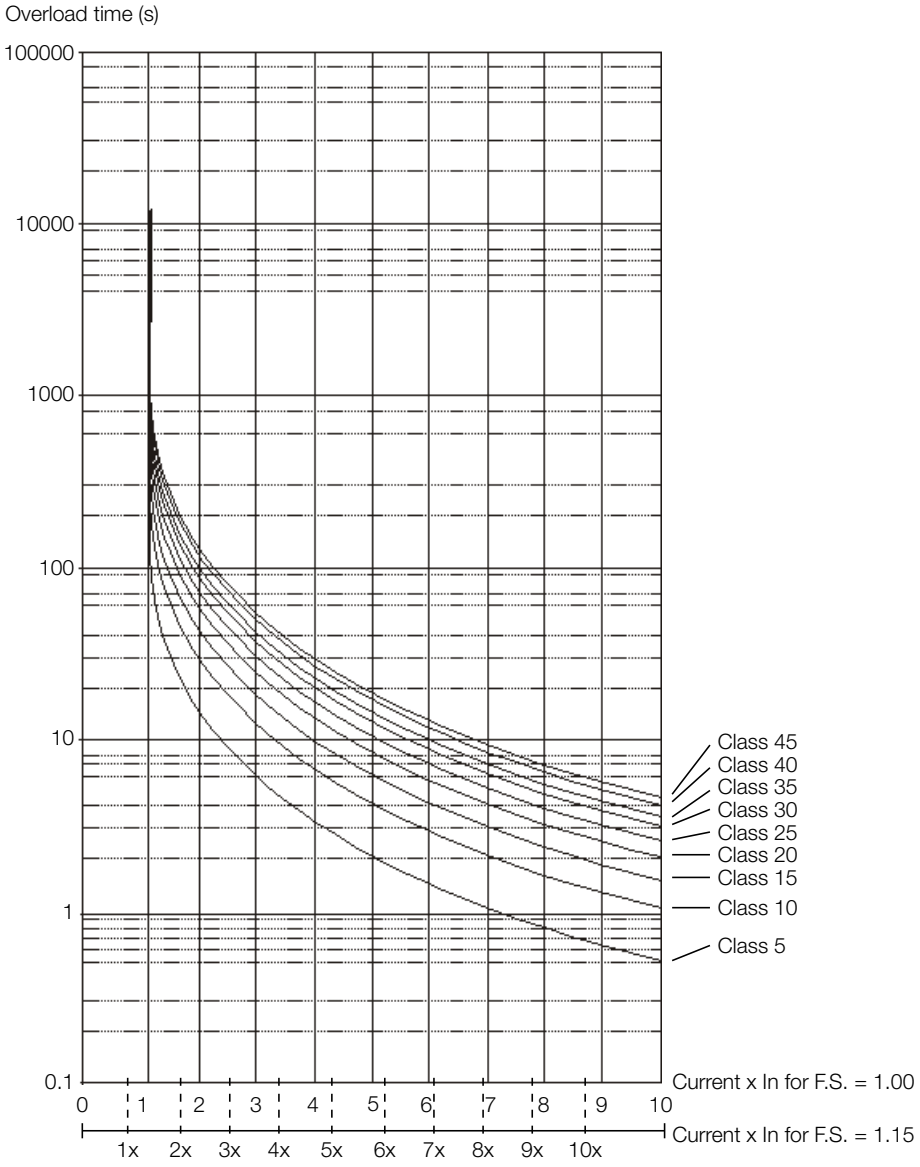


Figure 11.46: *Hot motor overload curves for HD and ND loads.*

For the previous example, relating the value of the Overload Current value 678 % (axis X) to the 4 seconds (axis Y) of the Overload Time in the chart in Figure 11.46 on page 191, (hot motor), the thermal class to be selected will be class 15 (t15).

C7.5 Over/Undertemp. Protection

Allows setting the Overtemperature and Undertemperature protections.

C7.5 Over/Undertemp. Protection		
C7.5.1 Temp. Fault Settings		
Range:	0 ... 5 Bit	**Default:** 0
Properties:	Stopped	

Description:
Sets the inverter overtemperature and undertemperature protections.

By default, both fault and alarm are enabled for all protections. Also, overtemperature faults cannot be disabled.

Bit	Value/Description
Bit 0 IGBT Overtemp.	Enables IGBT overtemperature protections. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 1 Rectifier Overtemp.	Enables the rectifier overtemperature protections. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 2 Power Internal Air Overtemp.	Enables the power overtemperature protections. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 3 Control Internal Air Overtemp.	Enables the control overtemperature protections. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 4 … 5 Undertemperature	Enables the undertemperature protections. **0 = Alarm and Fault**: Undertemperature fault and alarm enabled. **1 = Fault**: Only undertemperature fault enabled. **2 = Alarm**: Only undertemperature alarm enabled. **3 = Disabled**: Undertemperature fault and alarm disabled.

C7.5 Over/Undertemp. Protection

C7.5.2 Motor Overtemp. Config.

Range: 0 ... 3 **Default:** 3

Properties: Stopped

Description:
Defines the motor overtemperature protection behavior.

WARNING!
The PTC must feature reinforced insulation of the live parts of the motor and installation.

This function protects the motor from overtemperature through the indication of alarm (A110) and fault (F078). For the correct operation, the following items must be observed:

- Only the standard accessory (Slot X) can be used;
- Analog output AO1 set in the PTC function;
- Analog input AI1 set in PTC function.

Once the protection trips, it will be inactive only when the temperature reaches a certain level. The trip and inactivation levels of the fault alarm can be seen in Table 11.70.

Table 11.70: *Tripping and inactivation levels of A110 and F078.*

Situation	PTC	Voltage at AI
Goes into alarm A110 in the temperature rise	$R_{PTC} = 3.51k\Omega$	$V_{AI} > 7.0V$
Goes into fault F078 in the temperature rise	$R_{PTC} = 3.9k\Omega$	$V_{AI} > 7.8V$
Disables Alarm A110	$150\Omega < R_{PTC} < 1,6k\Omega$	$0.3 < V_{AI} < 3.2V$
Allows enabling fault F078	$150\Omega < R_{PTC} < 1,6k\Omega$	$0.3 < V_{AI} < 3.2V$
Goes into fault F078 (minimum resistance detection)	$R_{PTC} < 60\Omega$	$V_{AI} < 0.12V$

NOTE!
For this function to work properly, it is important to keep the gain(s) and offset(s) values of the analog inputs and outputs at the factory setting values.

