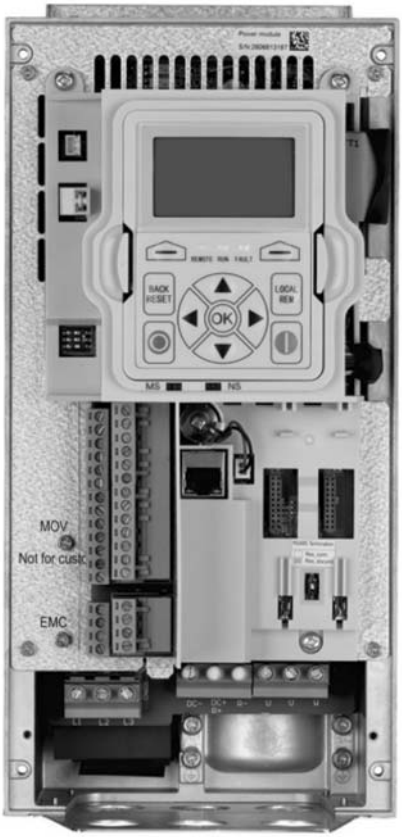
PowerXL DG1 Series VFD

Application Manual

Effective March 2014
New Information



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Cover Photo: Eaton PowerXL DG1 Series Drives

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Safety

Warning!
Dangerous Electrical Voltage!

Before Commencing the Installation

- Disconnect the power supply of the device
- Ensure that devices cannot be accidentally restarted
- Verify isolation from the supply
- Earth and short circuit the device
- Cover or enclose any adjacent live components
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/ system
- Before installation and before touching the device ensure that you are free of electrostatic charge
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states in the automation devices
- Ensure a reliable electrical isolation of the extra-low voltage of the 24V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2
- Deviations of the input voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause a restart
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented
- Wherever faults in the automation system may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, and so on)
- Depending on their degree of protection, adjustable frequency drives may contain live bright metal parts, moving or rotating components, or hot surfaces during and immediately after operation
- Removal of the required covers, improper installation, or incorrect operation of motor or adjustable frequency drive may cause the failure of the device and may lead to serious injury or damage
- The applicable national accident prevention and safety regulations apply to all work carried out on live adjustable frequency drives
- The electrical installation must be carried out in accordance with the relevant regulations (for example, with regard to cable cross sections, fuses, PE)
- Transport, installation, commissioning, and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations)
- Installations containing adjustable frequency drives must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the adjustable frequency drives using the operating software are permitted
- All covers and doors must be kept closed during operation
- To reduce hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
  - Other independent devices for monitoring safety-related variables (speed, travel, end positions, and so on)
  - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks)
  - Never touch live parts or cable connections of the adjustable frequency drive after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs

Definitions and Symbols

WARNING

This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operating this equipment. Read the message and follow the instructions carefully. This symbol is the "Safety Alert Symbol". It occurs with either of two signal words: CAUTION or WARNING, as described below.

WARNING

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the product. The situation described in the CAUTION may, if not avoided, lead to serious results. Important safety measures are described in CAUTION (as well as WARNING).

Hazardous High Voltage

WARNING

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic controllers or rotating machinery.

Warnings and Cautions

This manual contains clearly marked cautions and warnings which are intended for your personal safety and to avoid any unintentional damage to the product or connected appliances. Please read the information included in cautions and warnings carefully.

WARNING

The relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DG1 is disconnected from mains.

WARNING

Be sure not to plug the Ethernet/BACnet/IP cable to the terminal under the keypad! This might harm your personal computer.

WARNING

Be sure not to plug the Modbus TCP cable to the terminal under the keypad! This might harm your personal computer.

CAUTION

Remove external control signal before resetting the fault to prevent unintentional restart of the drive.

Important Safety Information

Hazardous High Voltage

WARNING

The components of the power unit of PowerXL DG1 are live when the AC drive is connected to mains potential. Coming into contact with this voltage is extremely dangerous and may cause death or severe injury.

WARNING

The motor terminals U, V, W and the brake resistor terminals are live when PowerXL DG1 is connected to mains, even if the motor is not running.

WARNING

After disconnecting the AC drive from the mains, wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait 5 more minutes before doing any work on the connections of PowerXL DG1. Do not open the cover before this time has expired. After expiration of this time, use a measuring equipment to absolutely ensure that no voltage is present. Always ensure absence of voltage before starting any electrical work!

WARNING

The control I/O-terminals are isolated from the mains potential. However, the relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DG1 is disconnected from mains.

WARNING

Before connecting the AC drive to mains, confirm that the front and cable covers of PowerXL DG1 are closed.

WARNING

During a ramp stop (see the Application Manual), the motor is still generating voltage to the drive. Therefore, do not touch the components of the AC drive before the motor has completely stopped. Wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait additional 5 minutes before starting any work on the drive.

Important Warnings

WARNING

PowerXL DG1 AC drive is meant for fixed installations only.

WARNING

Do not perform any measurements when the AC drive is connected to the mains.

WARNING

The ground leakage current of PowerXL DG1 AC drives exceeds 3.5 mA AC. According to standard EN61800-5-1, a reinforced protective ground connection must be ensured.

WARNING

If the AC drive is used as a part of a machine, the machine manufacturer is responsible for providing the machine with a supply disconnecting device (EN 60204-1).

WARNING

Only spare parts delivered by Eaton can be used.

WARNING

At power-up, power brake or fault reset the motor will start immediately if the start signal is active, unless the pulse control for Start/Stop logic has been selected. Furthermore, the I/O functionalistic (including start inputs) may change if parameters, applications or software are changed. Disconnect, therefore, the motor if an unexpected start can cause danger.

WARNING

The motor starts automatically after automatic fault reset if the auto restart function is activated. See the Application Manual for more detailed information.

WARNING

Prior to measurements on the motor or the motor cable, disconnect the motor cable from the AC drive.

WARNING

Do not touch the components on the circuit boards. Static voltage discharge may damage the components.

WARNING

Check that the EMC level of the AC drive corresponds to the requirements of your supply network.

