PowerXL DG1 Series VFD

Quick Start Guide

Effective March 2014
New Information

CONTENTS

Powering Business Worldwide

Step 1—PowerXL DG1 Series Overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the DG1 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 DG1 Series adjustable frequency drive (AFD). 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 DG1 Series AFD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and Inspection

The DG1 Series AFD 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 DG1 Series AFD, please check for the following:

Check to make sure that the package includes the Instruction Leaflet (IL040016EN), Quick Start Guide (MN040006EN), User Manual CD (CD040002EN) 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 DG1 AFD on the wall or in a cabinet.

Real Time Clock Battery Activation

To activate the real time clock (RTC) functionality in the PowerXL DG1 Series AFD, 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.

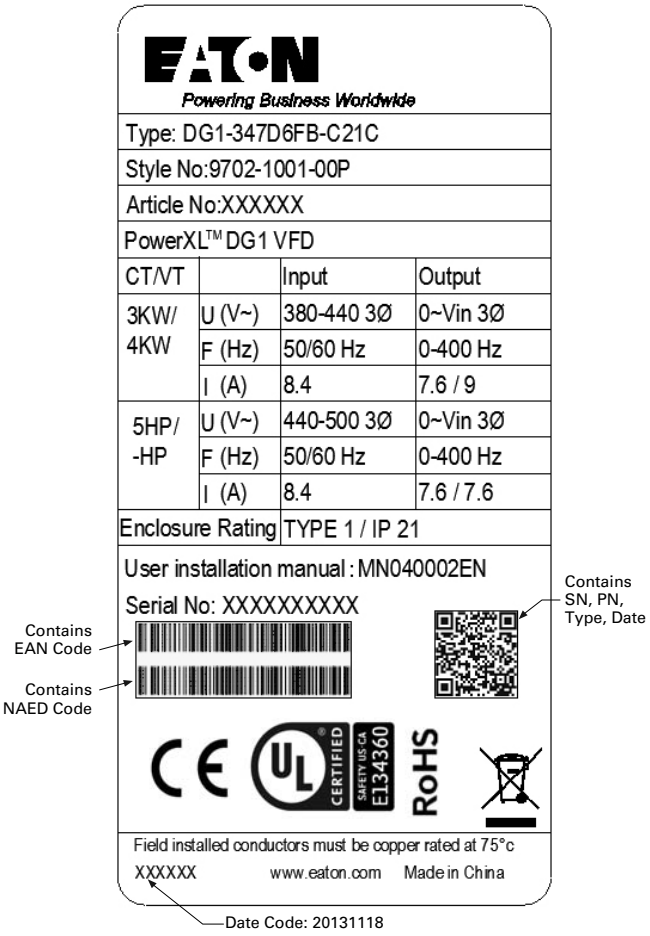
Figure 1. RTC Battery Connection

Table 1. Common Abbreviations

Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
I_H	High Overload (150%)
I_L	Low Overload (110%)
AFD	Adjustable Frequency Drive
VFD	Variable Frequency Drive

Rating Label

Figure 2. Rating Label

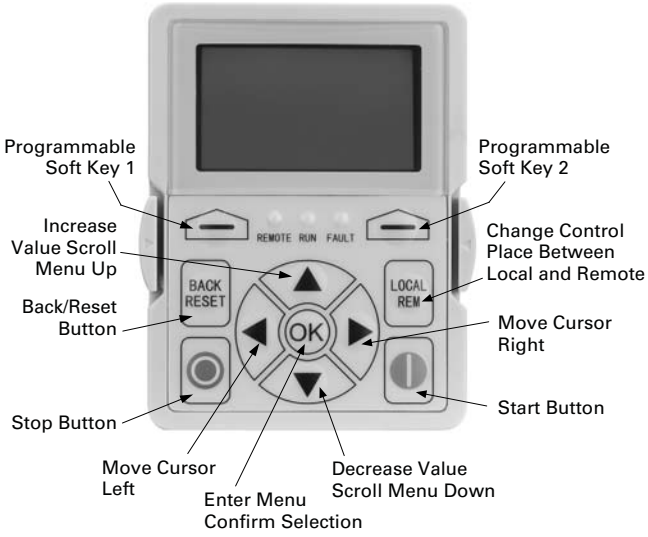


Carton Labels (U.S. and Europe)

Same as rating label shown above.