The protection can be disabled, generate only alarm, generate only fault or generate alarm and fault, according to the table below.

Indication	Description
0 = Alarm and Fault	The protection has alarm and fault enabled.
1 = Fault	The protection has fault enabled.
2 = Alarm	The protection has an alarm enabled.
3 = Disabled	Protection is disabled.

C7.6 Fan Speed Protection

Allows setting the Fan Speed protections.

C7.6 Fan Speed Protection

C7.6.1 Heatsink Fan Conf.

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:
Enables the fault or alarm protections for low speed on the inverter heatsink fan (power fan).

The low speed fault occurs when the fan speed is below 50% of the rated speed. The low speed alarm occurs when the fan speed is below 75% of the rated speed, and it is reset when above 80% of rated speed.

Indication	Description
0 = Alarm/Fault	Enables fault and alarm. The inverter will be disabled when the fault occurs.
1 = Alarm	Enables only the alarm. The inverter will not be disabled; therefore, the protection will be disabled.

C7.6 Fan Speed Protection

C7.6.2 Internal Fan Conf.

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:
Enables the fault or alarm protections for low speed on the inverter internal fan.

The low speed fault occurs when the fan speed is below 10% of the rated speed. The low speed alarm occurs when the fan speed is below 15% of the rated speed, and it is reset when above 17,5% of rated speed.

Indication	Description
0 = Alarm/Fault	Enables fault and alarm. The inverter will be disabled when the fault occurs.
1 = Alarm	Enables only the alarm. The inverter will not be disabled; therefore, the protection will be disabled.

C7.7 Motor Overspeed

Allows setting the Motor Overspeed protection.

C7.7 Motor Overspeed

C7.7.1 Max. Overspeed Level

Range: 0.0 ... 100.0 % **Default:** 10.0 %

Properties: Stopped

Description:
Sets the highest speed value the motor can operate at, which should be set as a percentage of the maximum speed limit. The maximum speed limit can be adjusted in C4.3.1.1.2.

When the real speed exceeds the value of C4.3.1.1.2 + C7.7.1 for more than 20 ms, the CFW900 will disable the PWM pulses and indicate fault (F150).

If you want to disable this function, set C7.7.1 = 100.0%.

C7.8 Pre-charge

Allows setting the inverter Pre-charge protection.

C7.8 Pre-charge		
C7.8.1 Pre-charge Fault Settings		
Range:	0 ... 3 Bit	**Default:** 15
Properties:		

Description:
Enables the activation of fault F185 due to its possible causes.

Bit	Value/Description
Bit 0 Phase disconnected	Enables the phase disconnected detection for protection F185. **0 = Disabled**: Disables the phase disconnected detection. **1 = Enabled**: Enables phase disconnected detection.
Bit 1 Freq. out of range	Enables frequency out of range detection for protection F185. **0 = Disabled**: Disables the frequency out of range detection. **1 = Enabled**: Enables the frequency out of range detection.
Bit 2 Input voltage imbalance	Enables the input voltage imbalance detection for protection F185. **0 = Disabled**: Disables the input voltage imbalance detection. **1 = Enabled**: Enables the input voltage imbalance detection.
Bit 3 Input phase imb.	Enables the input phase imbalance detection for protection F185. **0 = Disabled**: Disables the input phase imbalance detection. **1 = Enabled**: Enables the input phase imbalance detection.

C7.9 Auto-Reset

Allows configuring the inverter Auto-Reset function.

C7.9 Auto-Reset		
C7.9.1 Time		
Range:	0 ... 3600 s	**Default:** 0 s
Properties:		

Description:
Sets the time value an automatic reset of a fault that has occurred.

After the auto-reset, if the same fault reoccurs three times in a row, the auto-reset function will be disabled. A fault is considered to be repeated if this same fault reoccurs within 30 seconds after the auto-reset. Therefore, if a fault occurs four consecutive times, the inverter will remain disabled (general disable) and the fault will continue to be indicated.

If C7.9.1 $\leq$ 2, no auto-reset will occur.

C7.10 External Fault/Alarm

Allows configuring the Fault and External Alarm functions activated via digital input.

C7.10 External Fault/Alarm		
C7.10.1 External Alarm DI		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables use and defines the digital input that will be used for the No External Alarm function.

When a transition from 1 to 0 occurs in the digital input programmed for the function No External Alarm, alarm A090 will be indicated. On transition from 0 to 1 on the programmed digital input, the alarm will be cleared. The motor continues to run normally, regardless of the status of the digital input.

The options are shown in the Table 11.74 on page 195.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-6 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-6 (54)	G-8 (62)

Table 11.74: *Values assigned to the Digital Inputs of X and A...G Slots for defining command activation.*

NOTE!
Example: To choose digital input 4 of Slot C to trigger a command, the parameter must be assigned the value C-4 (28).

C7.10 External Fault/Alarm

C7.10.2 External Fault DI

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used for the External Faultless function. The options are shown in the Table 11.74 at page 195.

When a transition from 1 to 0 occurs in the digital input programmed for No External Fault, the inverter goes into fault indicating fault F091 as shown in Figure 11.47 on page 195.