Additional Cautions

⚠ CAUTION

The PowerXL DG1 AC drive must always be grounded with an grounding conductor connected to the grounding terminal marked with. The ground leakage current of PowerXL DG1 exceeds 3.5 mA AC. According to EN61800-5-1, one or more of the following conditions for the associated protective circuit shall be satisfied:

a) The protective conductor shall have a cross-sectional area of at least 10 mm^2 Cu or 16 mm^2 Al, through its total run.

b) Where the protective conductor has a cross-sectional area of less than 10 mm^2 Cu or 16 mm^2 Al, a second protective conductor of at least the same cross-sectional area shall be provided up to a point where the protective conductor has a cross-sectional area not less than 10 mm^2 Cu or 16 mm^2 Al.

c) Automatic disconnection of the supply in case of loss of continuity of the protective conductor. The cross-sectional area of every protective grounding conductor that does not form part of the supply cable or cable enclosure shall, in any case, be not less than:

— 2.5 mm^2 if mechanical protection is provided or

— 4 mm^2 if mechanical protection is not provided.

The ground fault protection inside the AC drive protects only the drive itself against ground faults in the motor or the motor cable. It is not intended for personal safety. The ground fault protection inside the AC drive protects only the drive itself against ground faults in the motor or the motor cable. It is not intended for personal safety. Due to the high capacitive currents present in the AC drive, fault current protective switches may not function properly.

Do not perform any voltage withstand tests on any part of PowerXL DG1. There is a certain procedure according to which the tests shall be performed. Ignoring this procedure may result in damaged product.

Chapter 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.

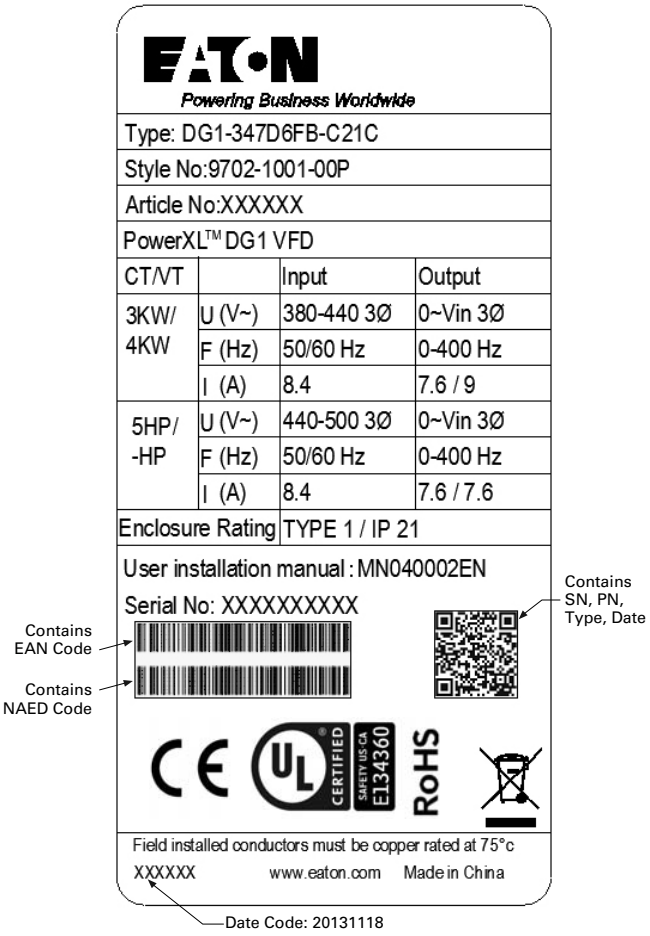
Figure 1. RTC Battery Connection

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

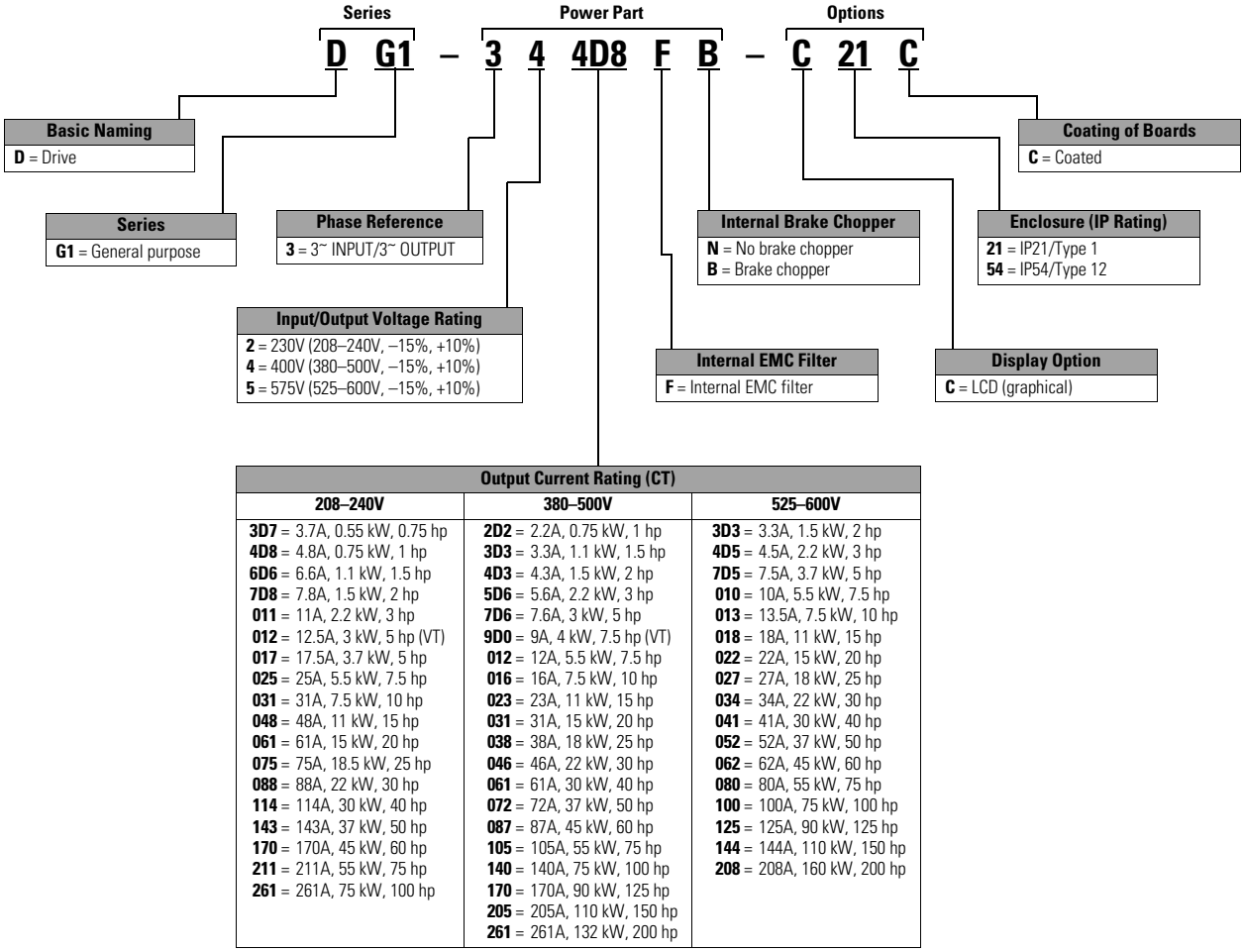


Carton Labels (U.S. and Europe)

Same as rating label shown above.