Keypad Overview

Figure 3. Keypad and Display



Step 2—Keypad Operation 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

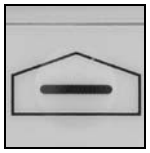
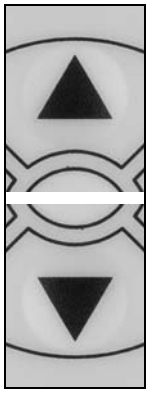
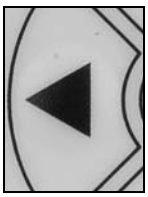
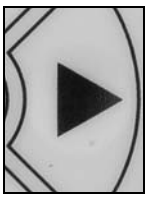
Icon	Button	Description
	Soft Key 1, Soft Key 2	**Soft Key 1, Soft Key 2:** The functions of these two buttons shall be the following: Forward/Reverse, this shall change motor's run direction. Reset, this shall ask MCU to reset after some parameters are modified. • Menu, this shall return to main menu. • 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).
	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.

Table 2. Keypad Buttons, continued

Icon	Button	Description
	Left	**Left Arrow:** • Navigation button, movement to left when editing a parameter digit by digit. • Backs up one step.
	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.

LED Lights

Table 3. LED State Indicators

Indicator	Description
Run	**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	**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	**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.

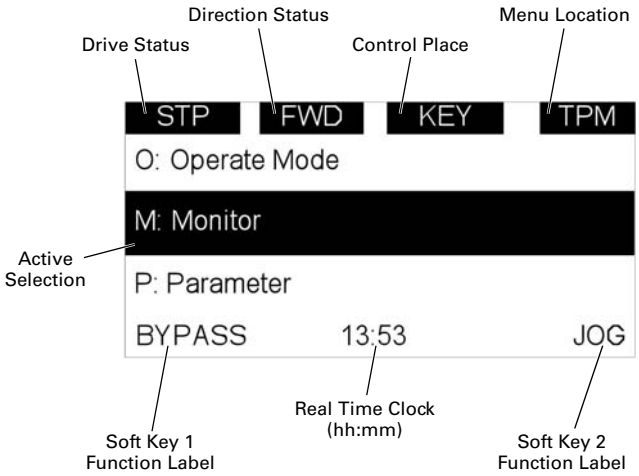
LCD Display

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**—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
- **FWD / REV**—If the motor running direction is clockwise, display "FWD", otherwise display "REV"
- **KEY / I/O / BPS / BUS**—If it is in bypass currently, display "BPS"; otherwise, if the current control source is I/O terminal, display "I/O". If it is keypad, then display "KEY"; otherwise display "BUS"
- **PAR / MON / FLT / OPE / QSW / FAV / TPM**—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"