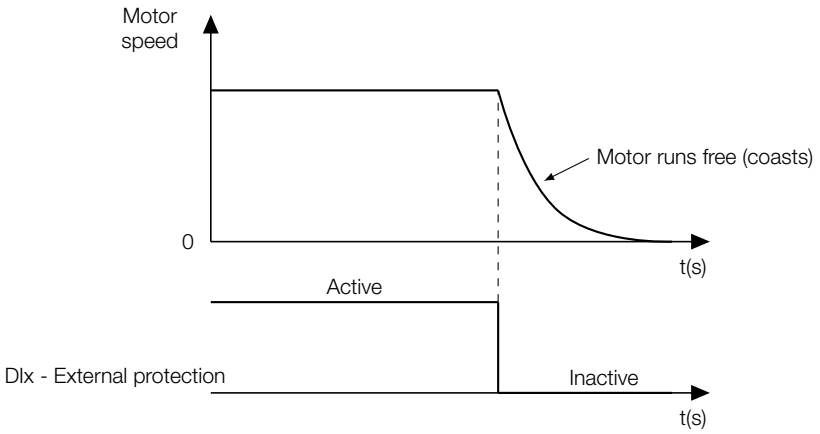


Figure 11.47: *Falha externa via entrada digital*

C7.11 Thermal Management

The thermal management function is a set of protections and actions that the inverter performs as a function of measured and estimated temperatures of the IGBTs, rectifiers, heatsink and internal air to protect the equipment integrity and functionality.

C7.11 Thermal Management
C7.11.1 Junc. temp. IGBT overload curve
Range: -50 ... 200 °C **Default:** 120 °C
Properties:

Description:
Selects the temperature from which the IGBT overload protection can use the fast curve.

If the maximum junction temperature is below this temperature, only the slow curve is used for any ratio between the output current and rated current above 1. If the maximum junction temperature is above this value, the fast curve is used from ratio 1.15 for normal duty (ND) and 1.5 for heavy duty (HD).

C7.11 Thermal Management
C7.11.2 Enable
Range: 0 ... 2 Bit **Default:** 3
Properties: Stopped

Description:
Enables the inverter switching frequency regulation loops as a function of the heatsink and IGBT junction temperatures.

It also influences the inverter rated current setting as a function of the switching frequency. If at least one of the loops is enabled, meaning that the switching frequency is adjustable during the inverter operation and parameter C1.3.1: Switching Frequency - User has a value less than or equal to the rated switching frequency of the inverter in question, the rated current is corrected as a function of the minimum switching frequency. If no loop is enabled, the rated current is always corrected as a function of the rated switching frequency.

Bit	Value/Description
Bit 0 Heatsink Temp. Reg. with fsw Operation	Enables the switching frequency regulation loop as a function of the heatsink temperature. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.
Bit 1 Junction Temperature Regulator	Enables the switching frequency regulation loop as a function of the maximum junction temperature. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.
Bit 2 Heatsink Temp. Reg. w/ Power Fan Speed	Enables the heatsink fan speed regulation loop as a function of its temperature. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.

C7.11 Thermal Management
C7.11.7 Proportional Gain
Range: 0.00 ... 20.00 **Default:** 1.00
Properties:

Description:
Proportional gain of the switching frequency regulation loop as a function of the maximum IGBT junction temperature.

C7.11 Thermal Management
C7.11.8 Integral Gain
Range: 0.00 ... 20.00 **Default:** 1.00
Properties:

Description:
Integral gain of the switching frequency regulation loop as a function of the maximum IGBT junction temperature.

C7.11 Thermal Management		
C7.11.9 Proportional Gain		
Range:	0.00 ... 20.00	**Default:** 1.00
Properties:		

Description:
Proportional gain of the switching frequency regulation loop as a function of the maximum NTC temperature.

C7.11 Thermal Management		
C7.11.10 Integral Gain		
Range:	0.00 ... 20.00	**Default:** 1.00
Properties:		

Description:
Integral gain of the switching frequency regulation loop as a function of the maximum NTC temperature.

C8 FUNCTIONAL SAFETY

Allows configuring parameters related to the functional safety of CFW900.

C8 Functional Safety		
C8.1 SS1-t Ramp Deceleration Time		
Range:	0.1 ... 999.9 s	**Default:** 5.0 s
Properties:	Stopped	

Description:
Defines the time in seconds to linearly decelerate the motor from the maximum speed to zero during the execution of the SS1-t safety function.

NOTE!
This parameter should not be confused with the delay time of the SS1-t safety function. For programming the delay time, please refer to the safety function configuration in the safety manual.

NOTE!
If the SS1-t ramp deceleration time is set to a time value greater than the programmed SS1-t delay time (S4.2), the STO state will be reached before the complete stop of the motor.

C9 COMMUNICATION

Sets the CFW900 to exchange information via communication network.

C9.1 Communication Error

Allows setting the operation of the protections for the communication interfaces and related protocols.

C9.1.1 Master Offline

Protection against interruption in the communication with the network master.

If for some reason the communication between the product and the network master is interrupted, a communication error will be issued, an alarm or fault will be displayed on the HMI, depending on the programming of this menu.

It only occurs after the device is online.

C9.1.1 Master Offline

C9.1.1.1 Mode

Range: 0 ... 2 **Default:** 2

Properties:

Description:
Allows configuring the tripping mode of the protection against interruption in the communication with the network master.

Indication	Description
0 = Off	No tripping.
1 = Fault	Trips as fault. Disables the motor.
2 = Alarm	Trips as alarm. Action described in C9.1.1.2.

C9.1.1 Master Offline

C9.1.1.2 Alarm Action

Range: 0 ... 4 **Default:** 2

Properties:

Description:
Action for offline communication alarm for any network interface - A128, A133, A134, A135, A137 and A149.

The actions described in this parameter are performed by writing the respective bits in the control word of the communication/interface protocol. Thus, for the commands to take effect, the equipment must be programmed to be controlled by the network interface used. This programming is done through menu C4.

Indication	Description
0 = Off	No action is taken; the device remains in the current state.
1 = Ramp Stop	The stop by ramp command is executed, and the motor stops according to the programmed deceleration ramp.
2 = General Disab.	The device is general disabled, and the motor coasts to stop.
3 = Go to R1	The equipment is commanded to the remote 1 state.
4 = Go to R2	The equipment is commanded to the remote 2 state.

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.1.1 is programmed for Alarm.

C9.1.2 Master Idle/Prog

Network master state protection.

If there is a transition of the network master state from the operation mode (Run) to the configuration mode (Idle/Prog), a communication error will be issued, an alarm or fault will be displayed on the HMI, depending on the programming made in this menu.