Catalog Number System

Figure 3. Catalog Numbering System



Output Current Rating (CT)		
208–240V	**380–500V**	**525–600V**
3D7 = 3.7A, 0.55 kW, 0.75 hp	**2D2** = 2.2A, 0.75 kW, 1 hp	**3D3** = 3.3A, 1.5 kW, 2 hp
4D8 = 4.8A, 0.75 kW, 1 hp	**3D3** = 3.3A, 1.1 kW, 1.5 hp	**4D5** = 4.5A, 2.2 kW, 3 hp
6D6 = 6.6A, 1.1 kW, 1.5 hp	**4D3** = 4.3A, 1.5 kW, 2 hp	**7D5** = 7.5A, 3.7 kW, 5 hp
7D8 = 7.8A, 1.5 kW, 2 hp	**5D6** = 5.6A, 2.2 kW, 3 hp	**010** = 10A, 5.5 kW, 7.5 hp
011 = 11A, 2.2 kW, 3 hp	**7D6** = 7.6A, 3 kW, 5 hp	**013** = 13.5A, 7.5 kW, 10 hp
012 = 12.5A, 3 kW, 5 hp (VT)	**9D0** = 9A, 4 kW, 7.5 hp (VT)	**018** = 18A, 11 kW, 15 hp
017 = 17.5A, 3.7 kW, 5 hp	**012** = 12A, 5.5 kW, 7.5 hp	**022** = 22A, 15 kW, 20 hp
025 = 25A, 5.5 kW, 7.5 hp	**016** = 16A, 7.5 kW, 10 hp	**027** = 27A, 18 kW, 25 hp
031 = 31A, 7.5 kW, 10 hp	**023** = 23A, 11 kW, 15 hp	**034** = 34A, 22 kW, 30 hp
048 = 48A, 11 kW, 15 hp	**031** = 31A, 15 kW, 20 hp	**041** = 41A, 30 kW, 40 hp
061 = 61A, 15 kW, 20 hp	**038** = 38A, 18 kW, 25 hp	**052** = 52A, 37 kW, 50 hp
075 = 75A, 18.5 kW, 25 hp	**046** = 46A, 22 kW, 30 hp	**062** = 62A, 45 kW, 60 hp
088 = 88A, 22 kW, 30 hp	**061** = 61A, 30 kW, 40 hp	**080** = 80A, 55 kW, 75 hp
114 = 114A, 30 kW, 40 hp	**072** = 72A, 37 kW, 50 hp	**100** = 100A, 75 kW, 100 hp
143 = 143A, 37 kW, 50 hp	**087** = 87A, 45 kW, 60 hp	**125** = 125A, 90 kW, 125 hp
170 = 170A, 45 kW, 60 hp	**105** = 105A, 55 kW, 75 hp	**144** = 144A, 110 kW, 150 hp
211 = 211A, 55 kW, 75 hp	**140** = 140A, 75 kW, 100 hp	**208** = 208A, 160 kW, 200 hp
261 = 261A, 75 kW, 100 hp	**170** = 170A, 90 kW, 125 hp	
	205 = 205A, 110 kW, 150 hp	
	261 = 261A, 132 kW, 200 hp	

Power Ratings and Product Selection

DG1 Series Drives—208–240 Volt

Table 2. Type 1/IP21

Frame Size	230V, 50 Hz kW Rating (CT/I_H)	230V, 50 Hz kW Rating (VT/I_L)	230V, 60 Hz hp (CT/I_H)	230V, 60 Hz hp (VT/I_L)	Current A (CT/I_H)	Current A (VT/I_L)	Catalog Number
FR1	0.55	0.75	0.75	1	3.7	4.8	**DG1-323D7FB-C21C**
	0.75	1.1	1	1.5	4.8	6.6	**DG1-324D8FB-C21C**
	1.1	1.5	1.5	2	6.6	7.8	**DG1-326D6FB-C21C**
	1.5	2.2	2	3	7.8	11	**DG1-327D8FB-C21C**
	2.2	3	3	—	11	12.5	**DG1-32011FB-C21C**
FR2	3	3.7	—	5	12.5	17.5	**DG1-32012FB-C21C**
	3.7	5.5	5	7.5	17.5	25	**DG1-32017FB-C21C**
	5.5	7.5	7.5	10	25	31	**DG1-32025FB-C21C**
FR3	7.5	11	10	15	31	48	**DG1-32031FB-C21C**
	11	15	15	20	48	61	**DG1-32048FB-C21C**
FR4	15	18.5	20	25	61	75	**DG1-32061FN-C21C**
	18.5	22	25	30	75	88	**DG1-32075FN-C21C**
	22	30	30	40	88	114	**DG1-32088FN-C21C**
FR5	30	37	40	50	114	143	**DG1-32114FN-C21C**
	37	45	50	60	143	170	**DG1-32143FN-C21C**
	45	55	60	75	170	211	**DG1-32170FN-C21C**
FR6 ①	55	75	75	100	211	261	**DG1-32211FN-C21C**
	75	90	100	125	261	312	**DG1-32261FN-C21C**

Table 3. Type 12/IP54

Frame Size	230V, 50 Hz kW Rating (CT/I_H)	230V, 50 Hz kW Rating (VT/I_L)	230V, 60 Hz hp (CT/I_H)	230V, 60 Hz hp (VT/I_L)	Current A (CT/I_H)	Current A (VT/I_L)	Catalog Number
FR1	0.55	0.75	0.75	1	3.7	4.8	**DG1-323D7FB-C54C**
	0.75	1.1	1	1.5	4.8	6.6	**DG1-324D8FB-C54C**
	1.1	1.5	1.5	2	6.6	7.8	**DG1-326D6FB-C54C**
	1.5	2.2	2	3	7.8	11	**DG1-327D8FB-C54C**
	2.2	3	3	—	11	12.5	**DG1-32011FB-C54C**
FR2	3	3.7	—	5	12.5	17.5	**DG1-32012FB-C54C**
	3.7	5.5	5	7.5	17.5	25	**DG1-32017FB-C54C**
	5.5	7.5	7.5	10	25	31	**DG1-32025FB-C54C**
FR3	7.5	11	10	15	31	48	**DG1-32031FB-C54C**
	11	15	15	20	48	61	**DG1-32048FB-C54C**
FR4	15	18.5	20	25	61	75	**DG1-32061FN-C54C**
	18.5	22	25	30	75	88	**DG1-32075FN-C54C**
	22	30	30	40	88	114	**DG1-32088FN-C54C**
FR5	30	37	40	50	114	143	**DG1-32114FN-C54C**
	37	45	50	60	143	170	**DG1-32143FN-C54C**
	45	55	60	75	170	211	**DG1-32170FN-C54C**
FR6 ①	55	75	75	100	211	261	**DG1-32211FN-C54C**
	75	90	100	125	261	312	**DG1-32261FN-C54C**

Note

① FR6 available in 2015.

