PowerXL DG1 Series VFD

Effective November 2017
Supersedes March 2014

Quick Start Guide



Powering Business Worldwide

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Step 1 — PowerXL series overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the PowerXL Series Open Drive catalog numbering system.

How to use this manual

The purpose of this manual is to provide you with information necessary to install, set and customize parameters, start up, troubleshoot and maintain the Eaton PowerXL Series variable frequency drive. To provide for safe installation and operation of the equipment, read the safety guidelines at the beginning of this manual and follow the procedures outlined in the following chapters before connecting power to the PowerXL Series VFD.
Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and inspection

The PowerXL Series VFD has met a stringent series of factory quality requirements before shipment. It is possible that packaging or equipment damage may have occurred during shipment. After receiving your PowerXL Series VFD, please check for the following:

Check to make sure that the package includes the Instruction Leaflet, Quick Start Guide, User Manual CD and accessory packet. The accessory packet includes:

- Rubber grommets
- Control cable grounding clamps
- Additional grounding screw

Inspect the unit to ensure it was not damaged during shipment.

Make sure that the part number indicated on the nameplate corresponds with the catalog number on your order.

If shipping damage has occurred, please contact and file a claim with the carrier involved immediately.

If the delivery does not correspond to your order, please contact your Eaton Electrical representative.

Note: Do not destroy the packing. The template printed on the protective cardboard can be used for marking the mounting points of the PowerXL VFD on the wall or in a cabinet.

Real time clock battery activation

To activate the real time clock (RTC) functionality in the PowerXL Series VFD, the RTC battery (already mounted in the drive) must be connected to the control board.

Simply remove the primary drive cover, locate the RTC battery directly below the keypad, and connect the white 2-wire connector to the receptacle on the control board.

Figure 1. RTC battery connection

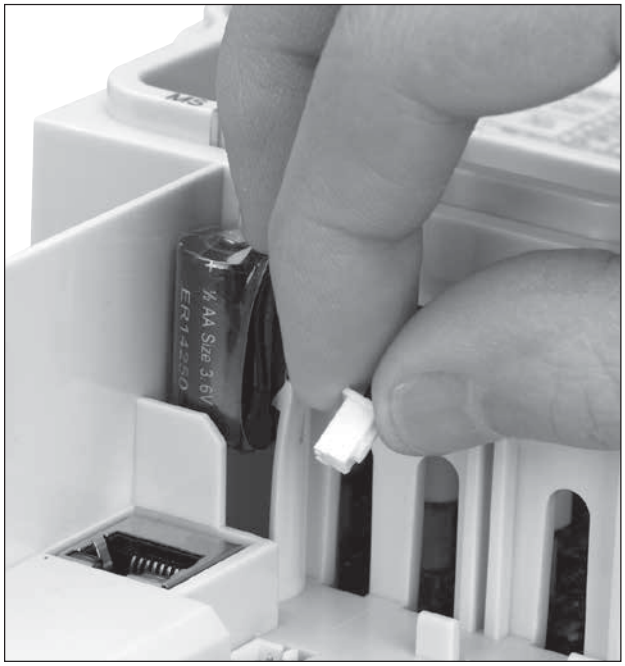


Table 1. Common abbreviations

Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
IH	High overload current (150%)
I_L	Low overload current (110%)
VFD	Variable Frequency Drive
RTC	Real Time Clock

Rating label

Figure 2. Rating label

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Type: DG1-34038FB-C21C
Style No.: 9702-3005-XX
Article No.: 9702-3004-XX
PowerXL™ DG1 VFD Factory ID: I

CT/VT		Input	Output
18.5KW/ 22KW	U(V~)	380-440 3Ø	0~Vin 3Ø
	F(Hz)	50/60 Hz	0-400 Hz
	I (A)	42.6	38/46
25HP/ 30HP	U(V~)	440-500 3Ø	0~Vin 3Ø
	F(Hz)	50/60 Hz	0-400 Hz
	I (A)	42.6	34/40
Enclosure Rating		TYPE1 / IP21	

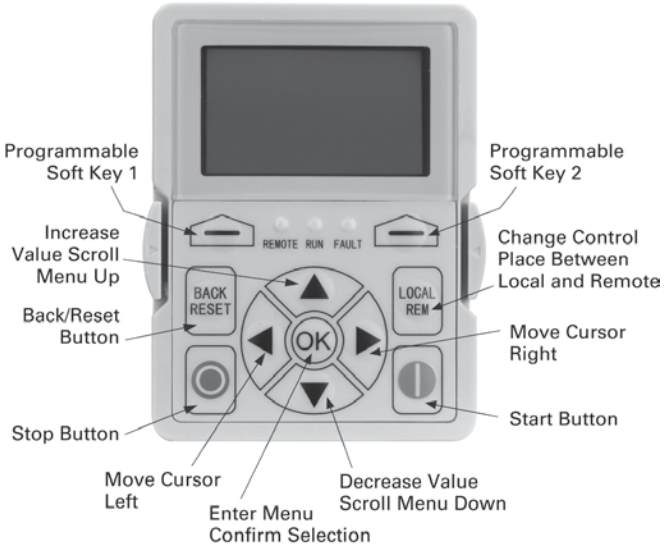
User installation manual:MN040002EN
Serial No.: XXXXXXXXXX
E A N: 4015081721450
NAED: 786685878928
CERTIFIED
SAFETY US-CA
E134360
E1296
Field installed conductors must be copper rated at 75°C
XXXXXX www.eaton.com Made in China

Carton labels (U.S. and Europe)

Same as rating label shown above.

Keypad Overview

Figure 3. Keypad and Display



Step 2 — Keypad overview

The keypad is the interface between the drive and the user. It features an LCD display, 3 LED lights and 11 buttons. With the control keypad, it is possible to control the speed of a motor, to supervise the state of the equipment and to set the frequency converter's parameters. See **Figure 3.**

Keypad buttons

Buttons description

Table 2. Keypad Buttons

Icon	Button	Description
	Soft key 1, Soft key 2	**Soft key 1, soft key 2:** The functions of these two buttons shall be the following: Forward/Reverse, this shall change motor's run direction. • Menu, this shall return to main menu • Details, this shall display the details of the fault • Bypass, this shall make drive go into bypass • Jog, this shall activate jog • Favorite, this shall add this parameter to the Favorite menu • Delete, this shall delete this parameter from the Favorite menu
	Back/Reset	**Back/Reset:** This button has three integrated functions. The button operates as backward button during normal mode. In edit mode, it is used as cancel operate. It is also used to reset faults when faults occur. • Backs up one step • Cancels Modify in edit mode • Resets the active faults (all the active faults shall be reset by pressing this button more than 2s in any page) • Hold Stop and Back Reset for 5 seconds to return drive to factory default • At Main Menu page by hitting Back/Reset takes to Default Page.
	Local/Remote	**Local/Remote:** Switches between LOCAL and REMOTE control for start and speed reference. The control locations corresponding to local and remote shall be selected within an application.
	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter comparison mode, scroll through the parameters of which current value is different from comparison parameter value. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.
		

	Left	**Left arrow:** • Navigation button, movement to left when editing a parameter digit by digit • Backs up one step • At Main Menu page by hitting Back/Reset takes to Default Page
	Right	**Right arrow:** • Enter parameter group mode • Enter parameter mode from group mode • Enter parameter whole edit mode when this parameter can be written • Enter parameter bit by bit edit mode from whole edit mode • Navigation button, movement to right when editing a parameter bit by bit
	OK	**OK:** • To clear all the Fault History if pressed for more than 5s (including 5s) in any page. • This button is used in the parameter edit mode to save the parameter setting. • To confirm the start-up list at the end of the Start-Up Wizard. • To confirm the comparison item in parameters comparison mode. The following is the same with Right key: • Enter parameter whole edit mode when this parameter can be written. • Enter parameter group mode. • Enter parameter mode from group mode..
	Stop	**Stop:** This button operates as motor stop button for normal operation when the "Keypad" is selected as the control source and keypad stop button is active, or stop button is always enabled regardless of control source.. • Motor stop from the keypad.
	Start	**Start:** This button operates as motor start button for normal operation when the "Keypad" is selected as the active control source. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen..

LED lights

Table 3. LED state indicators

Indicator	Description
Run	**Green Run:** Indicates that the VFD is running and controlling the load in Drive or Bypass. Blinks when a stop command has been given but the drive is still ramping down.
Fault	**Red Fault:** Turn on when there is one or more active drive fault(s). Blinks when there is one or more active drive warning(s).
Remote	**Yellow Local/Remote:** Local: If the local control place is selected, turn off the light. Remote: If the remote control place is selected, turn on the light.

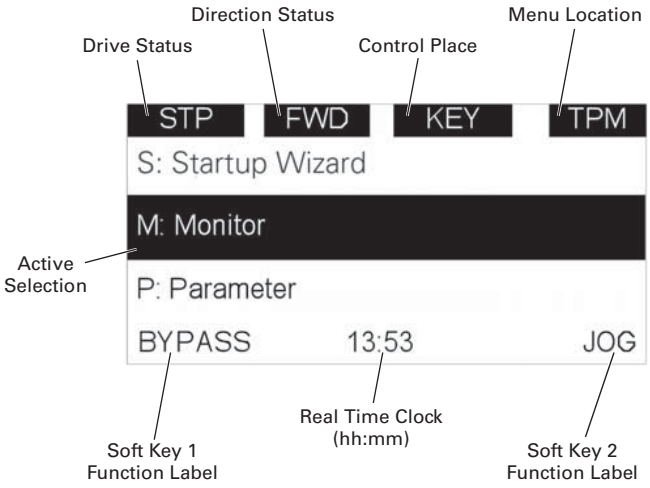
LCD display

The keypad LCD indicates the status of the motor and the drive and any faults in motor or drive functions. On the LCD, the user sees information about the current location in the menu structure and the item displayed.