It only occurs after the network master Run mode is detected. The way to detect this condition depends on the communication protocol and the network master.

C9.1.2 Master Idle/Prog

C9.1.2.1 Mode

Range: 0 ... 2 **Default:** 1

Properties:

Description:
Allows configuring the protection tripping mode when the network master is placed in programming mode (Idle/Prog).

Indication	Description
0 = Inactive	No tripping.
1 = Fault	Trips as fault. Disables the motor.
2 = Alarm	Trips as alarm. Action described in C9.1.2.2.

C9.1.2 Master Idle/Prog
C9.1.2.2 Alarm Action
Range: 0 ... 4 **Default:** 2
Properties:

Description:
Action for the alarm of master in programming mode (Idle/Prog) - A136.

The actions described in this parameter are performed by writing the respective bits in the control word of the communication/interface protocol. Thus, for the commands to take effect, the equipment must be programmed to be controlled by the network interface used. This programming is done through menu C4.

Indication	Description
0 = Off	No action is taken; the device remains in the current state.
1 = Ramp Stop	The stop by ramp command is executed, and the motor stops according to the programmed deceleration ramp.
2 = General Disab.	The device is general disabled, and the motor coasts to stop.
3 = Go to R1	The equipment is commanded to the remote 1 state.
4 = Go to R2	The equipment is commanded to the remote 2 state.

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.2.1 is programmed for Alarm.

C9.2 I/O Data

Configures the cyclic data exchange area of the communication networks.

C9.2.1 Data Read

Configures a set of 16-bit parameters to be read via communication network.

C9.2.1 Data Read
C9.2.1.1 Word #1

C9.2.1.1 to C9.2.1.100

C9.2.1 Data Read
C9.2.1.100 Word #100
Range: 0 ... 9999 **Default:** 0
Properties: Stopped

Description:
Selects the address (Net Id) of the parameter whose content should be provided in the reading area for the fieldbus interfaces (input: sent to the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.2.2 Data Write

Configures a set of 16-bit parameters to be written via communication network.

C9.2.2 Data Write		
C9.2.2.2 Word #1		

C9.2.2.2 to C9.2.2.101

C9.2.2 Data Write		
C9.2.2.101 Word #100		
Range:	0 ... 9999	**Default:** 0
Properties:	Stopped	

Description:
Selects the address (Net Id) of the parameter whose content should be provided in the writing area for the fieldbus interfaces (output: received from the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.3 RS485 Serial

Configuration for the RS485 communication interface and the protocols that use this interface.

For a detailed description, refer to the CFW900 Modbus-RTU User's Manual, available in electronic format..

C9.3 RS485 Serial		
C9.3.1 Protocol		
Range:	0 ... 2	**Default:** 2
Properties:	Stopped	

Description:
Select the desired protocol for the RS485 serial interface.

Indication	Description
0 ... 1 = Reserved	No used.
2 = Modbus RTU	Slave Modbus RTU serial protocol.

C9.3 RS485 Serial		
C9.3.2 Address		
Range:	1 ... 247	**Default:** 1
Properties:	Stopped	

Description:
Select the address used for the serial communication.

It is necessary that each device in the network have an address different from all the others.

C9.3 RS485 Serial		
C9.3.3 Baud Rate		
Range:	0 ... 3	**Default:** 1
Properties:	Stopped	

Description:
Select the desired value for the baud rate of the serial interface in bit per second. This rate must be the same for all devices connected to the network.

Indication	Description
0 = 9600 bit/s	9600 bit per second.
1 = 19200 bit/s	19200 bit per second.
2 = 38400 bit/s	38400 bit per second.
3 = 57600 bit/s	57600 bit per second.

C9.3 RS485 Serial

C9.3.4 Bytes Config.

Range: 0 ... 5 **Default:** 1

Properties: Stopped

Description:

Select the settings for the number of data bits, parity and stop bits in the serial interface bytes. This configuration must be identical for all the devices connected to the network.

Indication	Description
0 = 8-bit, no, 1	8-bit, no parity, 1 stop bit.
1 = 8-bit, even,1	8 bits, with even parity, 1 stop bit.
2 = 8-bit, odd, 1	8-bit, with odd parity, 1 stop bit.
3 = 8-bit, no, 2	8-bit, no parity, 2 stop bit.
4 = 8-bit, even,2	8-bit, with even parity, 2 stop bit.
5 = 8-bit, odd, 2	8-bit, with odd parity, 2 stop bit.

C9.3 RS485 Serial

C9.3.5 Timeout RS485

Range: 0.0 ... 999.0 s **Default:** 0.0 s

Properties: Stopped

Description:

Maximum time without communication.

C9.4 Ethernet

Settings for the product built-in Ethernet port.

For a detailed description, see the CFW900 Ethernet Communication Manual, available in electronic format.

C9.4 Ethernet

C9.4.1 IP Address Configuration

Range: 0 ... 1 **Default:** 1

Properties: Stopped

Description:

Allows setting the IP address for the built-in Ethernet interface.

Indication	Description
0 = Parameters	The IP address, subnet mask and gateway must be set through the product parameters.
1 = DHCP	Enables the DHCP function. The IP address and other network settings are received from a DHCP server via network.

C9.4 Ethernet

C9.4.2 IP Address

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 192.168.0.10
Properties:	Stopped	

Description:
Allows programming the IP address of the Ethernet interface. It only takes effect if the address was set via parameters.

C9.4 Ethernet

C9.4.3 Network Mask

Range:	0 ... 31	**Default:** 24
Properties:	Stopped	

Description:
Allows programming the subnet mask used for the Ethernet interface. It only takes effect if the address was set via parameters.