DG1 Series Drives—380–500 Volt

Table 4. Type 1/IP21

Frame Size	400V, 50 Hz kW Rating (CT/I_H)	400V, 50 Hz kW Rating (VT/I_L)	460V, 60 Hz hp (CT/I_H)	460V, 60 Hz hp (VT/I_L)	Current A (CT/I_H)	Current A (VT/I_L)	Catalog Number
FR1	0.75	1.1	1	1.5	2.2	3.3	**DG1-342D2FB-C21C**
	1.1	1.5	1.5	2	3.3	4.3	**DG1-343D3FB-C21C**
	1.5	2.2	2	3	4.3	5.6	**DG1-344D3FB-C21C**
	2.2	3	3	5	5.6	7.6	**DG1-345D6FB-C21C**
	3	4	5	—	7.6	9	**DG1-347D6FB-C21C**
	4	5.5	—	7.5	9	12	**DG1-349D0FB-C21C**
FR2	5.5	7.5	7.5	10	12	16	**DG1-34012FB-C21C**
	7.5	11	10	15	16	23	**DG1-34016FB-C21C**
	11	15	15	20	23	31	**DG1-34023FB-C21C**
FR3	15	18.5	20	25	31	38	**DG1-34031FB-C21C**
	18.5	22	25	30	38	46	**DG1-34038FB-C21C**
	22	30	30	40	46	61	**DG1-34046FB-C21C**
FR4	30	37	40	50	61	72	**DG1-34061FN-C21C**
	37	45	50	60	72	87	**DG1-34072FN-C21C**
	45	55	60	75	87	105	**DG1-34087FN-C21C**
FR5	55	75	75	100	105	140	**DG1-34105FN-C21C**
	75	90	100	125	140	170	**DG1-34140FN-C21C**
	90	110	125	150	170	205	**DG1-34170FN-C21C**
FR6 ①	110	132	150	200	205	261	**DG1-34205FN-C21C**
	132	160	200	250	261	310	**DG1-34261FN-C21C**

Table 5. Type 12/IP54

Frame Size	400V, 50 Hz kW Rating (CT/I_H)	400V, 50 Hz kW Rating (VT/I_L)	460V, 60 Hz hp (CT/I_H)	460V, 60 Hz hp (VT/I_L)	Current A (CT/I_H)	Current A (VT/I_L)	Catalog Number
FR1	0.75	1.1	1	1.5	2.2	3.3	**DG1-342D2FB-C54C**
	1.1	1.5	1.5	2	3.3	4.3	**DG1-343D3FB-C54C**
	1.5	2.2	2	3	4.3	5.6	**DG1-344D3FB-C54C**
	2.2	3	3	5	5.6	7.6	**DG1-345D6FB-C54C**
	3	4	5	—	7.6	9	**DG1-347D6FB-C54C**
	4	5.5	—	7.5	9	12	**DG1-349D0FB-C54C**
FR2	5.5	7.5	7.5	10	12	16	**DG1-34012FB-C54C**
	7.5	11	10	15	16	23	**DG1-34016FB-C54C**
	11	15	15	20	23	31	**DG1-34023FB-C54C**
FR3	15	18.5	20	25	31	38	**DG1-34031FB-C54C**
	18.5	22	25	30	38	46	**DG1-34038FB-C54C**
	22	30	30	40	46	61	**DG1-34046FB-C54C**
FR4	30	37	40	50	61	72	**DG1-34061FN-C54C**
	37	45	50	60	72	87	**DG1-34072FN-C54C**
	45	55	60	75	87	105	**DG1-34087FN-C54C**
FR5	55	75	75	100	105	140	**DG1-34105FN-C54C**
	75	90	100	125	140	170	**DG1-34140FN-C54C**
	90	110	125	150	170	205	**DG1-34170FN-C54C**
FR6 ①	110	132	150	200	205	261	**DG1-34205FN-C54C**
	132	160	200	250	261	310	**DG1-34261FN-C54C**