Overview

Five lines shall be displayed in the screen. General view is as following in Figure 4.

Figure 4. General view of LCD



The lines definition is as below:

The first line is State line, shows:

- **RUN/STP/NRD/FIM/TFM** — If motor is running, the run state shall display "RUN", otherwise the state display "STP". "RUN" blinks when the stop command is sent but the drive is decelerating. "NRD" is displayed if the drive is not ready or does not have a signal "FIM" is displayed to indicate it is in Fire Mode and the drive is in a Run state. "TFM" is displayed when in the Fire Mode Test Mode and the drive is in a Run State.
- **FWD/REV/JOG** — If the motor running direction is clockwise, display "FWD", otherwise display "REV" "Jog" if the drive is in Jog mode the status indication will occur.
- **KEY/I/O/BPS/RBP/BUS/OFF** — If it is in bypass currently, display "BPS"; when run command is given it will got to "RBP". otherwise, if the current control source is I/O terminal, display "I/O". If it is keypad, then display "KEY"; otherwise display "BUS." if HOA enabled and switch to OFF, it shall show OFF.
- **PAR/MON/FLT/OPE/QSW/FAV/TPM/MS1/SL1/SL2/SL3/SL4/BUx.** — If the current page is parameter menu, display "PAR"; If monitor menu, then display "MON"; If fault menu, then display "FLT"; If operation menu, then display "OPE"; If quick start wizard, then display "QSW"; If optional card menu, then display "BOA"; If favorite menu, then display "FAV"; If main menu, then display "TPM" when doing the Multi-drive Pump and Fan mode, the drive mode will be defined with MS- Master and SL being a slave drive. The 1 through 5 will indicate the number in the series it is. "BUx" indicates the drive being a backup drive when in the redundant drive system.

The second line is Code line, shows the menu code.

The third line is Name line, shows the menu name or parameters name.

The fourth line is Value line, shows the submenu name or parameters value.

The fifth line is Soft key line, the functions of Soft key 1 and Soft key 2 are changeable, and the real time is in the middle.

Step 3 — Menu structure

Table 4. Keypad menus

Item	Description	
Monitor	M1—Output Frequency	M31—PID1 Feedback
	M2—Freq Reference	M32—PID1 Error Value
	M3—Motor Speed	M33—PID1 Output
	M4—Motor Current	M34—PID1 Status
	M5—Motor Torque	M35—PID2 Set Point
	M6—Motor Power	M36—PID2 Feedback
	M7—Motor Voltage	M37—PID2 Error Value
	M8—DC-link Voltage	M38—PID2 Output
	M9—Unit Temperature	M39—PID2 Status
	M10—Motor Temperature	M40—Running Motors
	M11—Torque Reference	M41—PT100 Temp
	M12—Analog Input 1	M42—Last Active Fault
	M13—Analog Input 2	M43—RTC Battery Status
	M14—Analog Output 1	M44—Instance Motor Power
	M15—Analog Output 2	M45—Energy Savings
	M16—DI1, DI2, DI3	M46—Control Board DIDO Status
	M17—DI4, DI5, DI6	M47—SlotA DIDO Status
	M18—DI7, DI8	M48—SlotB DIDO Status
	M19—DO1, Virtual RO1, Virtual RO2	M49—Application Status Word
	M20—RO1, RO2, RO3	M50—Standard Status Word
	M21—TC1, TC2, TC3	M51—Output
	M22—Interval 1	M52—Reference
	M23—Interval 2	M53—Total MWh Count
	M24—Interval 3	M54—Total Power Day Count
	M25—Interval 4	M55—Total Power Hr Count
	M26—Interval 5	M56—Trip MWh Count
	M27—Timer 1	M57—Trip Power Day Count
	M28—Timer 2	M58—Trip Power Hr Count
	M29—Timer 3	M59—Multi-Monitoring
	M30—PID1 Set Point	

Item	Description
Parameters	P1—Basic Parameters
	P2—Analog Input
	P3—Digital Input
	P4—Analog Output
	P5—Digital Output
	P6—Logic Function
	P7—Drive Control
	P8—Motor Control
	P9—Protections
	P10—PID Controller1
	P11—PID Controller2
	P12—Preset Speed
	P13—Torque Control
	P14—Brake
	P15—Fire Mode
	P16—Second Motor Para
	P17—Bypass
	P18—Pump Parameters
	P19—Real Time Clock
	P20—Communication
	P21—System

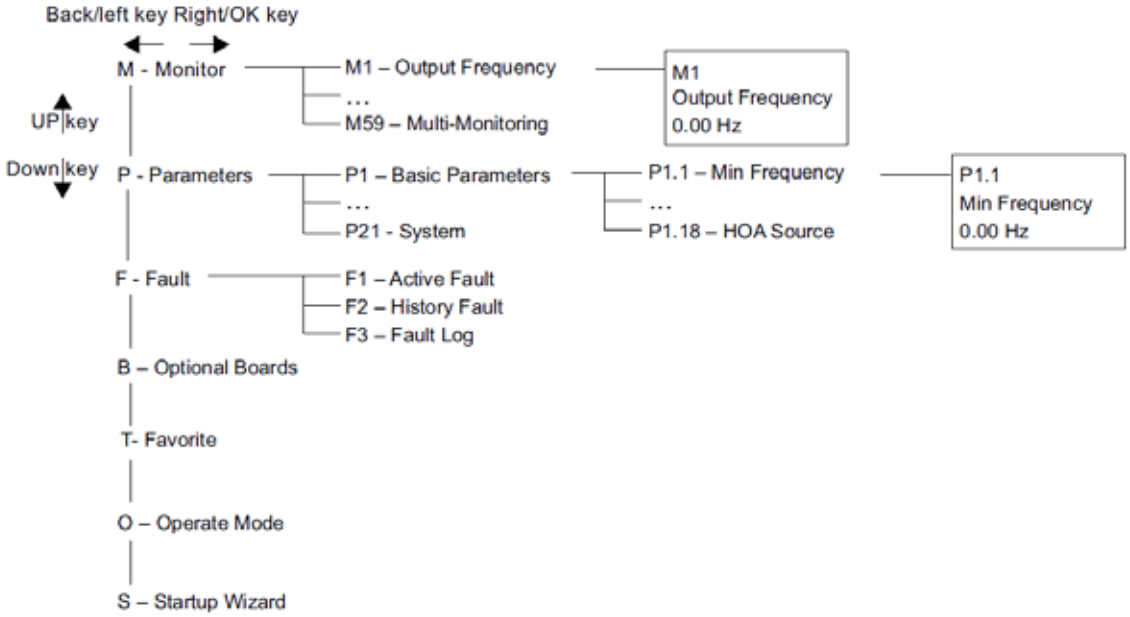
Item	Description
Fault	F1—Active Fault
	F2—History Fault
	F3—Fault Log
Optional Boards	Bx—SlotA
	Bx—SlotB
Favorite	—
Operate Mode	O1—Output Frequency
	O2—Freq Reference
	O3—Motor Speed
	O4—Motor Current
	O5—Motor Torque
	O6—Motor Power
	O7—Motor Voltage
	O8—DC-Link Voltage
	O9—Unit Temperature
	O10—Motor Temperature
	R11—Keypad Torque Ref
	R12—Keypad Reference
	R13—PID1 Keypad Setpoint 1
	R14—PID1 Keypad Setpoint 2
Startup Wizard	S—Startup Wizard

Note: Will vary depending on application selected.

Menu navigation

This section provides basic instruction on navigating each section in the menu structure.

Figure 4. Main menu navigation



Step 4 — Startup

Startup wizard

In the *Startup Wizard*, you will be prompted for essential information needed by the drive so that it can start controlling your process. In the Wizard, you will need the following keypad buttons:



Up/Down buttons.

Use these to change value.





OK button.

Confirm selection with this button, and enter into next question.



Back/Reset button.

If this button was pressed at the first question, the Startup Wizard will be cancelled.

If this button is pressed in any step on the Startup Wizard, the Startup Wizard will be cancelled.

Once you have connected power to your Eaton PowerXL frequency converter, and the Startup Wizard is enabled, follow these instructions to easily set up your drive.