The following table shows the allowable values for CIDR and the equivalent dot-separated notation for the subnet mask:

Indication	Description
0 = Reserved	Subnet mask
1 = 128.0.0.0	Subnet mask
2 = 192.0.0.0	Subnet mask
3 = 224.0.0.0	Subnet mask
4 = 240.0.0.0	Subnet mask
5 = 248.0.0.0	Subnet mask
6 = 252.0.0.0	Subnet mask
7 = 254.0.0.0	Subnet mask
8 = 255.0.0.0	Subnet mask
9 = 255.128.0.0	Subnet mask
10 = 255.192.0.0	Subnet mask
11 = 255.224.0.0	Subnet mask
12 = 255.240.0.0	Subnet mask
13 = 255.248.0.0	Subnet mask
14 = 255.252.0.0	Subnet mask
15 = 255.254.0.0	Subnet mask
16 = 255.255.0.0	Subnet mask
17 = 255.255.128.0	Subnet mask
18 = 255.255.192.0	Subnet mask
19 = 255.255.224.0	Subnet mask
20 = 255.255.240.0	Subnet mask
21 = 255.255.248.0	Subnet mask
22 = 255.255.252.0	Subnet mask
23 = 255.255.254.0	Subnet mask
24 = 255.255.255.0	Subnet mask. Factory setting.
25 = 255.255.255.128	Subnet mask
26 = 255.255.255.192	Subnet mask
27 = 255.255.255.224	Subnet mask
28 = 255.255.255.240	Subnet mask
29 = 255.255.255.248	Subnet mask
30 = 255.255.255.252	Subnet mask
31 = 255.255.255.254	Subnet mask

C9.4 Ethernet
C9.4.4 Gateway

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 0.0.0.0
Properties:	Stopped	

Description:
Allows programming the IP address of the default gateway used by the Ethernet interface. It only takes effect if the address was set via parameters.

C9.4 Ethernet
C9.4.5 SNTP - Server 1

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 0.0.0.0
Properties:	Stopped	

Description:
Allows programming the IP address of the NTP primary server. If the value is zero, the NTP cliente is disabled.

C9.4 Ethernet
C9.4.6 SNTP - Server 2

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 0.0.0.0
Properties:	Stopped	

Description:
Allows programming the IP address of the NTP secondary server.

C9.4 Ethernet
C9.4.7 SNTP - Update

Range:	0 ... 65535	**Default:** 0
Properties:	Stopped	

Description:
Indicates the date and time update interval of the NTP server. If the value is zero, the NTP client is disabled. The minimum interval is 15 seconds.

C9.6 Modbus TCP

Allows setting the Modbus TCP network protocol using the CFW900 built-in Ethernet port.

C9.6 Modbus TCP
C9.6.1 TCP Port

Range:	0 ... 65535	**Default:** 0
Properties:	Stopped	

Description:
Allows setting the number of the TCP port used for Modbus TCP connections.

Port 502 is the default TCP port for Modbus TCP connections, and it is always available. If you want an additional port to establish Modbus TCP connections, you can set the number of another TCP port in this parameter.

NOTE!
After changing this property, the device must be turned off and back on to effect the modifications.

C9.6 Modbus TCP

C9.6.3 Timeout

Range:	0.0 ... 999.0 s	**Default:** 0.0 s
Properties:	Stopped	

Description:
Time to detect interruption in Modbus TCP communication.

After Modbus TCP communication starts, if the device stops receiving valid telegrams for a period longer than programmed at this parameter, it will consider the communication timed out, and will indicate an alarm/fault. If programmed for alarm, it will also take the action programmed for communication error.

Time will start counting from the first valid telegram received. The value 0.0 disables this function.

C9.8 CAN/CANop/DNet

Configures CAN communication accessory and protocols that use this interface.

C9.8 CAN/CANop/DNet

C9.8.1 Protocol

Range:	0 ... 2	**Default:** 2
Properties:	Stopped	

Description:
Allows selecting the desired protocol for the CAN interface.

Indication	Description
0 = Disabled	Disables the CAN interface.
1 = CANopen	Enables the CAN interface with CANopen protocol.
2 = DeviceNet	Enables the CAN interface with DeviceNet protocol.

C9.8 CAN/CANop/DNet

C9.8.2 Address

Range:	0 ... 127	**Default:** 63
Properties:	Stopped	

Description:
Allows programming the address used for CAN communication of the device. It is necessary that each device on the network have a different address from the others. Valid addresses for this parameter depend on the protocol selected in C9.8.1:

- C9.8.1 = 1 (CANopen): valid addresses: 1 to 127.
- C9.8.1 = 2 (DeviceNet): valid addresses: 0 to 63.

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANop/DNet

C9.8.3 Baud Rate

Range:	0 ... 5	**Default:** 0
Properties:	Stopped	

Description:
Allows programming the desired value for the baud rate of the CAN interface in bit per second. This rate must be the same for all devices connected to the network. The supported baud rates for the device depend on the protocol set in C9.8.1:

- C9.8.1 = 1 (CANopen): any rate indicated in this parameter can be used, but it does not have the automatic rate detection function (autobaud).
- C9.8.1 = 2 (DeviceNet): Only rates of 500, 250 and 125 Kbit/s are supported. Other options enable the automatic rate detection function (autobaud).

For the autobaud function, after successful detection, the baud rate parameter (C9.8.3) automatically changes to the detected rate. To rerun the autobaud function, it is necessary to change parameter C9.8.3 to one of the autobaud options.

Indication	Description
0 = 1 Mbps/Auto	CAN baud rate (automatic detection for DeviceNet).
1 = Reserved/Auto	Automatic detection for DeviceNet.
2 = 500 Kbps	CAN baud rate.
3 = 250 Kbps	CAN baud rate.
4 = 125 Kbps	CAN baud rate.
5 = 100 Kbps/Auto	CAN baud rate (automatic detection for DeviceNet).

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANop/DNet
C9.8.4 Bus Off Reset
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
Allows programming the behavior of the equipment when detecting a bus off error on the CAN interface.

Indication	Description
0 = Manual	If bus off occurs, A134/F234 will be displayed on the HMI and the communication will be disabled. In case of alarm, the action set in parameter C9.1.2.2 will be executed. For the equipment to communicate again via CAN interface, it will be necessary to disable and enable the interface, or restart the product.
1 = Automatic	If bus off occurs, the communication will be automatically restarted, and the error will be ignored. In this case the alarm will not be displayed on the HMI and the device will not execute the action described in C9.1.2.2.