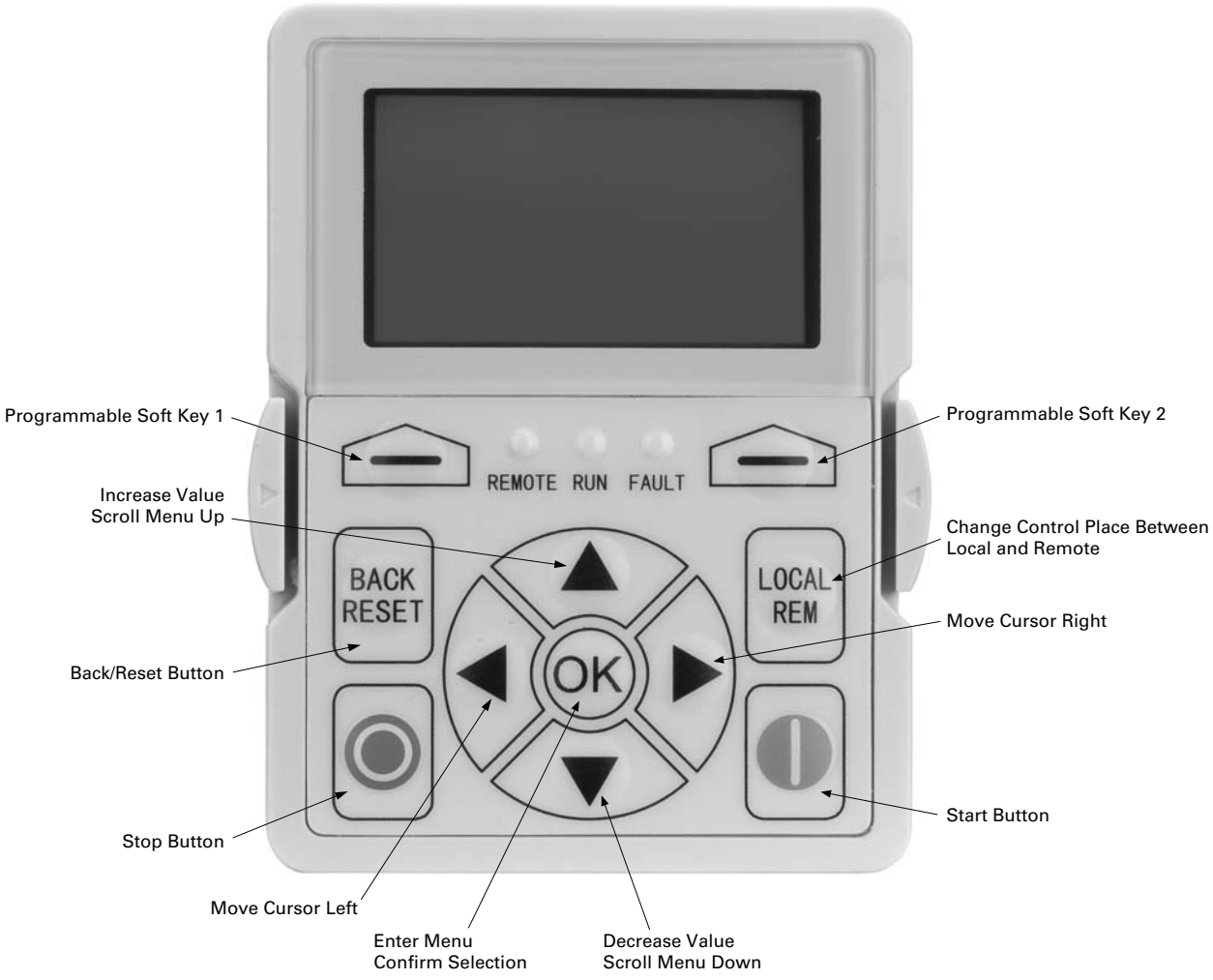
Note

① FR6 available in 2015.

Chapter 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 4**.

Figure 4. Keypad and Display



Keypad Buttons

Buttons Description

Table 6. Keypad Buttons

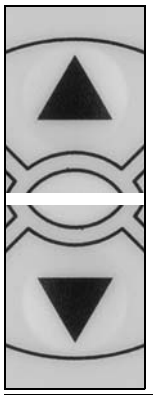
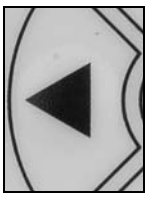
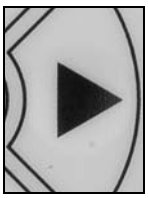
Icon	Button	Description
	Soft Key 1, Soft Key 2	**Soft Key 1, Soft Key 2:** The functions of these two buttons shall be the following: Forward/Reverse, this shall change motor's run direction. Reset, this shall ask MCU to reset after some parameters are modified. • Menu, this shall return to main menu. • 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 6. 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 7. 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.

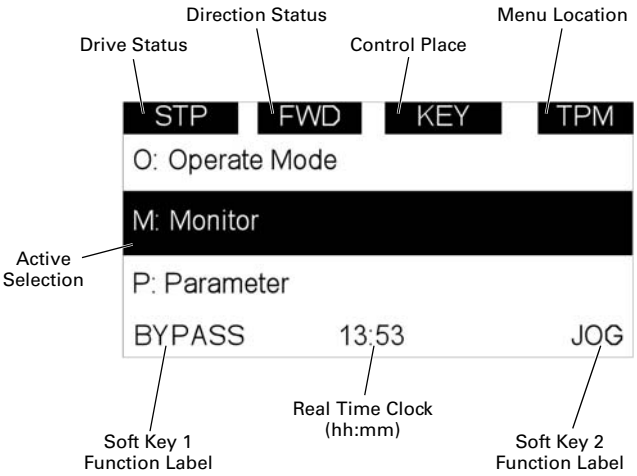
LCD Display

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 5**.

Figure 5. 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.

Welcome Page

LCD shall show the welcome page when power on. See **Figure 6**.

Figure 6. Welcome Page

Upgrade Page

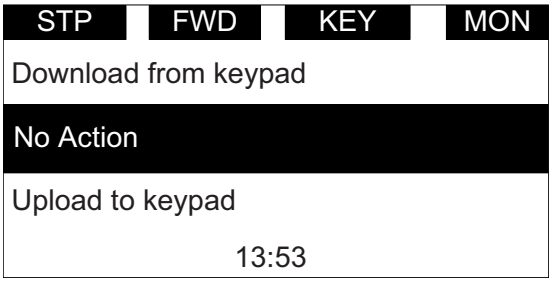
After welcome page, keypad will check whether there is different keypad firmware version in MCU's serial flash. If yes, then ask user whether to upgrade the keypad.

Figure 7. Upgrade Page

Auto Backup Page

If keypad is plugged into a new drive, then auto backup page will be shown to notice the user whether to do the upload/ download.

Figure 8. Auto Backup Page



Soft Key Description

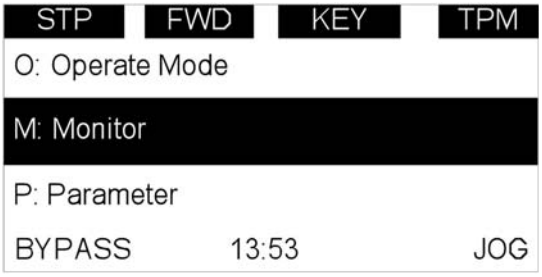
There are two soft key buttons. They have different definitions under different pages.

Table 8. Soft Keys

Keypad Display Page	Default Soft Key 1	Default Soft Key 2
Main Menu Page	NULL or BYPASS	JOG
Group Node Page	REVERSE or FORWARD	MENU
Parameter Node Page	NULL or FAVORITE or RESET	MENU
Favorite Page	DELETE	MENU
Fault Page	DETAIL	MENU

1. In the main menu (root node), "JOG" shall be shown on the right. If bypass is enabled, then "BYPASS" shall be shown on the left. Otherwise, it will not be shown. See **Figure 9**.