Table 5. Startup wizard instructions

Item	Description	
1	Startup Wizard	Press OK?
2	Application	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
3	Language	0 = English 1 = 中文 2 = Deutsch
4	Real Time Clock	yy.mm.dd hh:mm:ss
5	Daylight Saving	0 = Off 1 = EU 2 = US
6	Min Frequency	Min: 0.00Hz Max: Max Frequency
7	Max Frequency	Min: Min Frequency Max: 400.00Hz
8	Motor Nom Current	Min: DriveNomCurrCT*1/10 Max: DriveNomCurrCT*2
9	Current Limit	Min: Ih*1/10 Max: Ih*2
10	Motor Nom Speed	Min: 300 Max: 20000

Table 5. Startup wizard instructions, continued

Item	Description	
11	Motor PF	Min: 0.30 Max: 1.0
12	Motor Nom Volt	Min: 180 V Max: 690 V
13	Motor Nom Freq	Min: 30.00 Hz Max: 400.00 Hz
14	Accel Time 1	Min: 0.1 s Max: 3000.0 s
15	Decel Time 1	Min: 0.1 s Max: 3000.0 s
16	Local Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
17	Local Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output
18	Remote 1 Control Place	0 = Keypad 1 = I/O terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
19	Remote 1 Reference	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 8 = Motor Pot 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 - AI2 12 = AI2 - AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1,AI2) 16 = MAX(AI1,AI2) 17 = PID1 Control Output 18 = PID2 Control Output

Now the Startup Wizard is done. It will not show again at the next power up. If you want to reset it, please select it from the main menu ("Startup Wizard").

The PID Mini-Wizard is activated in the Quick Setup menu.

Step 5 — Standard application

Introduction

The Standard Application is typically used in basic motor control scenarios where multiple pump control, PID loops, or advanced control loops are not required. It provides the ability for the user to define its local and remote control and reference signals. In addition there is the ability to scale the analog input and output signals to be read based off the desired motor response. There are also 8 digital inputs, 3 relay outputs, and 1 digital output that can be programmed to allow for control schemes that require the drive to have certain functions. It provides full customization on the motor control sequence with the ability to be in frequency or speed control mode, and tuning of the V/Hz curve can be selected. Drive/Motor protections can be customized to defined actions for added user control. Below is a list of other features that are available in the Standard Application.

Standard Application includes functions:

- Selectable digital input function
- Selectable digital output function
- Reference filter, scaling, inversion, offset and range
- Output signal filter, scaling, inversion, offset and range
- Selectable analog output function
- Programmable start/stop and reverse signal logic
- Two independent set of Acceleration/Deceleration ramps
- S curves
- Skip frequency
- Start source (Local/Remote control function)
- Reference source
- Flying start
- Jog
- Volts per Hertz control
- Real time clock function—RTC time display
- Drive temperature limit supervision
- Output frequency 1 limit supervision
- Output frequency 2 limit supervision
- Torque limit supervision
- Reference frequency limit supervision
- Power limit supervision
- Analog input limit supervision
- Auto restart
- Power loss ride through
- Trend buffer
- Programmable switching frequency
- Multi-Preset speeds
- Emergency stop
- Line start lockout
- Fan control
- DC brake
- Flux brake
- Dynamic brake
- Motor current limit supervision

I/O controls

- "Terminal To Function" (TTF) Programming

The design behind the programming of the digital inputs in the DG1 drive is to use "Terminal To Function" programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital input and slot in some cases, depending on which options are available. For use of the drives control board inputs, they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in, which will be either A or B. The IOY determines the type of card it is, which would be IO1 or IO5. The Z indicates which input is being used on that available option card.

- "Function To Terminal" (FTT) Programming

The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

The parameters of the Standard Application are explained on **Page 11** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

Force open/force close selection

The Force Open Selection would make the selected function always off. Essentially this is a virtual switch that is always open. The Force Close Selection would make the selected function always on. Essentially this is a virtual switch that is always closed. These options are assigned to a function if we want to force a state without using a hardware input.

The standard options are DigIn: Force Open - indication that the parameter function is always going to be open, that being said depending on the logic of the function this could mean the function is always not active or always active. When the selection of a function is DigIN: Force Closed - indication that the parameter function is always going to be closed, that being said again depending on the location of the function this could mean the function is always active or not active. Examples of these options would be P3.2 Start Signal 1, when set to "Force Open" and the drive is looking at I/O terminals for control, in this case the drive would never start since this Function is always Open. If this function is set to "Force closed" the drive would always be in a start mode when in that control location.

Example:

If we set Run Enable to Force Closed the drive is always enabled. If we set the same function to Force Open the drive would never be Enabled. If a Digital input is to be used to activate this Run Enable the function should be assigned to a hardware input(See below for DIGIN Selections).

DIGIN selection

This allows Assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 8 Digital inputs on the Main control board.

Example:

If we set Run Enable to DigI N:6 the drive will be enabled when digital input 6 (Terminal 8) is closed, and would not be enabled when digital input 6 (Terminal 8) is open.

Option board digIN selection

This allows Assignment of a hardware digital input on an option card to a function, this is set in a format of DigIN: Y:IO1:X where Y is the slot the option card is inserted on the Main control board and X is the Input on the Board and IO1 is the type of option board used.

Example:

If we set Run Enable to DigIN:A:IO5:6 the drive will be enabled when digital input 6 is closed on the IO5 option card which is inserted in Slot A, and would not be enabled when digital input 6 on the option card is open.

Timer channel selection

A Time Channel is a virtual path to link the digital output of a timer function to a digital input function. To utilize this feature a timer or interval would need to be assigned to a time channel 1 through 3, and the input function to be controlled would need to be assigned to the same time channel.

Example:

If we set Run Enable to DigIN:TimeChannel1 the drive will be enabled when the timer assigned to Time Channel 1 is active or High, and would not be enabled when the Time Channel is inactive or Low.

Table 6 Drive communication ports

Port	Communication
RJ45 Keypad Port	
Upload/Download Parameters	USB to RJ45
Remote Mount Keypad	Ethernet
Upgrade Drive Firmware	USB to RJ45
RJ45 Ethernet Port	
Upload/Download Parameters	Ethernet
Ethernet IP Communications	Ethernet
Modbus TCP Communications	Ethernet
RS-485 Serial Port ①	
Upload/Download Parameters	Two-Wire Twisted Pair
Upgrade Drive Firmware	Two-Wire Twisted Pair
Modbus RTU Communications	Two-Wire Twisted Pair
BACnet MS/TP Communications	Two-Wire Twisted Pair

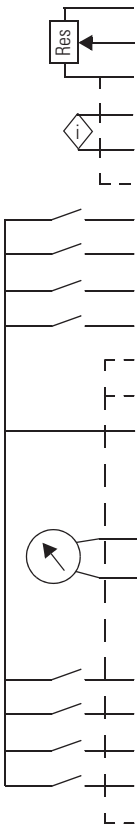
① Shielded wire recommended.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit
- Communication wire to be shielded

Table 6. I/O connection



External Wiring	Pin	Signal Name	Signal	Default Setting	Description
	1	+10 V	Ref. Output Voltage	—	10 Vdc Supply Source
	2	AI1+ ①	Analog Input 1	0–10 V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
	3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
	4	AI2+ ①	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10 V)
	5	AI2–	Analog Input 2 Ground	—	Analog Input 2 Common (Ground)
	6	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	7	DIN5	Digital Input 5	Preset Speed B0	Sets frequency output to Preset Speed 1
	8	DIN6	Digital Input 6	Preset Speed B1	Sets frequency output to Preset Speed 2
	9	DIN7	Digital Input 7	Not used (TI–)	Input forces VFD output to shut off
	10	DIN8	Digital Input 8	Force Remote (TI+)	Input takes VFD from Local to Remote
	11	CMB	DI5 to DI8 Common	Grounded	Allows source input
	12	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	13	24 V	+24 Vdc Output	—	Control voltage output (100 mA max.)
	14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
	15	24 Vo	+24 Vdc Output	—	Control voltage output (100 mA max.)
	16	GND	I/O Signal Ground	—	I/O Ground for Reference and Control
	17	AO1+	Analog Output 1	Output Frequency	Shows Output frequency to motor 0–60 Hz (4 mA to 20 mA)
	18	AO2+	Analog Output 2	Motor Current	Shows Motor current of motor 0–FLA (4 mA to 20 mA)
	19	24 Vi	+24 Vdc Input	—	External control voltage input
	20	DIN1	Digital Input 1	Run Forward	Input starts drive in forward direction (start enable)
	21	DIN2	Digital Input 2	Run Reverse	Input starts drive in reverse direction (start enable)
	22	DIN3	Digital Input 3	External Fault	Input causes drive to fault
	23	DIN4	Digital Input 4	Fault Reset	Input resets active faults
	24	CMA	DI1 to DI4 Common	Grounded	Allows source input
	25	A	RS-485 Signal A	—	Fieldbus Communication (Modbus, BACnet)
	26	B	RS-485 Signal B	—	Fieldbus Communication (Modbus, BACnet)
	27	R3NO	Relay 3 Normally Open	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	28	R1NC	Relay 1 Normally Closed	Run	Relay output 1 shows VFD is in a run state
	29	R1CM	Relay 1 Common		
	30	R1NO	Relay 1 Normally Open		
	31	R3CM	Relay 3 Common	At Speed	Relay output 3 shows VFD is at Ref. Frequency
	32	R2NC	Relay 2 Normally Closed	Fault	Relay output 2 shows VFD is in a fault state
	33	R2CM	Relay 2 Common		
	34	R2NO	Relay 2 Normally Open		

Notes: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1—to ground (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 3, 5, and 6 need to be jumpered together.

① AI1+ and AI2+ support 10K potentiometer.

Standard application—parameters list

On the next pages you will find the lists of parameters within the respective parameter groups.