C9.8 CAN/CANop/DNet
C9.8.5 DeviceNet I/O Instances
Range: 0 ... 10 **Default:** 0
Properties: Stopped

Description:
Allows selecting the Assembly class instance used during the exchange of I/O data with the network master.

The CFW900 frequency inverter has eleven setting options. Four of them follow the standard defined in the ODVA AC/DC Drive Profile. The others represent specific words for the CFW900 frequency inverter. The table presented below detail each of these control and monitoring words.

Indication	Description
0 = 20/70 CIP	Called Basic Speed, these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile
1 = 21/71 CIP	Called Extended Speed, these instances present an equipment operation interface a little bit more refined, which follows the AC/DC Drive Profile
2 = 22/72 CIP	These instances represent an interface very similar to the 20/70 CIP Basic Speed Control, being the only difference the possibility to send the torque limit
3 = 23/73 CIP	These instances represent an interface very similar to the 21/71 CIP Extended Speed Control, being the only difference the possibility to send the torque limit
4 = 120/170 CIP + I/O data	These instances have the same data format of 20/70 CIP Basic Speed Control. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network.
5 = 121/171 CIP + I/O data	These instances have the same data format of 21/71 CIP Extended Speed Control. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network.
6 = 122/172 CIP + I/O data	These instances have the same data format of 22/72 CIP Speed and Torque Control. In addition, it is possible to program up to 47 parameters of the equipment itself for reading and/or 47 for writing via network.
7 = 123/173 CIP + I/O data	These instances have the same data format of 23/73 CIP Extended Speed and Torque Control. In addition, it is possible to program up to 47 parameters of the equipment itself for reading and/or 47 for writing via network.
8 = 100/150 Manuf. + I/O data	These instances represent the operation interface of a device according to the CFW900 frequency converter profile. Besides the control and state words, speed reference and effective value, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network.
9 = 101/151 Manuf. + I/O data	These instances represent an interface very similar to the 100/150 Manufacturer Speed Control + configurable I/O data, being the only difference the possibility to send the torque limit
10 = 102/152 Config I/O data	In these instances it is possible to program up to 50 parameters of the equipment itself for reading and/or 50 for writing via network

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANop/DNet

C9.8.6 DNet Read 1st Word

Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
Sets the index of the first programmable reading word for data exchange with the network (input to the network master).

C9.8 CAN/CANop/DNet

C9.8.7 DNet Read Quantity

Range:	0 ... 50	**Default:** 0
Properties:	Stopped	

Description:
Sets the number of programmable reading words for data exchange with the network (input to the network master), from the first configured word.

C9.8 CAN/CANop/DNet

C9.8.8 DNet Write 1st Word

Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
Sets the index of the first programmable writing word for data exchange with the network (output to the network master).

C9.8 CAN/CANop/DNet

C9.8.9 DNet Write Quantity

Range: 0 ... 50 **Default:** 0

Properties: Stopped

Description:
Sets the number of programmable writing words for data exchange with the network (output to the network master), from the first configured word.

C9.10 Bluetooth

The following settings are available for products that have an HMI interface with integrated Bluetooth technology.

To use this product with another Bluetooth enabled device, both device should to be paired.

C9.10 Bluetooth

C9.10.1 Mode

Range: 0 ... 1 **Default:** 0

Properties:

Description:
Bluetooth settings are inactive by default. These settings must be enabled to use the Bluetooth wireless interface.

Indication	Description
0 = Off	Inactive.
1 = On	Active.

C9.10 Bluetooth

C9.10.2 PIN

Default: 123456

Properties:

Description:
Before using the product with another Bluetooth enabled device for the first time, you should pair it using the six-digit PIN set in this parameter.

The PIN must have 6 digits from 0 to 9.

C9.10 Bluetooth

C9.10.3 Device Name

Default: -

Properties: Model

Description:
You can set the Bluetooth device name.

By default, the product Bluetooth name is CFW9x plus the product serial number (e.g. CFW9x0123456789).

The device name must have 1 to 15 alphanumeric digits.

C10 SOFTPLC

The softPLC function allows the frequency inverter to have PLC (Programmable Logic Controller) functions. For more details regarding the programming of these functions in the CFW900, refer to the Help texts in the WPS (WEG Programming Suite).

C10.1 Configuration

Allows setting parameters of the SoftPLC function.

C10.1 Configuration

C10.1.1 Command

Range: 0 ... 5 **Default:** 0

Properties: Stopped

Description:

Allow the user to execute commands for the application.

Indication	Description
0 = Stop	For the active application.
1 = Execute	Runs the active application.
2 ... 4 = Not Used	
5 = Erase	Deletes the active user application.

C10.1 Configuration

C10.1.2 Active Aplication

Range: 0 ... 6 **Default:** 0

Properties: Stopped

Description:

Allows the user to select the active application.

Indication	Description
0 = Application 1 User	When selected, it is possible to download, stop, run or delete the user application configured in the WPS software.
1 = Application 2 User	When selected, it is possible to download, stop, execute or delete another user program.
2 ... 6 = Not used	Not used.

C10.1 Configuration

C10.1.3 Action Stopped Application

Range: 0 ... 2 **Default:** 0

Properties:

Description:

Allow the user to set the action for when the SoftPlc application is not running.

Indication	Description
0 = Inactive	No action.
1 = Generate Alarm	Generates alarm A708.
2 = Generate Fault	Generates fault F709.

C10.2 Engineering Unit

C10.2 Engineering Unit

C10.2.1 Eng. Unit 1

Range: 0 ... 64 **Default:** 0

Properties:

Description:

This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the table below.