Figure 9. Main Menu



2. For the parameter group (), the two soft keys "REVERSE/FORWARD" and "MENU" shall be shown. See **Figure 10**.

Figure 10. Parent Node Page

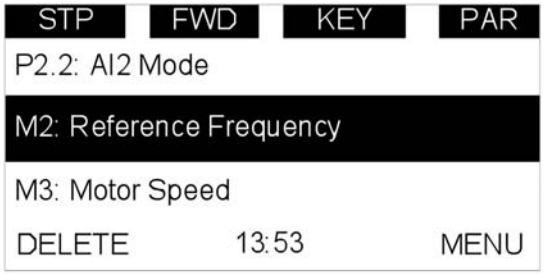
3. For the parameter menu (), if this parameter hasn't been added into the favorite list, two soft keys "FAVORITE" and "MENU" shall be shown. If it has been added into the favorite list, only one soft key "MENU" is shown in the right.

   If a parameter has been edited and drive needs to reset so that the new value can become effective, "RESET" shall be shown, which means user can reset the drive through this soft key. See **Figure 11**.

Figure 11. Parameter Page

4. If one parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, two soft keys "DELETE" and "MENU" shall be shown, and "DELETE" means you can delete the selected parameter from favorite list. See **Figure 12**.

Figure 12. Parameter Page from Favorite Menu



5. For the fault group, two soft keys "DETAIL" and "MENU" shall be shown. See **Figure 13**. For more information, see **Page 15**.

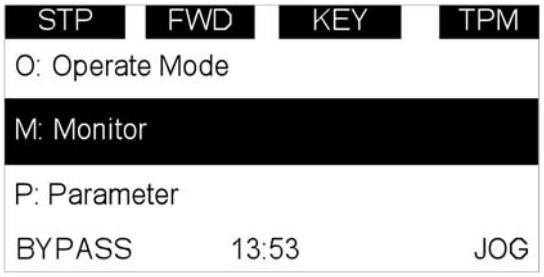
Figure 13. Fault Page

Chapter 3—Menu Overview

Main Menu Page

The data on the keypad are arranged in menus and sub-menus. The first menu level consists of M1, P1, F1, B1, T1 and O1, and it is called the Main Menu.

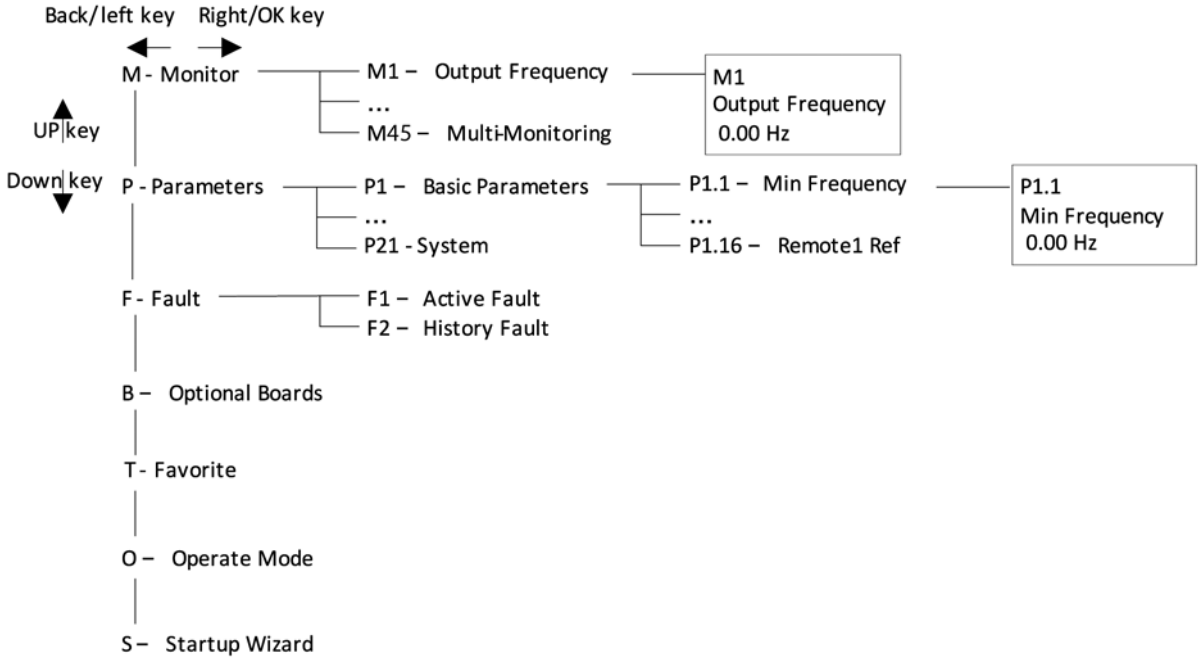
Figure 14. Main Menu Page



Menu Navigation

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

Figure 15. Main Menu Navigation



Menu Structure

Table 9. Keypad Menus

Item	Description	
Monitor	M1—Output Frequency	M24—Interval 3
	M2—Freq Reference	M25—Interval 4
	M3—Motor Speed	M26—Interval 5
	M4—Motor Current	M27—Timer 1
	M5—Motor Torque	M28—Timer 2
	M6—Motor Power	M29—Timer 3
	M7—Motor Voltage	M30—PID1 Set Point
	M8—DC-link Voltage	M31—PID1 Feedback
	M9—Unit Temperature	M32—PID1 Error Value
	M10—Motor Temperature	M33—PID1 Output
	M11—Torque Reference	M34—PID1 Status
	M12—Analog Input 1	M35—PID2 Set Point
	M13—Analog Input 2	M36—PID2 Feedback
	M14—Analog Output 1	M37—PID2 Error Value
	M15—Analog Output 2	M38—PID2 Output
	M16—DI1, DI2, DI3	M39—PID2 Status
	M17—DI4, DI5, DI6	M40—Running Aux Drives
	M18—DI7, DI8	M41—PT100 Temp
	M19—DO1	M42—Last Active Fault
	M20—RO1, RO2, RO3	M43—RTC Battery Status
	M21—TC1, TC2, TC3	M44—Instance Motor Power
	M22—Interval 1	M45—Energy Savings
	M23—Interval 2	M46—Multi-Monitoring

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—Multi-Pump Ctrl
	P19—Real Time Clock
	P20—Communication
	P21—System

Item	Description
Fault	F1—Active Fault
	F2—History Fault
Optional Boards	B1—SlotA
	B2—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
	O11—Keypad Torque Ref
	O12—Keypad Reference
Startup Wizard	S—Startup Wizard