Column explanations:

Code = Location indication on the keypad; shows the operator the present parameter number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; given if available
Default = Value preset by factory
ID = ID number of the parameter

Table 7. Monitor—M

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M1	Output Frequency			Hz	0.00	1	
M2	Freq Reference			Hz	0.00	24	
M3	Motor Speed			rpm	0	2	
M4	Motor Current			A	0.0	3	
M5	Motor Torque			%	0.0	4	
M6	Motor Power			%	0.0	5	
M7	Motor Voltage			V	0.0	6	
M8	DC-link Voltage			V	0	7	
M9	Unit Temperature			°C	0.0	8	
M10	Motor Temperature			%	0.0	9	
M12	Analog Input 1			Varies	0.00	10	
M13	Analog Input 2			Varies	0.00	11	
M14	Analog Output 1			Varies	0.00	25	
M15	Analog Output 2			Varies	0.00	575	
M16	DI1, DI2, DI3				0	12	
M17	DI4, DI5, DI6				0	13	
M18	DI7, DI8				0	576	
M19	DO1, Virtual RO1, Virtual RO2				0	14	
M20	RO1, RO2, RO3				0	557	
M41	PT100 Temperature			°C	1000.0	27	

Table 7. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M42	Last Active Faults				0	28	See fault section below for Fault Code.
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.00	1686	
M45	Energy Savings			Varies		2119	
M46	Control board DIDO Status				0	2209	Bit 0 = DIN1 Status Bit 1 = DIN2 Status Bit 2 = DIN3 Status Bit 3 = DIN4 Status Bit 4 = DIN5 Status Bit 5 = DIN6 Status Bit 6 = DIN7 Status Bit 7 = DIN8 Status Bit 8 = DO1 Status Bit 9 = RO1 Status Bit 10 = RO2 Status Bit 11 = RO3 Status Bit 12 = Slot A with Board Bit 13 = Slot B with Board Bit 14 -15 = Not used
M47	SlotA DIDO Status				0	2210	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used
M48	SlotB DIDO Status				0	2211	Bit 0 = IO1_DIN1 Status Bit 1 = IO1_DIN2 Status Bit 2 = IO1_DIN3 Status Bit 3 = IO1_DO1 Status Bit 4 = IO1_DO2 Status Bit 5 = IO1_DO3 Status Bite 6 = IO3_RO1 Status Bit 7 = IO3_RO2 Status Bit 8 = IO3_RO3 Status Bit 9 = IO5_AC1 Status Bit 10 = IO5_AC2 Status Bit 11 = IO5_AC3 Status Bit 12 = IO5_AC4 Status Bit 13 = IO5_AC5 Status Bit 14 = IO5_AC6 Status Bit 15 = Not Used

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 7. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M49	App Status Word				0	29	Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_ZeroSpeed Bit 8 = I/O Control Indicate Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Indicator Bit 11 = MC_DC_Brake Bit 12 = RunEnable Bit 13 = Run Bypass Bit 14 = Ext Brake Control Bit 15 = Bypass Mode
M50	Standard Status Word				0	2414	Bit 0 = P20.1.9 (default = Ready) Bit 1 = P20.1.10 (default = Run) Bit 2 = P20.1.11 (default = Fault) Bit 3 = P20.1.12 (default = Fault Invert) Bit 4 = P20.1.13 (default = Warning) Bit 5 = P20.1.14 (default = Reversed) Bit 6 = P20.1.15 (default = At Speed) Bit 7 = P20.1.16 (default = Zero Frequency) Bit 8 - 15 = Not Used
M51	Output				0	2447	
M52	Reference				0	2449	
M53	Total MWh Count				Varies	601	
M54	Total Power Day Count				Varies	603	
M55	Total Power Hr Count				Varies	606	
M56	Trip MWh Count				Varies	604	
M57	Trip Power Day Count				Varies	636	
M58	Trip Power Hr Count				Varies	637	
M59	Multi-Monitoring				1, 2, 3	30	

Table 8. Operate mode—O

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output Frequency			Hz	0.00	1	
O2	Freq Reference			Hz	0.00	24	
O3	Motor Speed			rpm	0	2	
O4	Motor Current			A	0.0	3	
O5	Motor Torque			%	0.0	4	
O6	Motor Power			%	0.0	5	
O7	Motor Voltage			V	0.0	6	
O8	DC-link Voltage			V	0	7	
O9	Unit Temperature			°C	0.0	8	
O10	Motor Temperature			%	0.0	9	
R12 ②	Keypad Reference	See Para ID 101	See Para ID 102	Hz	0.00	141	

Table 9. Basic parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ①②	Min Frequency	0.00	See Para ID 102	Hz	0.00	101	
P1.2 ①②	Max Frequency	See Para ID 101	400.00	Hz	60.00	102	
P1.3 ②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4 ②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5 ①	Motor Nom Current	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6 ①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7 ①	Motor PF	0.30	1.00		0.85	490	
P1.8 ①	Motor Nom Voltage	180	690	V	Motor Nom Voltage	487	
P1.9 ①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10 ②	Power Up Local Remote Select				0	1685	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11 ②	Remote1 Control Place				0	135	0 = I/O Terminal Start 1 1 = Fieldbus 2 = I/O Terminal Start 2 3 = Keypad
P1.12 ②	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = Fieldbus
P1.13 ②	Bumpless Enable				0	2464	0 = Disabled 1 = Enabled

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 9. Basic parameters—P1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.14 ①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1–AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = Min (AI1, AI2) 16 = MAX(AI1,AI2)
P1.15 ①②	Remote1 Reference				1	137	See Para ID 136
P1.16 ①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled
P1.17 ②	Run Delay Time	0	32500	s	0	2423	
P1.18 ②	HOA Source	0	2		0	2465	0 = Disable 1 = I/O Terminal 2 = Keypad
P1.13①②	Local Reference				6	136	0 = AI1 1 = AI2 2 = Slot A: AI1 3 = Slot B: AI1 4 = AI1 Joystick 5 = AI2 Joystick 6 = Keypad 7 = Fieldbus Ref 9 = Max Frequency 10 = AI1 + AI2 11 = AI1 –AI2 12 = AI2–AI1 13 = AI1 * AI2 14 = AI1 or AI2 15 = MIN(AI1, AI2) 16 = MAX(AI1, AI2)
P1.14①②	Remote1 Reference				1	137	See Para ID 1695
P1.15①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 10. Analog input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1.1	AI Ref Scale Min Value	0.00	See Para ID 145	Hz	0	144	
P2.1.2	AI Ref Scale Max Value	See Para ID 144	400.00	Hz	0	145	
P2.2.1 ②	AI1 Mode	0	1		1	222	0 = 0–20 mA 1 = 0–10 V
P2.2.2 ②	AI1 Signal Range	0	2		0	175	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.2.3 ②	AI1 Custom Min	0.00	See Para ID 177	%	0.00	176	
P2.2.4 ②	AI1 Custom Max	See Para ID 176	100.00	%	100.00	177	
P2.2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.2.6 ②	AI1 Signal Invert	0	1		0.00	181	0 = Not Inverted 1 = Inverted
P2.2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.2.10 ②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.3.1 ②	AI2 Mode	0	2		1	223	0 = 0–20 mA 1 = 0–10 V 2 = –10 to +10 V
P2.3.2 ②	AI2 Signal Range	0	2		0	183	0 = 0–100% / 0–20 mA / 0–10 V 1 = 20–100% / 4–20 mA / 2–10 V 2 = Customized
P2.3.3 ②	AI2 Custom Min	0.00	0.00	%	0.00	184	
P2.3.4 ②	AI2 Custom Max	See Para ID 184	100.00	%	100.00	185	
P2.3.5 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.3.6 ②	AI2 Signal Invert	0	1		0.00	189	"0 = Not Inverted 1 = Inverted"
P2.3.7 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.3.8 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.3.9 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
P2.3.10 ②	AI2 Joystick Offset	-50.00	50.00	%	0.00	134	
P2.4.1 ②	Fine Tuning Input	0	5		0	2484	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot A: AI1 5 = Fieldbus
P2.4.2 ②	Fine Tuning Min	0.00	100.00	%	0.00	2485	
P2.4.3 ②	Fine Tuning Max	0.00	100.00	%	0.00	2486	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 11. Digital input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	IO Terminal 1 Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②⑤	IO Terminal 1 Start Signal 1				2	190	0 = DigIN:ForceOpen 1 = DigIN:ForceClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3 13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = RO1 Function 32 = RO2 Function 33 = RO3 Function 34 = Virtual RO1 Function 35 = Virtual RO2 Function