Engineering Unit Options					
0 = No Unit	11 = m^3/h	22 = gal/s	33 = kgf/m^2	44 = mca	55 = Nm
1 = A	12 = m^3/min	23 = H	34 = kl/h	45 = m	56 = Pa
2 = bar	13 = m^3/s	24 = Hz	35 = kPa	46 = m/h	57 = %
3 = °C	14 =°F	25 = HP	36 = kW	47 = m/min	58 = psi
4 = CPM	15 = ft	26 = h	37 = kWh	48 = m/s	59 = rpm
5 = CV	16 = ft/h	27 = in	38 = l	49 = mbar	60 = s
6 = ft^3	17 = ft/min	28 = InWC	39 = l/h	50 = ms	61 = V
7 = ft^3/h	18 = ft/s	29 = K	40 = l/min	51 = min	62 = W
8 = ft^3/min	19 = gal	30 = kg	41 = l/s	52 = MPa	63 = W/m^2
9 = ft^3/s	20 = gal/h	31 = kgf	42 = lbf	53 = mwc	64 = Wh/m^2
10 = m^3	21 = gal/min	32 = kgf/cm^2	43 = mA	54 = N	

Table 11.92: *Engineering Units associated with the SoftPLC user parameter.*

C10.2 Engineering Unit

C10.2.2 Dec. Point Unit Eng. 1

Range: 0 ... 3 **Default:** 1

Properties:

Description:

This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit

C10.2.3 Eng. Unit 2

Range: 0 ... 64 **Default:** 0

Properties:

Description:

This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the Table 11.92 at page 209.

C10.2 Engineering Unit

C10.2.4 Dec. Point Unit Eng. 2

Range: 0 ... 3 **Default:** 1

Properties:

Description:

This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit

C10.2.5 Eng. Unit 3

Range: 0 ... 64 **Default:** 0

Properties:

Description:

This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the Table 11.92 at page 209.

C10.2 Engineering Unit		
C10.2.6 Dec. Point Unit Eng. 3		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit		
C10.2.7 Eng. Unit 4		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the Table 11.92 at page 209.

C10.2 Engineering Unit		
C10.2.8 Dec. Point Unit Eng. 4		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.3 User's Parameters

SoftPLC user parameter setting.

C11 HMI

Allows changing the parameters related to the presentation of information on the HMI display.

C11.1 Configuration

Allows changing the CFW900 HMI configuration parameters.

C11.1 Configuration		
C11.1.1 Time Zone		
Range:	0 ... 52	**Default:** 24
Properties:		

Description:
Setting of the time zone where the product is applied.

The options are shown in the table below.

Time Zone Options					
0 = UTC-12:00	9 = UTC-07:30	18 = UTC-03:00	27 = UTC+01:30	36 = UTC+06:00	45 = UTC+10:30
1 = UTC-11:30	10 = UTC-07:00	19 = UTC-02:30	28 = UTC+02:00	37 = UTC+06:30	46 = UTC+11:00
2 = UTC-11:00	11 = UTC-06:30	20 = UTC-02:00	29 = UTC+02:30	38 = UTC+07:00	47 = UTC+11:30
3 = UTC-10:30	12 = UTC-06:00	21 = UTC-01:30	30 = UTC+03:00	39 = UTC+07:30	48 = UTC+12:00
4 = UTC-10:00	13 = UTC-05:30	22 = UTC-01:00	31 = UTC+03:30	40 = UTC+08:00	49 = UTC+12:30
5 = UTC-09:30	14 = UTC-05:00	23 = UTC-00:30	32 = UTC+04:00	41 = UTC+08:30	50 = UTC+13:00
6 = UTC-09:00	15 = UTC-04:30	24 = UTC+00:00	33 = UTC+04:30	42 = UTC+09:00	51 = UTC+13:30
7 = UTC-08:30	16 = UTC-04:00	25 = UTC+00:30	34 = UTC+05:00	43 = UTC+09:30	52 = UTC+14:00
8 = UTC-08:00	17 = UTC-03:30	26 = UTC+01:00	35 = UTC+05:30	44 = UTC+10:00	

Table 11.93: *Time zone where the product is applied.*

C11.1 Configuration

C11.1.2 Date/Time

Range: YYYY-MM-DD HH:MM:SS

Properties:

Description:
Setting of the CFW900 Real Time Clock (RTC) date and time.

It is important to set it to the correct date and time so that the fault and alarm logs occur with real date and time information.

C11.1 Configuration

C11.1.3 Language

Range: 0 ... 3 **Default:** 1

Properties:

Description:
Determines the language in which the information will be displayed on the HMI.

Indication	Description
0 = Português	Portuguese
1 = English	English
2 = Español	Spanish
3 = Deutsch	German

C11.1 Configuration

C11.1.4 Display Brightness

Range: 0 ... 100 % **Default:** 100 %

Properties:

Description:
Allows setting the brightness of the HMI display. Higher values set a higher brightness.

C11.1 Configuration

C11.1.5 Contrast

Range: 0 ... 100 % **Default:** 40 %

Properties:

Description:
Allows setting the HMI display background contrast level. Higher values set a higher contrast.

C11.2 Main Screen

These parameters allow you to program what should be shown on the main monitoring screen.

Programming is realized selecting the menu to which you want to show the content.

Only show the numeric reading parameters of Status. When a parameter is selected in which the content cannot be shown, the respective area will be shown empty.

More information see Chapter 8.6.

C11.3 User

Allows to login and change the current user password.

More information see Chapter 8.5.

C11.3.1 Login

Allows to login for a specific user. A password is required if previously configured.

C11.3.2 Change password

Allows changing the user password. If the user already has a previously configured password, the current password will be requested to allow changing the password. To disable the password, simply set the new value to zero.

C12 BACKUP

The CFW900 BACKUP function allows loading the factory default values to the inverter.

C12 Backup		
C12.1 Load Parameters		
Range:	0 ... 10	**Default:** 0
Properties:	Stopped	

Description:
Loads factory default values to the inverter parameters.

Allows factory default restoring, and loading or saving of parameters sets 1, 2, 3 and SD card.

NOTE!
When setting C12.1 = 1 or 2, parameters C11.1.3: Configuration - Language, C11.1.2: Configuration - Date/Time,C1.1.1: Power Supply - Type, C1.1.2: Power Supply - Rated Voltage, S1.3.5: Inverter Data - Rated Current and C3.2.3.1: Current Stabilization - Function Enable will not change with 50/60Hz factory default.