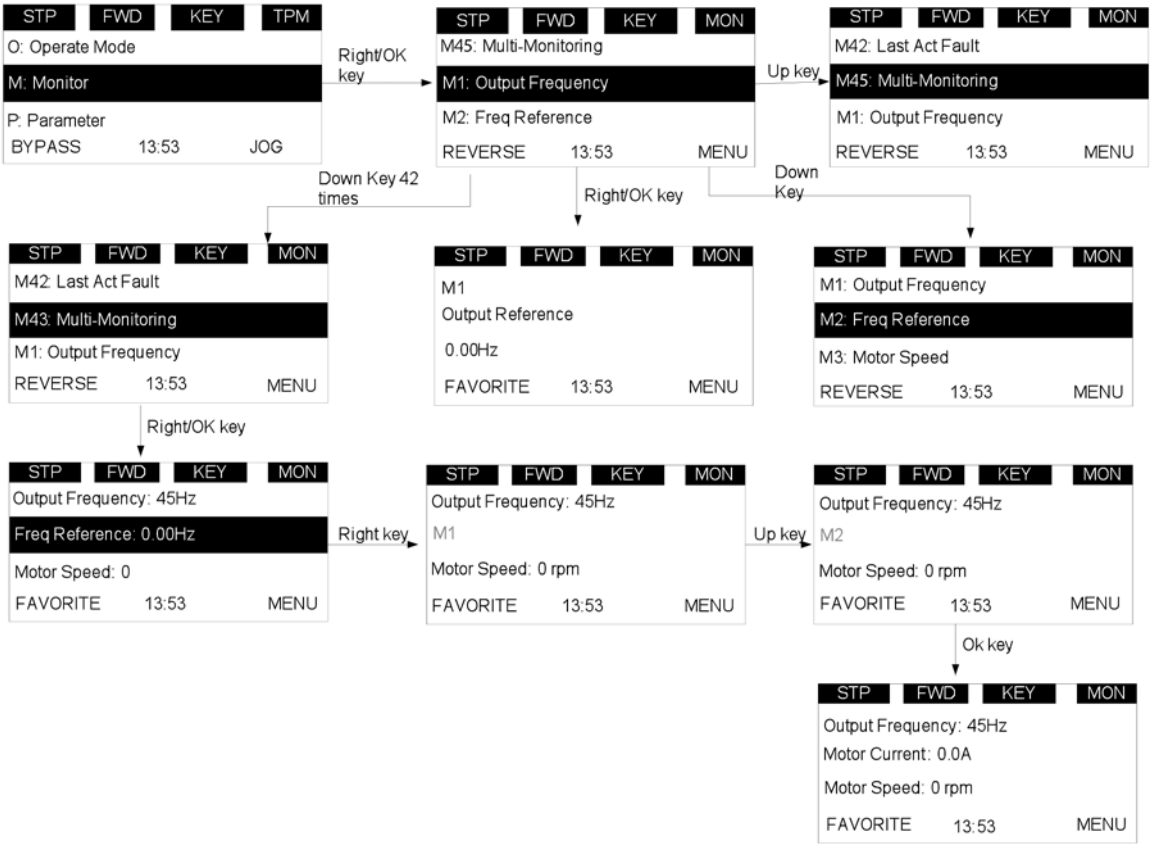
Note: Will vary depending on application selected.

M—Monitor

In monitor page, user shall not be able to edit the parameters except multi-monitor parameter.

The navigation for monitor is as **Figure 16**.

Figure 16. M—Monitor



F—Fault

There are three fault pages. The first one is F1 active faults; the second one is pop-up automatically when fault occurs; the third one is F2 fault history.

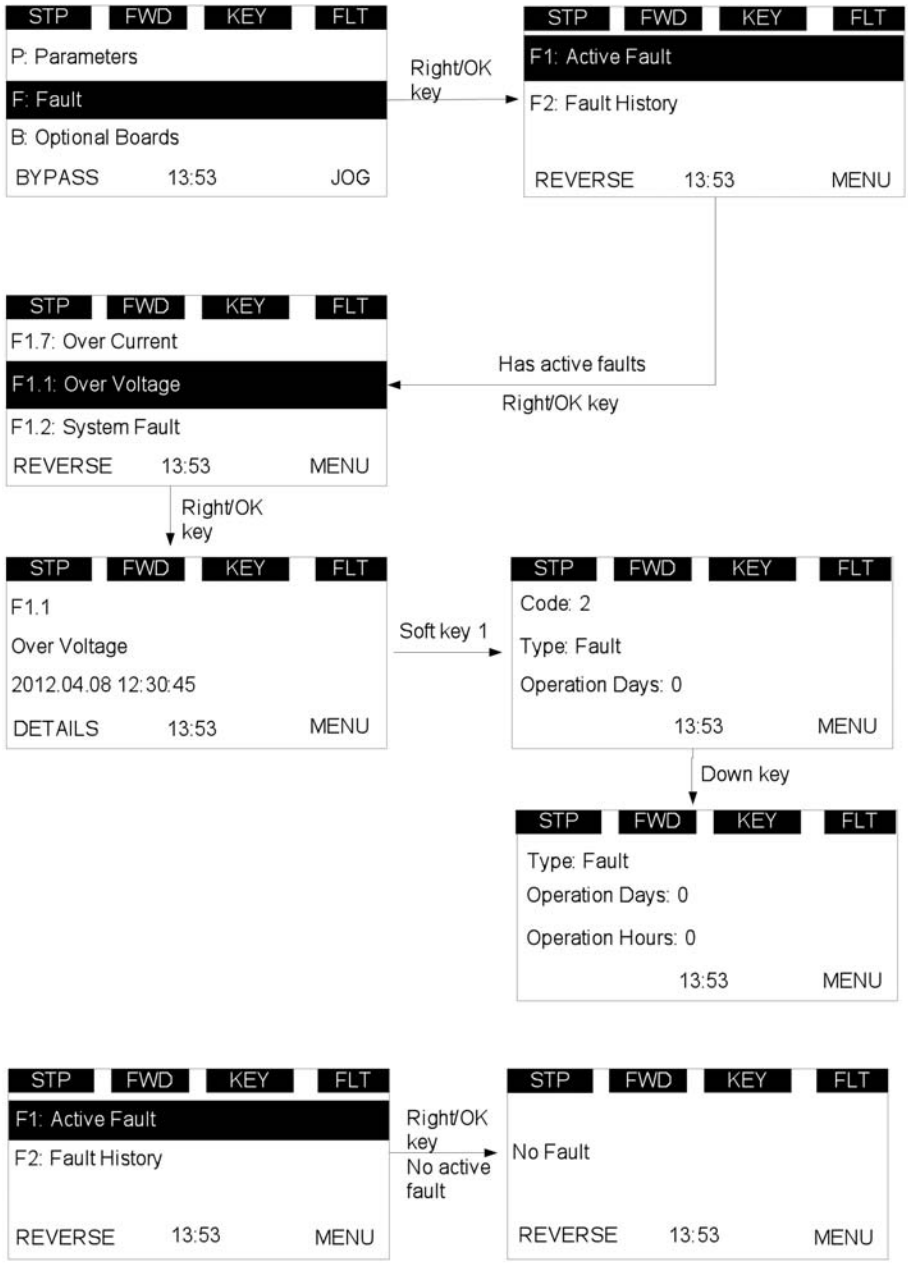
If there is no active fault/history fault, then "No fault" shall be shown.