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 11. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.3 ②⑤	IO Terminal 1 Start Signal 2				3	191	See Para ID 190
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②③	Reverse				0	198	See Para ID 190
P3.6 ②③	Ext. Fault Close				4	192	See Para ID 190
P3.7 ②③	Ext. Fault Open				1	193	See Para ID 190
P3.8 ②④	Fault Reset				5	200	See Para ID 190
P3.9 ②③	Run Enable				1	194	See Para ID 190
P3.10 ②③	Preset Speed B0				6	205	See Para ID 190
P3.11 ②③	Preset Speed B1				7	206	See Para ID 190
P3.12 ②③	Preset Speed B2				0	207	See Para ID 190
P3.15 ②③	Accel/Decel Time Set				0	195	See Para ID 190
P3.16 ②③	Accel/Decel Prohibit				0	201	See Para ID 190
P3.17 ②④	No Access To Param				0	215	See Para ID 190
P3.21 ②③	Remote Control				9	196	See Para ID 190
P3.22 ②③	Local Control				0	197	See Para ID 190
P3.23 ②③	Remote1/2 Select				0	209	See Para ID 190
P3.26 ②③	DC Brake Enable				0	202	See Para ID 190
P3.32 ②③	Jog Enable				0	199	See Para ID 190
P3.36 ②③	AI Ref Source Select				0	208	See Para ID 190
P3.42 ②③	Emergency Stop				1	747	See Para ID 190
P3.45 ①②	IO Terminal 2 Start Stop Logic				0	2206	See Para ID 143
P3.46 ②⑤	IO Terminal 2 Start Signal 1				2	2207	See Para ID 190
P3.47 ②⑤	IO Terminal 2 Start Signal 2				3	2208	See Para ID 190
P3.48 ②③	Ext. Fault 2 NO				0	2293	See Para ID 190
P3.49 ②③	Ext. Fault 2 NC				1	2294	See Para ID 190
P3.50 ②③	Ext. Fault 3 NO				0	2295	See Para ID 190
P3.51 ②③	Ext. Fault 3 NC				1	2296	See Para ID 190
P3.52 ②	Ext. Fault 1 Text				0	2297	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.53 ②	Ext. Fault 2 Text				1	2298	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
- Input function is Level sensed
- Input function is edge sensed
- Input function is edge sensed when using StartP/StopP start logic Para ID 143 and 2206

Table 11. Digital input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.54 ②	Ext. Fault 3 Text				2	2299	0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeze Stat Trip 9 = Smoke Detect 10 = Seal Leakage 11 = Rod Breakage
P3.55 ②④	Parameter Set1/2 Sel				0	2312	See Para ID 190
P3.56 ②④	Deragging Enable				0	2394	See Para ID 190
P3.57 ②③	Off Control				0	2395	See Para ID 190

Table 12. Analog output—P4

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10 V
P4.2 ②	AO1 Function				1	146	0 = Not Used 1 = Output Frequency 2 = Freq Reference 3 = Motor Speed 4 = Motor Current 5 = Motor Torque (0–Nom) 6 = Motor Power 7 = Motor Voltage 8 = DC-Bus Voltage 19 = AI1 20 = AI2 21 = Output Freq (–2 to +2N) 22 = Motor Torque (–2 to +2N) 23 = Motor Power (–2 to +2N) 24 = PT100 Temperature 25 = FB Data Input 1 26 = FB Data Input 2 27 = FB Data Input 3 28 = FB Data Input 4 29 = FB Data Input 5 30 = FB Data Input 6 31 = FB Data Input 7 32 = FB Data Input 8 33 = SlotA PT100 Temp Channel 1 34 = SlotA PT100 Temp Channel 2

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is Level sensed.
④ Input function is Edge sensed.
⑤ Input function is Edge sensed when using StartP/StopP start logic.

Table 12. Analog output—P4, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
							35 = SlotA PT100 Temp Channel 3 36 = SlotB PT100 Temp Channel 1 37 = SlotB PT100 Temp Channel 2 38 = SlotB PT100 Temp Channel 3 39 = User Defined Output 40 = Motor Current(-2 to +2N)
P4.3 ②	AO1 Minimum				1	149	0 = 0 V / 0 mA 1 = 2 V / 4 mA
P4.4 ②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5 ②	AO1 Scale	10	1000	%	100	150	
P4.6 ②	AO1 Inversion				0	148	0 = Not Inverted 1 = Inverted
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See Para ID 227
P4.9 ②	AO2 Function				4	229	See Para ID 146
P4.10 ②	AO2 Minimum				1	232	See Para ID 149
P4.11 ②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12 ②	AO2 Scale	10	1000	%	100	233	
P4.13 ②	AO2 Inversion				0	231	See Para ID 148
P4.14 ②	AO2 Offset	–100.00	100.00	%	0.00	234	

Table 13. Digital output—P5

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P5.1 ②	DO1 Function				1	151	0 = Not Used 1 = Ready 2 = Run 3 = Fault 4 = Fault Invert 5 = Warning 6 = Reversed 7 = At Speed 8 = Zero Frequency 9 = Freq Limit 1 Superv 10 = Freq Limit 2 Superv 13 = Overheat Fault 14 = Overcurrent Regular 15 = Overvoltage Regular 16 = Undervoltage Regular 17 = 4 mA Ref Fault/Warning 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Therm Protection 31 = FB Digital Input 1

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 13. Digital output—P5, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
							32 = FB Digital Input 2 33 = FB Digital Input 3 34 = FB Digital Input 4 36 = TC1 Status 37 = TC2 Status 38 = TC3 Status 39 = In E-Stop 40 = Power Limit Superv 41 = Temp Limit Superv 42 = Analog Input Superv 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active note ⑥ 58 = 2th Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass/Drive 61 = Bypass Overload
P5.2 ②	RO1 Function				2	152	See Para ID 151
P5.3 ②	RO2 Function				3	153	See Para ID 151
P5.4 ②	RO3 Function				7	538	See Para ID 151
P5.5 ②	Virtual RO1 Function				0	2465	See Para ID 151
P5.6 ②	Virtual RO2 Function				0	2466	See Para ID 151
P5.7 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 1 Supv Val	0.00	See Para ID 102	Hz	0.00	155	
P5.9 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Freq Limit 2 Supv Val	0.00	See Para ID 102	Hz	0.00	158	
P5.11 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Torque Limit Supv Val	–300.0	300.0	%	100.0	160	
P5.13 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.14 ②	Ref Limit Supv Val	0.00	See Para ID 102	Hz	0.00	162	
P5.17 ②	Temp Limit Supv				0	165	See Para ID 161
P5.18 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.19 ②	Power Limit Supv				0	167	See Para ID 161
P5.20 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.21 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.22 ②	AI Limit Supv					171	
P5.23 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.24 ②	RO1 On Delay	0	320	s	0	2111	
P5.25 ②	RO1 Off Delay	0	320	s	0	2112	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
⑥ Function is not available in FR7 and FR8 drives.

Table 13. Digital output—P5, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P5.34 ②	RO2 On Delay	0	320	s	0	2113	
P5.35 ②	RO2 Off Delay	0	320	s	0	2114	
P5.36 ②	RO3 On Delay	0	320	s	0	2115	
P5.37 ②	RO3 Off Delay	0	320	s	0	2116	
P5.38 ②	RO3 Reverse	0	1		0	2117	0 = Not Inverted 1 = Inverted
P5.39 ②	Motor Current 1 Supv				0	2189	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.40 ②	Motor Current 1 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190	
P5.41 ②	Motor Current 2 Supv				0	2191	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.42 ②	Motor Current 2 Supv Value	0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192	
P5.43 ②	Second AI Supv Select				0	2193	0 = AI1 1 = AI2
P5.44 ②	Second AI Limit Supv				0	2194	See Para ID 161
P5.45 ②	Second AI Limit Supv Val	0	100	%	0	2195	
P5.46 ②	Motor Current 1 Supv Hyst	0.1	1	A	0.1	2196	
P5.47 ②	Motor Current 2 Supv Hyst	0.1	1	A	0.1	2197	
P5.48 ②	AI Supv Hyst	1	10	%	1	2198	
P5.49 ②	Second AI Supv Hyst	1	10	%	1	2199	
P5.50 ②	Freq Limit 1 Supv Hyst	0.1	1	Hz	0.1	2200	
P5.51 ②	Freq Limit 2 Supv Hyst	0.1	1	Hz	0.1	2201	
P5.52 ②	Torque Limit Supv Hyst	1	5	%	1	2202	
P5.53 ②	Ref Limit Supv Hyst	0.1	1	Hz	0.1	2203	
P5.54 ②	Temp Limit Supv Hyst	1	10	?	1	2204	
P5.55 ②	Power Limit Supv Hyst	0.1	10	%	0.1	2205	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 14. Drive control—P7

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See Para ID 135
P7.2 ①②	Remote 2 Reference				7	139	See Para ID 136
P7.3 ②	Keypad Reference	See Para ID 101	See Para ID 102	Hz	0.00	141	
P7.4 ②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5 ②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6 ②	Jog Reference	See Para ID 101	See Para ID 102	Hz	0.00	117	
P7.9 ②	Start Mode				0	252	0 = Ramp 1 = Flying Start
P7.10 ②	Stop Mode				1	253	0 = Coasting 1 = Ramp
P7.11 ②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12 ②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13 ②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14 ②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15 ②	Skip F1 Low Limit	0.00	See Para ID 257	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	See Para ID 256	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	See Para ID 259	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	See Para ID 258	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	See Para ID 261	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	See Para ID 260	400.00	Hz	0.00	261	
P7.21 ②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	
P7.22 ②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23 ②	Power Loss Time	0.3	5.0	s	2.0	268	
P7.24 ②	Currency	0	8		$	2121	0 = $ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R$ 6 = Fr 7 = Kr
P7.25 ②	Energy Cost				0	2122	
P7.26 ②	Data Type	0	4	s	0	2123	0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg
P7.27 ②	Energy Savings Reset	0	1	s	0	2124	0 = No Action 1 = Reset
P7.28 ②	2th Stage Ramp Frequency	See Para ID 101	See Para ID 102	Hz	30	2447	
P7.29 ②	Change Phase Sequence Motor	0	1		0	2515	0 = Change Disable 1 = Change Enable