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 Navigation

Menu Structure

Table 4. Keypad Menus

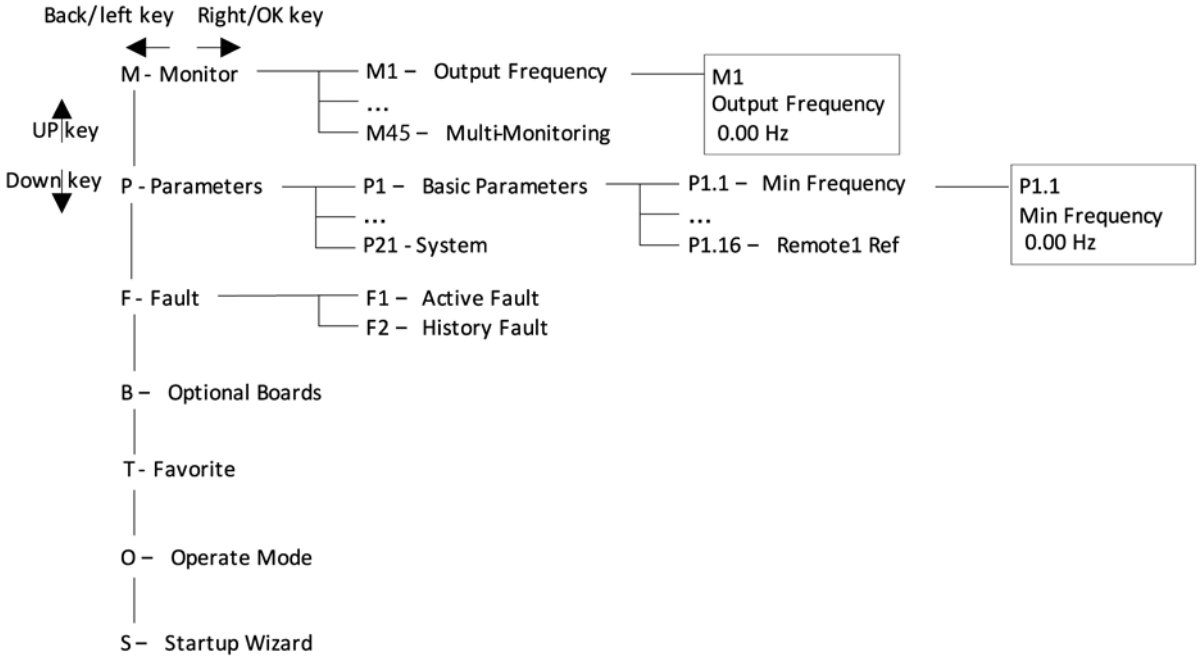
Item	Description		Item	Description	Item	Description
Monitor	M1—Output Frequency	M24—Interval 3	Parameters	P1—Basic Parameters	Fault	F1—Active Fault
	M2—Freq Reference	M25—Interval 4		P2—Analog Input		F2—History Fault
	M3—Motor Speed	M26—Interval 5		P3—Digital Input	Optional Boards	B1—SlotA
	M4—Motor Current	M27—Timer 1		P4—Analog Output		B2—SlotB
	M5—Motor Torque	M28—Timer 2		P5—Digital Output	Favorite	—
	M6—Motor Power	M29—Timer 3		P6—Logic Function	Operate Mode	O1—Output Frequency
	M7—Motor Voltage	M30—PID1 Set Point		P7—Drive Control		O2—Freq Reference
	M8—DC-link Voltage	M31—PID1 Feedback		P8—Motor Control		O3—Motor Speed
	M9—Unit Temperature	M32—PID1 Error Value		P9—Protections		O4—Motor Current
	M10—Motor Temperature	M33—PID1 Output		P10—PID Controller1		O5—Motor Torque
	M11—Torque Reference	M34—PID1 Status		P11—PID Controller2		O6—Motor Power
	M12—Analog Input 1	M35—PID2 Set Point		P12—Preset Speed		O7—Motor Voltage
	M13—Analog Input 2	M36—PID2 Feedback		P13—Torque Control		O8—DC-Link Voltage
	M14—Analog Output 1	M37—PID2 Error Value		P14—Brake		O9—Unit Temperature
	M15—Analog Output 2	M38—PID2 Output		P15—Fire Mode		O10—Motor Temperature
	M16—DI1, DI2, DI3	M39—PID2 Status		P16—Second Motor Para		O11—Keypad Torque Ref
	M17—DI4, DI5, DI6	M40—Running Aux Drives		P17—Bypass		O12—Keypad Reference
	M18—DI7, DI8	M41—PT100 Temp		P18—Multi-Pump Ctrl	Startup Wizard	S—Startup Wizard
	M19—DO1	M42—Last Active Fault		P19—Real Time Clock		
	M20—RO1, RO2, RO3	M43—RTC Battery Status		P20—Communication		
	M21—TC1, TC2, TC3	M44—Instance Motor Power		P21—System		
	M22—Interval 1	M45—Energy Savings				
	M23—Interval 2	M46—Multi-Monitoring				

Note: Will vary depending on application selected.

Menu Navigation

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

Figure 5. Main Menu Navigation



Step 4—Startup Wizard

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.

Once you have connected power to your Eaton PowerXL DG1 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	Language	0 = English 1 = 中文 2 = Deutsch
3	Real Time Clock	yy.mm.dd hh:mm:ss
4	Daylight Saving	0 = Off 1 = EU 2 = US
5	Application	0 = Standard 1 = Multi-Pump 2 = Multi-PID 3 = Multi-Purpose
6	Min Frequency	Min: 0.00Hz Max: Max Frequency
7	Max Frequency	Min: Min Frequency Max: 400.00Hz
8	Motor Nom Current	Min: 0.1A Max: 500.0A
9	Current Limit	Min: Ih*1/10 Max: Ih*2
10	Motor Nom Speed	Min: Ih*1/10 Max: Ih*2
11	Motor PF	Min: 0.30 Max: 1.0
12	Motor Nom Volt	Min: 180V Max: 690V
13	Motor Nom Freq	Min: 30.00 Hz Max: 400.00 Hz
14	Motor Nom Power	Min: 0.1 kW Max:5000.0 kW
15	Application Mini-Wizard	Press OK?

Now the Startup Wizard is done. It won't show again when next power up. If you want to reset it, please set the Startup Wizard (P21.1.9) or select it from the main menu screen to enable and cycle the power to the drive.