Indication	Description
0 = Not Used	Not used.
1 = Load Default 60 Hz	Loads the CFW900 settings with the default content of the parameters.

Indication	Description
2 = Load Default 50 Hz	Load the CFW900 settings with the default content of the parameters. All parameters are loaded with the default 60 Hz value, except the following cases: ▪ C4.3.1.5.1 set to 75 rpm; ▪ C4.3.1.5.2 set to 250 rpm; ▪ C4.3.1.5.3 set to 500 rpm; ▪ C4.3.1.5.4 set to 750 rpm; ▪ C4.3.1.5.5 set to 1000 rpm; ▪ C4.3.1.5.6 set to 1250 rpm; ▪ C4.3.1.5.7 set to 1500 rpm; ▪ C4.3.1.5.8 set to 1375 rpm; ▪ C4.3.1.1.1 set to 75 rpm; ▪ C4.3.1.1.2 set to 1500 rpm; ▪ C5.9.3 set to 15 rpm; ▪ C5.9.4 set to 100 rpm; ▪ C5.9.5 set to 1500 rpm; ▪ set to 15 rpm; ▪ C5.9.8 set to 15 rpm; ▪ C2.1.8 set to 1458 rpm; ▪ C2.1.6 set to 50 Hz; ▪ C2.1.2 set to kW; ▪ C3.10.6 set to 525 rpm.
3 = Load Parameter Set 1	Loads the CFW900 settings with the content of user memory 1. If the parameter set to be loaded is incompatible with the drive version, the parameters are not loaded. If the parameter set to be loaded is from a different drive model, model-specific parameters are not loaded.
4 = Load Parameter Set 2	Loads the CFW900 settings with the content of user memory 2. If the parameter set to be loaded is incompatible with the drive version, the parameters are not loaded. If the parameter set to be loaded is from a different drive model, model-specific parameters are not loaded.
5 = Load Parameter Set 3	Loads the CFW900 settings with the content of user memory 3. If the parameter set to be loaded is incompatible with the drive version, the parameters are not loaded. If the parameter set to be loaded is from a different drive model, model-specific parameters are not loaded.
6 = Save Parameter Set 1	Saves the content of the CFW900 current settings to user memory 1.
7 = Save Parameter Set 2	Saves the content of the CFW900 current settings to user memory 2.
8 = Save Parameter Set 3	Saves the content of the CFW900 current settings to user memory 3.
9 = Load SD card	Loads the settings saved on the SD card. If the parameter set to be loaded is incompatible with the drive version, the parameters are not loaded. If the parameter set to be loaded is from a different drive model, model-specific parameters are not loaded. Additionally, it imports the settings of parameter sets 1, 2 and 3 from the SD card into the inverter memory.
10 = Save SD card	Saves the present settings to the SD card.

12 A ASSISTANTS

Allows setting the parameters related to the Oriented Startup and Self-tuning processes.

The Assistant mode simplifies the configuration of the inverter according to the motor that will be driven. In this environment, the user can configure the inverter data, the motor data, the desired control method, the parametric identification process and present some application specifications.

The Startup Wizard is started during the first power-up of the CFW900 and allows you to make the initial settings required to drive the motor. If it is necessary to start the Startup Wizard again, set the parameter A1 = 1, as shown in the following screenshots.

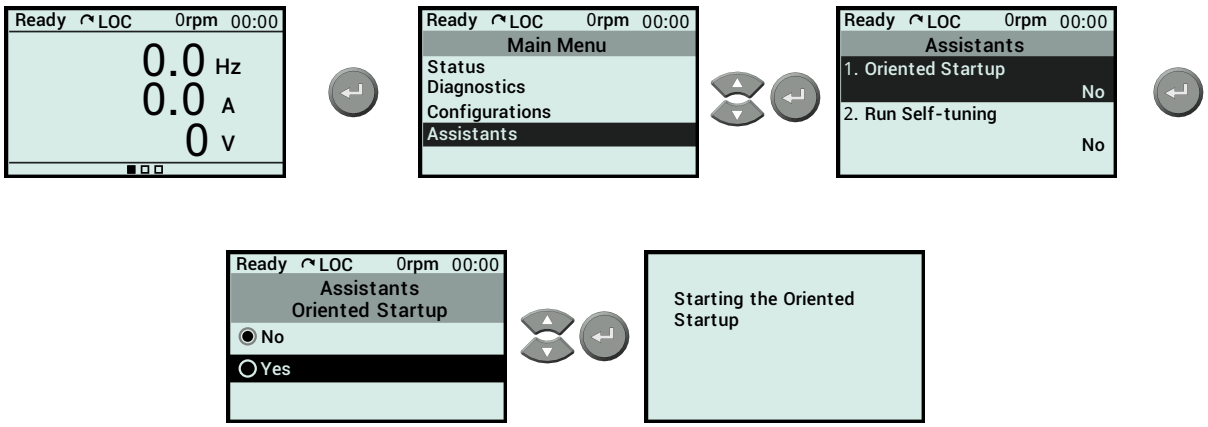


Figure 12.1: *Oriented Startup.*

A Assistants

A1 Oriented Startup

Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:

When this parameter is changed to "1", the Oriented Startup routine starts. The CFW900 goes to the "CONF" state, which is indicated on the HMI. Within the Oriented Startup, the user only has access to important parameters to set the CFW900 and the motor for the type of control to be used in the application.

Indication	Description
0 = No	Does not execute.
1 = Yes	Executes.

A Assistants

A2 Run Self-tuning

Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:

NOTE!
Before executing the Self-tuning function it is recommended to program an emergency option such as STO or digital input programmed for general enable.

NOTE!
During the execution of the Self-tuning function, no other operations must be performed on the inverter, such as: setting, copying and loading the factory default parameters, downloading parameters via WPS, executing commands, etc.

Defines the motor parameter identification mode. After selected the identification method, self-tuning starts executing the steps automatically.

Indication	Description
0 = No	Function disabled.
1 = Stopped	Self-tuning with the motor stopped.
2 = Running	Self-tuning with the motor running.

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