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 15. Motor control—P8

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P8.1 ①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P8.2 ①	Current Limit	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom VT	107	
P8.3 ①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled
P8.4 ①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5 ①②	Field Weakening Point	8.00	400.00	Hz	60.00	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	See Para ID 289	Hz	V/Hz Midpoint Freq	291	
P8.8 ①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9 ①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10 ②	Switching Frequency	Min Switching Freq	Max Switching Freq	kHz	Default Switching Freq CT	288	
P8.11 ②	Sine Filter Enable				0	1665	0 = Disabled 1 = Enabled
P8.12 ①②	Overvoltage Control				1	294	0 = Disabled 1 = Enabled
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.39 ②	Start Boost Rise Time	–1	32000	s	0	1622	

Table 16. Protections—P9

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P9.1 ①②	4 mA Input Fault				0	306	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P9.2 ①②	4 mA Fault Frequency	0.00	See Para ID 102	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See Para ID 313
P9.4 ①②	Input Phase Fault				2	332	See Para ID 313
P9.5 ①②	Uvolt Fault Response				2	330	See Para ID 313
P9.6 ①②	Output Phase Fault				2	308	See Para ID 313
P9.7 ①②	Ground Fault				2	309	See Para ID 313
P9.8 ①②	Motor Thermal Protection				2	310	See Para ID 313
P9.9 ②	Motor Thermal F0 Current	0.0	150.0	%	40.0	311	
P9.10 ②	Motor Thermal Time	1	200	min	12	312	
P9.11 ①②	Stall Protection				0	313	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P9.12 ②	Stall Current Limit	0.1	Active Motor Nom I*2	A	Active Motor Nom I*13/10	314	
P9.13 ②	Stall Time Limit	1.0	120.0	s	15.0	315	
P9.14 ②	Stall Frequency Limit	1.00	See Para ID 102	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See Para ID 313
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 16. Protections—P9, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P9.17 ②	Underload F0 Torque	5.0	150.0	%	10.0	319	
P9.18 ②	Underload Time Limit	2.00	600.00	s	20.00	320	
P9.19 ①②	Thermistor Fault Response				2	333	See Para ID 313
P9.20 ②	Line Start Lockout				2	750	0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P9.21 ①②	Fieldbus Fault Response				2	334	See Para ID 313
P9.22 ①②	OPTCard Fault Response				2	335	See Para ID 313
P9.23 ①②	Unit Under Temp Prot				2	1564	See Para ID 313
P9.24 ②	Wait Time	1.00	300.00	s	1.00	321	
P9.25 ②	Trail Time	0.00	600.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Flying Start 1 = Ramp
P9.27 ②	Undervoltage Attempts	0	10		1	324	
P9.28 ②	Overvoltage Attempts	0	10		1	325	
P9.29 ②	Overcurrent Attempts	0	3		1	326	
P9.30 ②	4 mA Fault Attempts	0	10		1	327	
P9.31 ②	Motor Temp Fault Attempts	0	10		1	329	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	
P9.34 ①②	RTC Fault				1	955	See Para ID 313
P9.36 ①②	Replace Battery Fault Response				1	1256	See Para ID 313
P9.37 ①②	Replace Fan Fault Response				1	1257	See Para ID 313
P9.38 ①②	IP Address Confliction Resp				1	1678	See Para ID 313
P9.39 ②	Cold Weather Mode				0	2126	0 = Disable 1 = Enable
P9.35 ①②	PT100 Fault Response				2	337	See Para ID 313
P9.40 ②⑥	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41②⑥	Cold Weather Time Out	0	10	min	3	2128	
P9.44 ②	Ground Fault Limit	0	30	%	15	2158	
P9.45 ①②	Keypad Comm Fault Response				2	2157	See Para ID 313
P9.46 ②	Preheat Mode				0	2159	0 = Disabled 1 = Enabled
P9.47 ②	Preheat Temp Source				31	2160	0 = DigIN: NormallyOpen 1 = DigIN: NormallyClosed 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: 7 9 = DigIN: 8 10 = DigIN: A: IO1: 1 11 = DigIN: A: IO1: 2 12 = DigIN: A: IO1: 3

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
⑥ Function is not available in FR7 and FR8 drives

Table 16. Protections—P9, continued

Code	Parameter	Min.	Min.	Unit	Default	ID	Note
P9.47 ②	Preheat Temp Source				31	2160	13 = DigIN: A: IO5: 1 14 = DigIN: A: IO5: 2 15 = DigIN: A: IO5: 3 16 = DigIN: A: IO5: 4 17 = DigIN: A: IO5: 5 18 = DigIN: A: IO5: 6 19 = DigIN: B: IO1: 1 20 = DigIN: B: IO1: 2 21 = DigIN: B: IO1: 3 22 = DigIN: B: IO5: 1 23 = DigIN: B: IO5: 2 24 = DigIN: B: IO5: 3 25 = DigIN: B: IO5: 4 26 = DigIN: B: IO5: 5 27 = DigIN: B: IO5: 6 28 = Time Channel 1 29 = Time Channel 2 30 = Time Channel 3 31 = Drive Temperature 32 = Slot A PT100 Temp Channel 1 33 = Slot A PT100 Temp Channel 2 34 = Slot A PT100 Temp Channel 3 35 = Slot A Max PT100 Temp 36 = Slot B PT100 Temp Channel 1 37 = Slot B PT100 Temp Channel 2 38 = Slot B PT100 Temp Channel 3 39 = Slot B Max PT100 Temp 40 = Slot A and Slot B Max PT100 Temp
P9.48 ②	Preheat Enter Temp	0.0	19.9	°C	10.0	2161	
P9.49 ②	Preheat Quit Temp	20.0	40.0	°C	20.0	2162	
P9.50 ②	Preheat Output Voltage	0.0	20.0	%	2.0	2163	
P9.56 ②	STO Fault Response				2	2429	0 = No Action 1 = Warning 2 = Fault
P9.57 ②	Fault Reset Start	0	1		0	2483	0 = Start/Stop After Fault Reset 1 = Restart After Fault Reset

Table 17. Preset speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	See Para ID 102	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	See Para ID 102	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	See Para ID 102	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	See Para ID 102	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	See Para ID 102	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	See Para ID 102	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	See Para ID 102	Hz	35.00	122	

Table 18. Brake—P14

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P14.1 ①②	DC-Brake Current	Drive Nom CT*15/100	Drive Nom CT*15/10	A	Drive Nom CT*1/2	254	
P14.2 ①②	Start DC-Brake Time	0.00	600.00	s	0.00	263	
P14.3 ①②	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	
P14.4 ①②	Stop DC-Brake Time	0.00	600.00	s	0.00	255	
P14.5 ①②	Brake Chopper Define				0	251	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P14.6 ①②	Flux Brake				0	266	0 = Off 1 = On
P14.7 ①②	Flux Brake Current	Active Motor Nom I*1/10	See Para ID 107	A	Active Motor Nom I*1/2	265	

Communication P20

Table 19. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1	FB Data Output 1 Sel				2541	1556	
P20.1.2	FB Data Output 2 Sel				2542	1557	
P20.1.3	FB Data Output 3 Sel				2550	1558	
P20.1.4	FB Data Output 4 Sel				103	1559	
P20.1.5	FB Data Output 5 Sel				104	1560	
P20.1.6	FB Data Output 6 Sel				107	1561	
P20.1.7	FB Data Output 7 Sel				0	1562	
P20.1.8	FB Data Output 8 Sel				0	1563	

Table 20. FB Process Data Output Sel—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	FB Process Data Output 1 Sel				1	1556	
P20.2.2	FB Process Data Output 2 Sel				2	1557	
P20.2.3	FB Process Data Output 3 Sel				3	1558	
P20.2.4	FB Process Data Output 4 Sel				4	1559	
P20.2.5	FB Process Data Output 5 Sel				5	1560	
P20.2.6	FB Process Data Output 6 Sel				6	1561	
P20.2.7	FB Process Data Output 7 Sel				7	1562	
P20.2.8	FB Process Data Output 8 Sel				28	1563	
P20.2.9	Standard Status Word Bit0 Function Select				1	2415	See Para ID 151
P20.2.10	Standard Status Word Bit1 Function Select				1	2416	See Para ID 151
P20.2.11	Standard Status Word Bit2 Function Select				1	2417	See Para ID 151
P20.2.12	Standard Status Word Bit3 Function Select				1	2418	See Para ID 151
P20.2.13	Standard Status Word Bit4 Function Select				1	2419	See Para ID 151
P20.2.14	Standard Status Word Bit5 Function Select				1	2420	See Para ID 151
P20.2.15	Standard Status Word Bit6 Function Select				1	2421	See Para ID 151
P20.2.16	Standard Status Word Bit7 Function Select				1	2422	See Para ID 151

RS485 Bus P20.3

Table 21. Basic Setting— P20.3.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP 2 = SWD

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 22. Modbus RTU— P20.3.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.2.1	Slave Address	1	247		1	587	
P20.3.2.2	Baud Rate				1	584	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.2.3	Parity Type				0	585	0 = None 1 = Odd 2 = Even
P20.3.2.4	Modbus RTU Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.3.2.5	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.3.2.6	Parity Error				0	590	
P20.3.2.7	Slave Fault				0	591	
P20.3.2.8	Last Fault Response				0	592	
P20.3.2.9	Comm Timeout Modbus RTU			ms	10000	593	
P20.3.2.10	Modbus RTU Fault Response	0	1		0	2516	0 = In Fieldbus Control 1 = In All Control