Step 5—Standard Parameter List

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

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

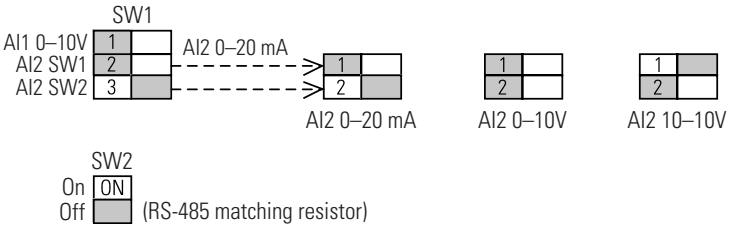
The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be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

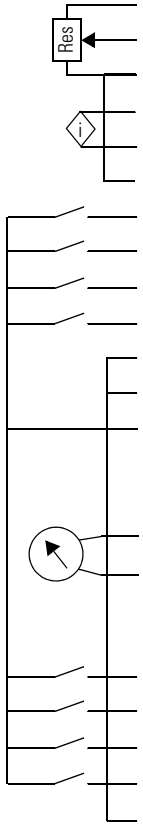
The parameters of the Standard Application are explained on **Page 11** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

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





Pin	Signal Name	Signal	Default Setting	Description
1	+10V	Ref. Output Voltage	—	10 Vdc Supply Source
2	AI1+	Analog Input 1	0–10V	Voltage Speed Reference (Programmable to 4 mA to 20 mA)
3	AI1–	Analog Input 1 Ground	—	Analog Input 1 Common (Ground)
4	AI2+	Analog Input 2	4 mA to 20 mA	Current Speed Reference (Programmable to 0–10V)
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	Emergency Stop (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	24V	+24 Vdc Output	—	Control voltage output (100 mA max.)
14	DO1	Digital Output 1	Ready	Shows the drive is ready to run
15	24Vo	+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	24Vi	+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		

Standard Application—Parameters List

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on **Page [?]**, "Description of Parameters." The descriptions are arranged according to the parameter number.

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			?	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				0	14	
M20	RO1, RO2, RO3				0	557	
M41	PT100 Temperature			°C	1000.0	27	

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
M42	Last Active Fault				0	28	0 = Null 1 = Over Current 2 = Over Voltage 3 = Earth Fault 4 = Charging Switch 5 = Emergency Stop 6 = Saturation Trip 7 = System Fault 8 = Undervoltage 9 = Input Phase Superv 10 = Output Phase Superv 11 = Brake Chopper Superv 12 = Drive Under Temp 13 = Drive Over Temp 14 = Motor Stalled 15 = Motor Over Temp 16 = Motor Under Load 17 = IP Address Conflict 18 = Power Board EEPROM Fault 19 = FRAM Fault 20 = S-Flash Fault 21 = MCU Watchdog Fault 22 = Start-up Prevent 23 = Thermistor Fault 24 = Fan Cooling 25 = Compatibility Fault 26 = Device Change 27 = Device Added 28 = Device Removed 29 = Device Unknown 30 = IGBT Over Temp 31 = Encoder Fault 32 = AI < 4 mA (4to20 mA) 33 = External Fault 34 = Keypad Comm Fault 35 = Fieldbus Fault 36 = Option Card Fault 37 = Bypass Overload 38 = Realtime Clock Fault 39 = PT100 Fault 40 = Motor ID Fault 41 = Current Measure Fault 42 = Power Wiring Error 43 = Control Board Overtemp 44 = Internal Control Supply 45 = Speed Search Fault 46 = Current Unbalance 47 = Replace Battery 48 = Replace Fan 49 = Safety Torque Off 50 = Current Limit Controller 51 = Over Voltage Controller
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	Multi-Monitoring				1, 2, 3	30	

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 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	Par. P1.1	Par. P1.2	Hz	0.00	141	

Table 9. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1 ②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2 ②	Max Frequency	Par. P1.1	400.00	Hz	Max Freq	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	Local/Remote Select				0	140	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11 ②	Remote1 Control Place				0	135	0 = I/O Terminal 1 = Fieldbus
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal

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
P1.13①②	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 P1.12
P1.15①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 10. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10V
P2.2②	AI1 Signal Range				0	175	0 = 0–100% 1 = 20–100% 2 = Customized
P2.3②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10②	AI1 Joystick Offset	–50.00	50.00	%	0.00	133	
P2.11	AI2 Mode				0	223	0 = 0–20 mA 1 = 0–10V 2 = –10 to +10V
P2.12②	AI2 Signal Range				1	183	See P2.2
P2.13②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16②	AI2 Signal Invert				0	189	See P2.6
P2.17②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	