Table 23. BACnet MS/TP— P20.3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.3.1	MSTP Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P20.3.3.2	MSTP MS/TP Device Address	0	127		1	595	
P20.3.3.3	MSTP Instance Number	0	4194302		0	596	
P20.3.3.4	MSTP Comm Timeout MSTP			ms	10000	598	
P20.3.3.5	MSTP Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.3.3.6	MSTP Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud Rate Fault
P20.3.3.7	MSTP Fault Response	0	1		0	2526	0 = In Fieldbus Control 1 = In All Control

Table 24. Ethernet IP—P20.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.4.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.4.2	Active IP Address					1507	
P20.4.3	Active Subnet Mask					1509	
P20.4.4	Active Default Gateway					1511	
P20.4.5	MAC Address					1513	
P20.4.6	Static IP Address				192.168.1.254	1501	
P20.4.7	Static Subnet Mask				255.255.255.0	1503	
P20.4.8	Static Default Gateway				192.168.1.1	1505	
P20.4.9	Ethernet IP Protocol Status					608	0 = Stopped 1 = Operational 2 = Faulted
P20.4.10	EIP Fault Response	0	1		0	2518	0 = In Fieldbus Control 1 = In All Control

Table 25. Modbus TCP—P20.5

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.5.1	Connection Limit				5	609	
P20.5.2	Modbus TCP Unit ID				1	610	
P20.5.3	Comm Timeout Modbus TCP			ms	10000	611	
P20.5.4	Modbus TCP Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.5.5	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.5.6	Parity Error				0	614	
P20.5.7	Slave Failure				0	615	
P20.5.8	Last Fault Response				0	616	
P20.5.9	Modbus TCP Fault Response	0	1		0	2517	0 = In Fieldbus Control 1 = In All Control

Table 26. Basic setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = Depends upon Language Pack 2 = Depends upon Language Pack
P21.1.2 ①	Application				0	142	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
P21.1.3	Parameter Sets				0	619	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P21.1.4	Up To Keypad				0	620	0 = No 1 = Yes
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters
P21.1.6	Parameter Comparison				0	623	0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2
P21.1.7	Password	0	9999		0	624	
P21.1.8	Parameter Lock				0	625	0 = Change Enable 1 = Change Disable
P21.1.9	Multimonitor Set				0	627	See Para ID 625
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor 3 = Favorite Menu 4 = Keypad Reference
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 27. Basic setting—P21.1 , continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.13	Backlight Time	1	65535	min	10	631	
P21.1.14	Fan Control				2	632	0 = Continuous 1 = Temperature 2 = Run Follow note ⑥ 3 = Calculate Temp note ⑥
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	
P21.1.17	Startup Wizard	0	1		1	626	0 = No 1 = Yes
P21.1.18	Jog Soft Key Hidden	0	1		0	2412	0 = Disable 1 = Enable
P21.1.19	Reverse Softkey Hidden	0	1		0	2413	0 = Disable 1 = Enable
P21.1.20	Output Display Unit				45	2426	0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVs 20 = kW 21 = deg C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft3/s 31 = ft3/min 32 = ft3/h 33 = ft/s 34 = in wg 35 = ft wg 36 = PSI 37 = lb/in2 38 = HP 39 = deg F 40 = PA 41 = WC 42 = HG 43 = ft 44 = m 45 = Hz
P21.1.21	Output Display Unit Min	-60000.00	See Para ID 2427	varies	0.00	2462	
P21.1.22	Output Display Unit Max	See Para ID 2462	60000.00	varies	60	2427	

Notes: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
⑥ Function is not available in FR7 and FR8 drives.

Table 28. Version Info—P21.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.2.1	Keypad Software Version					640	
P21.2.2	Motor Control Software Version					642	
P21.2.3	Application Software Version				App Firmware	644	
P21.2.4	Software Bundle Version				App bundle rev	1714	

Table 29. Application Info—P21.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.3.1	Brake Chopper					646	0 = No 1 = Yes
P21.3.2	Brake Resistor Status					647	See Para ID 646
P21.3.3	Serial Number					648	

Table 30. User Info—P21.4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.4.1	Real Time Clock				0.0.0.1:1:13	566	
P21.4.2	Daylight Saving				0	582	0 = Off 1 = EU 2 = US
P21.4.3	Total MWh Count			Mwh		601	
P21.4.4	Total Power Day Count					603	
P21.4.5	Total Power Hr Count					606	
P21.4.6	Trip MWh Count			Mwh		604	
P21.4.7	Clear Trip MWh Count				0	635	0 = Not Reset 1 = Reset
P21.4.8	Trip Power Day Count					636	
P21.4.9	Trip Power Hr Count					637	
P21.4.10	Clear Trip Power Count				0	639	See Para ID 635

Step 6 — Faults and Warning Codes

Under this menu, you can find Active faults, History faults and Fault codes.

Table 31. Active Faults

Menu	Function	Note
Active Faults	When a fault/faults appear(s), the display with the name and fault time of the fault will be pop. Press DETAIL to see the fault data. The Active Faults submenu shows the list of faults. Select the fault and push DETAIL to see the fault data.	The fault remains active until it is cleared with the Reset button push for 2s) or with a reset signal from the I/O terminal or Fieldbus. The memory of active faults can store the maximum of 10 faults in the order of appearance.

Table 30. History Faults

Menu	Function	Note
History Faults	10 latest faults are stored in the Fault history, Select the fault and push DETAIL to see the fault data.	The history fault will be stored until it is cleared with the OK button (push for 5s). The memory of active faults can store the maximum of 10 faults in the order of appearance.

Fault Codes and Descriptions

Configurable 1 = The fault type of this fault is configurable, fault type can be configured as
0 = No Action; 1 = Warning; 2 = Fault; 3= Fault, Coast

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy	Realization
1	Over Current	Fault		AC drive has detected too high a current (>4*IH) in the motor cable: • Sudden heavy load increase • Short circuit in motor cables • Unsuitable motor	• Check loading • Check motor • Check cables and connections • Make identification run • Check ramp times	DSP
2	Over Voltage	Fault		The DC-link voltage has exceeded the limits defined: • Too short a deceleration time • Brake chopper is disabled • High overvoltage spikes in supply • Start/Stop sequence too fast	• Make deceleration time longer • Use brake chopper or brake resistor (available as options) • Activate overvoltage controller • Check input voltage	DSP
3	Earth Fault	Configurable	Fault	Current measurement has detected that the sum of motor phase current is not zero: • Insulation failure in cables or motor	• Check motor cables and motor	DSP
5	Charging Switch	Fault		The charging switch is open, when the START command has been given: • Faulty operation • Component failure	• Reset the fault and restart • Should the fault re-occur, contact the distributor near to you	DSP
6	Emergency Stop	Fault		Emergency stop input is active from DI	Remove signal form DI	DSP
7	Saturation Trip	Fault		• Short circuit in motor cables • IGBT module is damaged	• Check cables and connections • Reset the fault and restart • Verify that EMC screw is installed • Should the fault re-occur, contact the distributor near to you	DSP
9	UnderVoltage	Configurable	Fault	DC link voltage is under the voltage limits defined: • Most probable cause: Too low a supply voltage • AC drive internal fault • Defect input fuse • External charge switch not closed Note: This fault is activated only if the drive is in Run state.	• In case of temporary supply voltage break reset the fault and restart the AC drive Check the supply voltage. If it is adequate, an internal failure has occurred. Contact the distributor near you	DSP
10	Input Phase Superv	Configurable	Fault	Input line phase is missing	• Check supply voltage, fuses and cable	DSP

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy	Realization
11	Output Phase Superv	Configurable	Fault	Current measurement has detected that there is no current in one motor phase	Check motor cable and motor	DSP
12	Brake Chopper Superv	Fault		• No brake resistor installed • Brake resistor is broken • Brake chopper failure	Check brake resistor and cabling. If these are OK, the chopper is faulty. Contact the distributor near you	DSP
13	Drive UnderTemp	Configurable	Warning	Too low temperature measured in power Unit's heat sink or board. Heat sink temperature is under –10°C		DSP
14	Drive OverTemp	Fault		Too high temperature measured in power Unit's heat sink or board. Heat sink temperature is over 90°C	• Check the correct amount and flow of cooling air • Check the heat sink for dust • Check the ambient temperature • Make sure that the switching frequency is not too high in relation to ambient temperature and motor load	DSP
15	Motor Stalled	Configurable	No Action	Motor is stalled	Check motor and load	DSP
16	Motor Over Temp	Configurable	No Action	Motor is too hot, based on either the drive's estimate or on temperature feedback	Decrease motor load. If no motor overload exists, check the temperature model parameters	DSP
17	Motor Under Load	Configurable	No Action	Condition defined by parameter P1.9.15~P1.9.17 have been valid longer than the time defined by P1.9.18	Check load	DSP
18	IP Address Conflict	Configurable	Warning	IP setting issue.	Check settings for IP address, verify no duplicates are on the network.	MCU
19	Power Board EEPROM Fault	Fault		Power board eeprom fault, memory lost in eeprom.	Cyle power to drive. Try updating software, if issue continues contact Distributor near you.	MCU
20	FRAM Fault	Fault		FRAM data error in FRAM memory.	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.	MCU
21	S-Flash Fault	Warning		Serial flash error, serial flash memory failed.	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.	MCU
25	MCU WatchDog Fault	Fault		Watchdog register overflows in MCU	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.	MCU
26	Start-up Prevent	Fault		The time when Interlock signal activates is over setting time.	Stop drive and resend start command.	MCU
29	Thermistor Fault	Configurable	Fault	Option board or control board thermistor resistor lager than 4.7K	Thermistor open or short, over temperature	MCU
32	Fan Cooling	Fault		Fan is damaged or stalled.	Check fan and fan connected wires, verify 24Vdc is supplied to fan.	DSP
36	Compatibility Fault	Fault		The control board isn't match with the power board.	Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.	MCU
37	Device Change	Warning		Power board or option card change.	Alarm will reset	MCU
38	Device Added	Warning		Power board or option board added.	Device is ready for use	MCU
39	Device Removed	Fault		Optional board removed from slot, or power board removed from control board.	Device no longer available in drive.	MCU
40	Device Unknown	Fault		Unknown device connected (power board/option board)	Check eeprom connection.	MCU
41	IGBT Over Temp	Fault		IGBT temperature is too high.	• Check output loading • Check motor size • Decrease switching frequency	DSP
50	AI < 4mA (4to20mA)	Configurable	No Action	Loss in analog input signal, dropped below 4mA.	Verify analog input current reference value on either AI1 or AI2, check cabling.	MCU

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy	Realization
51	External Fault	Configurable	Fault	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.	MCU
52	Keypad Comm Fault	Configurable	Fault	The connection between the control "keypad and frequency converter is broken, and The local reference is keypad reference or the local control place is keypad, and The keypad communication fault protection is not "NO action"	Check keypad connection and possible keypad cable.	MCU
54	Option Card Fault	Configurable	Fault	Defective option card or option card slot	"Check right option card and optoin card slot connections. Check Board Status on Keypad for exact cause of fault. Contact distributor nearest you."	MCU
55	Realtime Clock Fault	Configurable	Warning	• Communication between MCU and RTC chip isn't normal • The power of RTC chip isn't normal • The real time isn't normal	Check the RTC chip, power cycle to drive. If issue contines contact distributor near you.	MCU
56	PT100 Fault	Configurable	Fault	Temperature is beyond the limit of sensing capacity of PT100	Pt100 short, open or over temperature, check PT100 temperature probe.	MCU
57	Motor ID fault	Fault		The Motor parameters Identification running was not completed successfully	Check motor size Verify the input and output wiring is connected properly.	DSP
58	Current Measure Fault	Fault		Current measurement is out of range	Restart the drive again. Should the fault re-occur, contact the distributor near to you	DSP
59	Power Wiring Error	Fault		Power wiring connected to output of drive.	Verify power input wiring is connected to L1, L2 and L3 terminals and they are properly torqued.	DSP
60	Control Board OverTemp	Fault		Control board is over +85 degrees or under –30 degrees	Check NTC resistor Check control board temperature	MCU
61	Internal Control Supply	Fault		+24V port voltage is over 27V or under 17V	Check voltage range of +24V on terminals 12 to 13. If voltage is out of range contact distributor near you.	MCU
62	Speed Search Fault	Fault		Speed searching failed when peforming flying start.	Check motor parameters' setting and motor connections.	DSP
64	Replace Battery	Configurable	Warning	RTC Battery voltage is too low.	Check the RTC battery voltage, contact distributor near you for replacement battery.	MCU
65	Replace Fan	Configurable	Warning	Fan life is less than 2 months	Check the fan, clean out any contamination, contact distributor near you for replacement fan.	MCU
66	Safety Torque Off	Fault		STO Triggered, STO input is open.	Reset STO Trigger and verify wiring. Reset fault after input is enabled.	DSP
67	Current Limit Control	Warning		The output current has reached the current limit value	Check the load Set the acceleration time longer	DSP
68	Over Voltage Control	Warning		The DC link voltage has reached its voltage limit value	Check the input voltage Set the acceleration/deceleration time longer	DSP
69	System Fault	Fault		Thermistor spi communication error.	Check thermistor chip.	MCU
70	System Fault	Fault		MCU send wrong parameters to DSP.	Restart the drive again. Should the fault re-occur, contact the distributor near to you.	DSP
72	Power Board EEPROM Fault	Fault		Power board eeprom fault, memory lost in eeprom when initial drive.	Cyle power to drive. Try updating software, if issue continues contact Distributor near you.	MCU
73	FRAM Fault	Fault		Fram chip is broken.	Contact Distributor near you.	MCU
74	FRAM Fault	Fault		Crc check fault when acess fram data.	Try recovery factory default setting if issue continues contact Distributor near you.	MCU
75	Power Board EEPROM Fault	Fault		Eeprom chipor I2c circuit is broken.	Contact Distributor near you.	MCU

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy	Realization
76	Power Board EEPROM Fault	Fault		Crc check fault when acess eeprom data.	Try recovery factory default setting if issue continues contact Distributor near you.	MCU
77	S-Flash Fault	Warning		External serial flash chip is broken.	Contact Distributor near you.	MCU
80	FieldBus Fault	Configurable	Fault	Loss of communication with BACnet IP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check RS485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
81	FieldBus Fault	Configurable	Fault	Loss of communication with SA Bus, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check RS485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
82	Bypass Overload	Fault		Over load when motor is in bypass mode	Check motor connection situation	MCU
83	FieldBus Fault	Configurable	Fault	Loss of communication with Modbus RTU, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check RS485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
84	FieldBus Fault	Configurable	Fault	Loss of communication with Modbus TCP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place.	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.	MCU
85	FieldBus Fault	Configurable	Fault	Loss of communication with BACnet, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check RS485 communication wiring. Verify drive parameter are set correctly. Check BACnet master configuration programming to verify proper addressing.	MCU
86	FieldBus Fault	Configurable	Fault	Loss of communication with Ethernet IP, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check EIP master configuration programming to verify proper addressing.	MCU
87	FieldBus Fault	Configurable	Fault	Loss of communication with Profibus/Canopen/ Devicenet master on Slot A, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Profibus/Canopen/Devicenet communication wiring. Verify drive parameter are set correctly. Check Profibus/Canopen/Devicenet master configuration programming to verify proper addressing.	MCU
88	FieldBus Fault	Configurable	Fault	Loss of communication with Profibus/Canopen/ Devicenet master on Slot B, and The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Profibus/Canopen/Devicenet communication wiring. Verify drive parameter are set correctly. Check Profibus/Canopen/Devicenet master configuration programming to verify proper addressing.	MCU
89	Under Voltage Stop	Fault		The DC link voltage has reached the Drive under voltage stop limit value.	In case of temporary supply voltage break reset the fault and restart the AC drive Check the supply voltage. If it is adequate, an internal failure has occurred. Contact the distributor near you	DSP
90	Drive Under Temp	Warning/Fault		• Cold weather mode is not enabled, and unit temperature is less than -10 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is less than -30 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is -20~ -30 degree. The temp <-20 degree when cold weather start time out.	If unit temp -20 ~ -10 degree, start motor in cold weather mode. If unit temp <-20 degree, Warm up unit above -20deg C for proper operation using cold weather mode.If still < -20 degree when cold weather mode time out, try higher output voltage in cold weather mode.	DSP

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy	Realization
91	Option Card Fault	Configurable	Fault	External supply on the DeviceNet communication connector is not present.	Check voltage and wiring of power supply of the DeviceNet communication.	MCU
92	External Fault 2	Configurable	Fault	Digital input is activated for external fault input.	check digital input settings and verify input level, could be an external device causing fault.	MCU
93	External Fault 3	Configurable	Fault	Digital input is activated for external fault input.	check digital input settings and verify input level, could be an external device causing fault.	MCU
103	Drive OverTemp Warning	Warning		Drive is 10 degrees away form the trip point of 90 deg C.	Check the drive degree	DSP
104	Compatibility Fault	Warning		DSP firmware is not compatible with MCB firmware	Check the DSP firmware revision	MCU
105	Compatibility Fault	Warning		Keypad firmware is not compatible with MCB firmware	Check the keypad firmware revision	MCU
106	Compatibility Fault	Warning		IO1 card firmware is not compatible with MCB firmware	Check the IO1 card firmware revision	MCU
107	Compatibility Fault	Warning		IO2 card firmware is not compatible with MCB firmware	Check the IO2 card firmware revision	MCU
108	Compatibility Fault	Warning		IO3 card firmware is not compatible with MCB firmware	Check the IO3 card firmware revision	MCU
109	Compatibility Fault	Warning		IO4 card firmware is not compatible with MCB firmware	Check the IO4 card firmware revision	MCU
110	Compatibility Fault	Warning		IO5 card firmware is not compatible with MCB firmware	Check the IO5 card firmware revision	MCU
111	Compatibility Fault	Warning		Profibus card firmware is not compatible with MCB firmware	Check the Profibus card firmware revision	MCU

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* At Eaton, we believe that power is a fundamental part of just about everything people do. Technology, transportation, energy and infrastructure-these are things the world relies on every day. That's why Eaton is dedicated to helping our customers find new ways to manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. To improve people's lives, the communities where we live and work, and the planet our future generations depend upon. Because that's what really matters. And we're here to make sure it works.

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