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, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.20 ②	AI2 Joystick Offset	–50.00	50.00	%	0.00	134	
P2.21 ②	AI Ref Scale Min Value	0.00	Par. P2.22	Hz	0.00	144	
P2.22 ②	AI Ref Scale Max Value	Par. P2.21	400.00	Hz	0.00	145	

Table 11. Digital Input—P3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.1 ①②	Start/Stop Logic				0	143	0 = Forward–Reverse 1 = Start–Reverse 2 = Start–Enable 3 = Start Pulse–Stop Pulse
P3.2 ②	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
P3.3 ②	Start Signal 2				3	191	See P3.2
P3.4 ①②	Thermistor Input Select				0	881	0 = Digital Input 1 = Thermistor Input
P3.5 ②	Reverse				0	198	See P3.2
P3.6 ②	Ext. Fault Close				4	192	See P3.2
P3.7 ②	Ext. Fault Open				1	193	See P3.2
P3.8 ②	Fault Reset				5	200	See P3.2
P3.9 ②	Run Enable				1	194	See P3.2
P3.10 ②	Preset Speed B0				6	205	See P3.2
P3.11 ②	Preset Speed B1				7	206	See P3.2
P3.12 ②	Preset Speed B2				0	207	See P3.2

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.

Table 11. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.15②	Accel/Decel Time Set				0	195	See P3.2
P3.16②	Accel/Decel Prohibit				0	201	See P3.2
P3.17②	No Access To Param				0	215	See P3.2
P3.21②	Remote Control				9	196	See P3.2
P3.22②	Local Control				0	197	See P3.2
P3.23②	Remote1/2 Select				0	209	See P3.2
P3.26②	DC Brake Enable				0	202	See P3.2
P3.32②	Jog Enable				0	199	See P3.2
P3.36②	AI Ref Source Select				0	208	See P3.2
P3.42②	Emergency Stop				8	747	See P3.2

Table 12. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10V
P4.2②	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
P4.3②	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 4 mA
P4.4②	AO1 Filter Time	0.00	10.00	s	1.00	147	
P4.5②	AO1 Scale	10	1000	%	100	150	
P4.6②	AO1 Inversion				0	148	See P2.6
P4.7②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8②	AO2 Mode				0	228	See P4.1
P4.9②	AO2 Function				4	229	See P4.2
P4.10②	AO2 Minimum				1	232	See P4.3
P4.11②	AO2 Filter Time	0.00	10.00	s	1.00	230	
P4.12②	AO2 Scale	10	1000	%	100	233	
P4.13②	AO2 Inversion				0	231	See P2.6
P4.14②	AO2 Offset	–100.00	100.00	%	0.00	234	

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

Code	Parameter	Min.	Max.	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 Warning 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 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
P5.2 ②	RO1 Function				2	152	See P5.1
P5.3 ②	RO2 Function				3	153	See P5.1
P5.4 ②	RO3 Function				7	538	See P5.1
P5.5 ②	Freq Limit 1 Supv				0	154	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	
P5.7 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.8 ②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9 ②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10 ②	Torque Limit Supv Val	–300.0	300.0	%	100.0	160	
P5.11 ②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12 ②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	

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.	Max.	Unit	Default	ID	Note
P5.15②	Temp Limit Supv				0	165	See P5.11
P5.16②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17②	Power Limit Supv				0	167	See P5.11
P5.18②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20②	AI Limit Supv				0	171	See P5.11
P5.21②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.30	RO1 On Delay	0	320	s	0	2111	
P5.31	RO1 Off Delay	0	320	s	0	2112	
P5.32	RO2 On Delay	0	320	s	0	2113	
P5.33	RO2 Off Delay	0	320	s	0	2114	
P5.34	RO3 On Delay	0	320	s	0	2115	
P5.35	RO3 Off Delay	0	320	s	0	2116	
P5.36	RO3 Reverse	0	1		0	2117	0 = Not Inverted 1 = Inverted

Table 14. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1②	Remote 2 Control Place				1	138	See P1.11
P7.2①②	Remote 2 Reference				7	139	See P1.12
P7.3②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	
P7.4②	Keypad Direction				0	116	0 = Forward 1 = Reverse
P7.5②	Keypad Stop				1	114	0 = Enabled-Keypad Operation 1 = Always Enabled
P7.6②	Jog Reference	Par. P1.1	Par. P1.2	Hz	0.00	117	
P7.9②	Start Mode				0	252	0 = Ramp 1 = Flying Start
P7.10②	Stop Mode				1	253	0 = Coasting 1 = Ramp
P7.11②	Ramp 1 Shape	0.0	10.0	s	0.0	247	
P7.12②	Ramp 2 Shape	0.0	10.0	s	0.0	248	
P7.13②	Accel Time 2	0.1	3000.0	s	10.0	249	
P7.14②	Decel Time 2	0.1	3000.0	s	10.0	250	
P7.15②	Skip F1 Low Limit	0.00	Par. P7.16	Hz	0.00	256	
P7.16②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20②	Skip F3 High Limit	Par. P7.19	400.00	Hz	0.00	261	
P7.21②	Prohibit Accel/Decel Ramp	0.1	10.0		1.0	264	

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, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	Currency	0	8		$	2121	0 = $ 1 = GBP 2 = Eur 3 = JPY 4 = Rs 5 = R$ 6 = Fr 7 = Kr
P7.25	Energy Cost				0	2122	
P7.26	Data Type	0	4	s	0	2123	0 = Cumulative 1 = Daily Avg 2 = Monthly Avg 3 = Yearly Avg
P7.27	Energy Savings Reset	0	1	s	0	2124	0 = No Action 1 = Reset

Table 15. Motor Control—P8

Code	Parameter	Min.	Max.	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	Field Weakening Point Freq	289	
P8.6 ①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	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	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	

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

Code	Parameter	Min.	Max.	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	Par. P1.2	Hz	0.00	331	
P9.3 ①②	External Fault				2	307	See P9.11
P9.4 ①②	Input Phase Fault				2	332	See P9.11
P9.5 ①②	Uvolt Fault Response				2	330	See P9.11
P9.6 ①②	Output Phase Fault				2	308	See P9.11
P9.7 ①②	Ground Fault				2	309	See P9.11
P9.8 ①②	Motor Thermal Protection				2	310	See P9.11
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	Par. P1.2	Hz	25.00	316	
P9.15 ①②	Underload Protection				0	317	See P9.11
P9.16 ②	Underload Fnom Torque	10.0	150.0	%	50.0	318	
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 P9.11
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 P9.11
P9.22 ①②	OPTCard Fault Response				2	335	See P9.11
P9.23 ①②	Unit Under Temp Prot				2	1564	See P9.11
P9.24 ②	Wait Time	0.10	10.00	s	0.50	321	
P9.25 ②	Trail Time	0.00	60.00	s	30.00	322	
P9.26 ②	Start Function				0	323	0 = Ramp 1 = Flying Start 2 = Start
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	

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.	Max.	Unit	Default	ID	Note
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 P9.11
P9.35 ①②	PT100 Fault Response				2	337	See P9.11
P9.36 ①②	Replace Battery Fault Response				1	1256	See P9.11
P9.37 ①②	Replace Fan Fault Response				1	1257	See P9.11
P9.38 ①②	IP Address Confliction Resp				1	1678	See P9.11
P9.39	Cold Weather Mode	0	1		0	2126	0 = No 1 = Yes
P9.40	Cold Weather Voltage Level	0	20	%	2	2127	
P9.41	Cold Weather Time Out	0	10	min	3	2128	
P9.42	Cold Weather Password					2129	
P9.43	Under Temp Fault Override	0	1		0	2130	0 = No 1 = Yes

Table 17. Preset Speed—P12

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P12.1 ②	Preset Speed 1	0.00	Par. P1.2	Hz	5.00	105	
P12.2 ②	Preset Speed 2	0.00	Par. P1.2	Hz	10.00	106	
P12.3 ②	Preset Speed 3	0.00	Par. P1.2	Hz	15.00	118	
P12.4 ②	Preset Speed 4	0.00	Par. P1.2	Hz	20.00	119	
P12.5 ②	Preset Speed 5	0.00	Par. P1.2	Hz	25.00	120	
P12.6 ②	Preset Speed 6	0.00	Par. P1.2	Hz	30.00	121	
P12.7 ②	Preset Speed 7	0.00	Par. P1.2	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				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	Par. P8.2	A	Active Motor Nom I*1/2	265	

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 19. FB Data Output Sel—P20.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.1.1 ②	FB Data Output 1 Sel				1	1556	
P20.1.2 ②	FB Data Output 2 Sel				2	1557	
P20.1.3 ②	FB Data Output 3 Sel				3	1558	
P20.1.4 ②	FB Data Output 4 Sel				4	1559	
P20.1.5 ②	FB Data Output 5 Sel				5	1560	
P20.1.6 ②	FB Data Output 6 Sel				6	1561	
P20.1.7 ②	FB Data Output 7 Sel				7	1562	
P20.1.8 ②	FB Data Output 8 Sel				359	1563	

Table 20. Modbus RTU/BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.2.1	RS485 Comm Set				0	586	0 = Modbus RTU 1 = BACnet MS/TP
P20.2.2	Slave Address	1	247		18	587	
P20.2.3	Baud Rate				2	584	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.4	Parity Type				2	585	0 = None 1 = Odd 2 = Even
P20.2.5	Protocol Status				0	588	0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P20.2.6	Slave Busy				0	589	0 = Not Busy 1 = Busy
P20.2.7	Parity Error				0	590	
P20.2.8	Slave Fault				0	591	
P20.2.9	Last Fault Response				0	592	
P20.2.10	Comm Timeout Modbus RTU			ms	2000	593	
P20.2.11	BACnet Baud Rate				2	594	0 = 9600 1 = 19200 2 = 38400 3 = 76800 4 = 115200
P20.2.12	MAC Address	0	127		1	595	
P20.2.13	Instance Number	0	4194302		0	596	
P20.2.14	Comm Timeout BACnet			ms	6000	598	
P20.2.15	Protocol Status				0	599	0 = Stopped 1 = Operational 2 = Faulted
P20.2.16	Fault Code				0	600	0 = None 1 = Sole Master 2 = Duplicate MAC ID 3 = Baud rate fault

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 21. EtherNet/IP / Modbus TCP—P20.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P20.3.1	IP Address Mode				1	1500	0 = Static IP 1 = DHCP with AutoIP
P20.3.2	Active IP Address					1507	
P20.3.3	Active Subnet Mask					1509	
P20.3.4	Active Default Gateway					1511	
P20.3.5	MAC Address					1513	
P20.3.6	Static IP Address				192.168.1.254	1501	
P20.3.7	Static Subnet Mask				255.255.255.0	1503	
P20.3.8	Static Default Gateway				192.168.1.1	1505	
P20.3.9	EtherNet/IP Protocol Status				0	608	0 = Stopped 1 = Operational 2 = Faulted
P20.3.10	Connection Limit	0	2		2	609	
P20.3.11	Modbus TCP Unit ID				1	610	
P20.3.12	Comm Timeout Modbus TCP			ms	2000	611	
P20.3.13	Protocol Status				0	612	0 = Stopped 1 = Operational 2 = Faulted
P20.3.14	Slave Busy				0	613	0 = Not Busy 1 = Busy
P20.3.15	Parity Error				0	614	
P20.3.16	Slave Failure				0	615	
P20.3.17	Last Fault Response				0	616	

Table 22. Basic Setting—P21.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P21.1.1	Language				0	340	0 = English 1 = English 2 = English
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
P21.1.4	Up To Keypad				0	620	See P21.3.1
P21.1.5	Down From Keypad				0	621	0 = No 1 = All Parameters 2 = All, No Motor 3 = App Parameters

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. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 P21.1.8
P21.1.10	Default Page				0	628	0 = None 1 = Main Menu 2 = Multi-Monitor
P21.1.11	Timeout Time	0	65535	s	30	629	
P21.1.12	Contrast Adjust	5	18		12	630	
P21.1.13	Backlight Time	0	65535	min	10	631	
P21.1.14	Fan Control				3	632	0 = Continuous 1 = Temperature 2 = Run Follow 3 = Calculate Temp
P21.1.15	HMI ACK Timeout	200	5000	ms	200	633	
P21.1.16	HMI Retry Number	1	10		5	634	

Table 23. 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	

Table 24. Application Info—P21.3

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

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 25. 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 P21.4.8

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.

Step 6—Faults and Warning Codes

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

Table 26. 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 27. 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
1	OverCurrent	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
2	OverVoltage	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
3	Earth Fault	Configurable ①	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
4	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
5	Emergency Stop	Fault		• STO terminal open in control board • Emergency signal from DI is activated	• Closed STO terminal • Remove signal from DI
6	Saturation Trip	Fault		• Short circuit in motor cables • IGBT module is damaged	Check cables and connections Reset the fault and restart • Should the fault re-occur, contact the distributor near to you
7	System Fault	Fault		Unexpected fault occurred	Reset the fault and restart. • Should the fault re-occur, contact the distributor near to you

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
8	UnderVoltage	Configurable ①	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
9	Input Phase Spv	Configurable ①	No Action	Input line phase is missing	Check supply voltage, fuses and cable
10	Output Phase Spv	Configurable ①	Fault	Current measurement has detected that there is no current in one motor phase	Check motor cable and motor
11	BrakeChopperSpv	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
12	Drive UnderTemp	Configurable ①	Warning	Too low temperature measured in power Unit's heat sink or board. Heat sink temperature is under –10°C	
13	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
14	Motor Stalled	Configurable ①	No Action	Motor is stalled	Check motor and load
15	Motor OverTemp	Configurable ①	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
16	Motor UnderLoad	Configurable ①	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
17	IP Address Conflict	Configurable	Warning	Reversed	
18	Power board EEPROM Fault	Fault		Power board eeprom fault	Check eeprom
19	FRAM Fault	Fault		Fram data error	Check fram
20	Serial Flash Fault	Fault		Serial flash error	Check serial flash
21	MCU Watchdog Fault	Fault		Watchdog register overflows	Power cycle unit
22	Start-up Prevent	Fault		The time when Interlock signal activates is over setting time	Stop drive
23	Thermistor Fault	Configurable ①	Fault	Option board or control board thermistor resistor lager than 4.7K	Thermistor open or short, over temperature
24	Fan Cooling	Fault		Fan is damaged or stalled	Check fan and fan connected wires
25	Compatibility Fault	Fault		The control board isn't match with the power board	Contact the distributor near you
26	Device Change	Warning		Power board or option card change	
27	Device Added	Warning		Power board or option board added The option board was previously inserted in the same slot. The board's parameter settings are saved	Device is ready for use Old parameter settings will be used

Fault Code	Fault Name	Fault Type	Default Fault Type	Possible Cause	Remedy
28	Device Removed	Fault		Optional board removed from slot, or power board removed from control board	Device no longer available
29	Device Unknown	Fault		Unknown device connected (power board/option board	Device no longer available
30	IGBT OverTemp	Fault		IGBT temperature is too high	• Check loading • Check motor size • Decrease switching frequency
31	Encoder Fault	Fault		• Encoder 1 channel A is missing • Encoder 1 channel B is missing • Both encoder 1 channels are missing • Encoder reversed • Encoder board missing	• Check encoder connections • Check encoder and encoder cable • Check encoder board • Check encoder frequency in open loop
32	AIN<4 mA (4 to 20 mA	Configurable ①	No Action		
33	External Fault	Configurable ①	Fault	Digital input	
34	Keypad Communication Fault	Fault		The connection between the control keypad and frequency converter is broken	Check keypad connection and possible keypad cable
35	FieldBus communication Fault	Configurable ①	Fault	Except communication board, also control board can communicate with external device using RS-485 port, so the possible cause includes the connection between external device and control board	Check installation and Fieldbus master
36	OPT Card Fault	Configurable ①	Fault	Defective option card or slot	Check option card and slot
37	BypassOverLoad	Fault		Over load when motor is in bypass mode	Check motor connection situation
38	Real time clock fault	Configurable ①	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
39	PT100 Fault	Configurable ①	Fault	Temperature is over user set value	Pt100 short, open or over temperature
40	Motor ID fault	Fault		The Motor ID Run was not completed successfully	Check motor size Motor may be not compactable with VFD
41	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
42	Possible power wiring error detected	Fault		Reserved	
43	Control Board OverTemp	Fault		Control board is over +85 degrees or under –30 degrees	Check NTC resistor Check control board temperature
44	Internal-ctrl Supply	Fault		+24V port voltage is over 27V or under 17V	Check voltage range of +24V
45	Too Many Speed Search Restarts	Fault		Speed searching failed	Check motor parameters' setting
46	Current Unbalance	Fault		Reserved	
47	Replace Battery	Configurable ①	Warning	Battery voltage is too low	Check the battery
48	Replace Fan	Configurable ①	Warning	Fan life is less than 2 months	Check the fan
49	Safe Torque Off	Fault		STO Triggered	Reset STO Trigger
50	Over Current Controller	Warning		The output current has reached the current limit value	Check the load Set the acceleration time longer
51	Over Voltage Controller	Warning		The DC link voltage has reached its voltage limit value	Check the input voltage Set the acceleration/deceleration time longer

Eaton is dedicated to ensuring that reliable, efficient and safe power is available when it's needed most. With unparalleled knowledge of electrical power management across industries, experts at Eaton deliver customized, integrated solutions to solve our customers' most critical challenges.

Our focus is on delivering the right solution for the application. But, decision makers demand more than just innovative products. They turn to Eaton for an unwavering commitment to personal support that makes customer success a top priority. For more information, **visit www.eaton.com/electrical.**

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Printed in USA
Publication No. MN040012EN / Z14975
March 2014