After the DETAIL soft key is pressed, the detail information about the fault shall be shown: fault code, type, current, voltage, power, torque, DC voltage, unit temperature, run status, direction, warnings, zero speed shall be shown in sequence.

Active Fault

The navigation for active faults is as **Figure 17**.

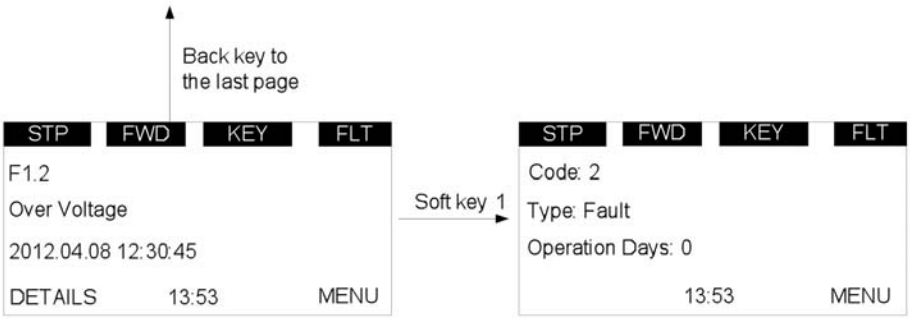
Figure 17. Active Faults



Pop-up Fault

The navigation for the pop-up active fault is as **Figure 18**.

Figure 18. Pop-Up Active Faults



The latest active fault page shall pop up when there is new active faults, the pop-up fault page is the same as the active fault page.

Pressing the back/reset key less than 2 seconds shall back to the last page user is watching.

Pressing the back/reset key more than 2 seconds shall reset all active faults when all the active fault condition is not satisfied.

User shall be able to navigate all the active faults by up/down key.

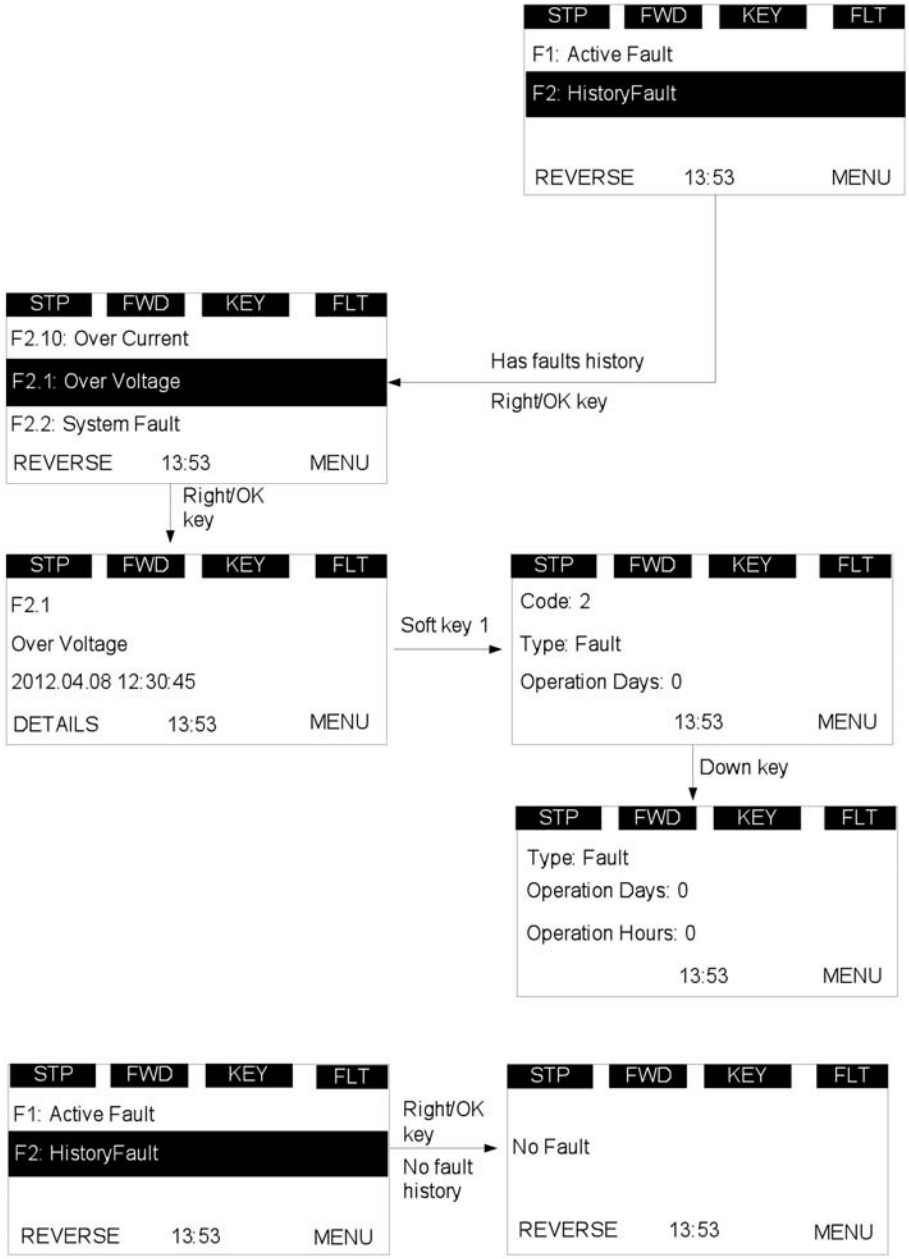
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

Fault History

The navigation for fault history is as **Figure 19**.

In any page, OK button is used to clear all the fault history by pressing more than 5s without password.

Figure 19. Fault History



P—Parameter

The navigation for parameter is as **Figure 20**.

In parameter page, the parameter code shall be shown in the second line (such as P1.1), align the text to the left.

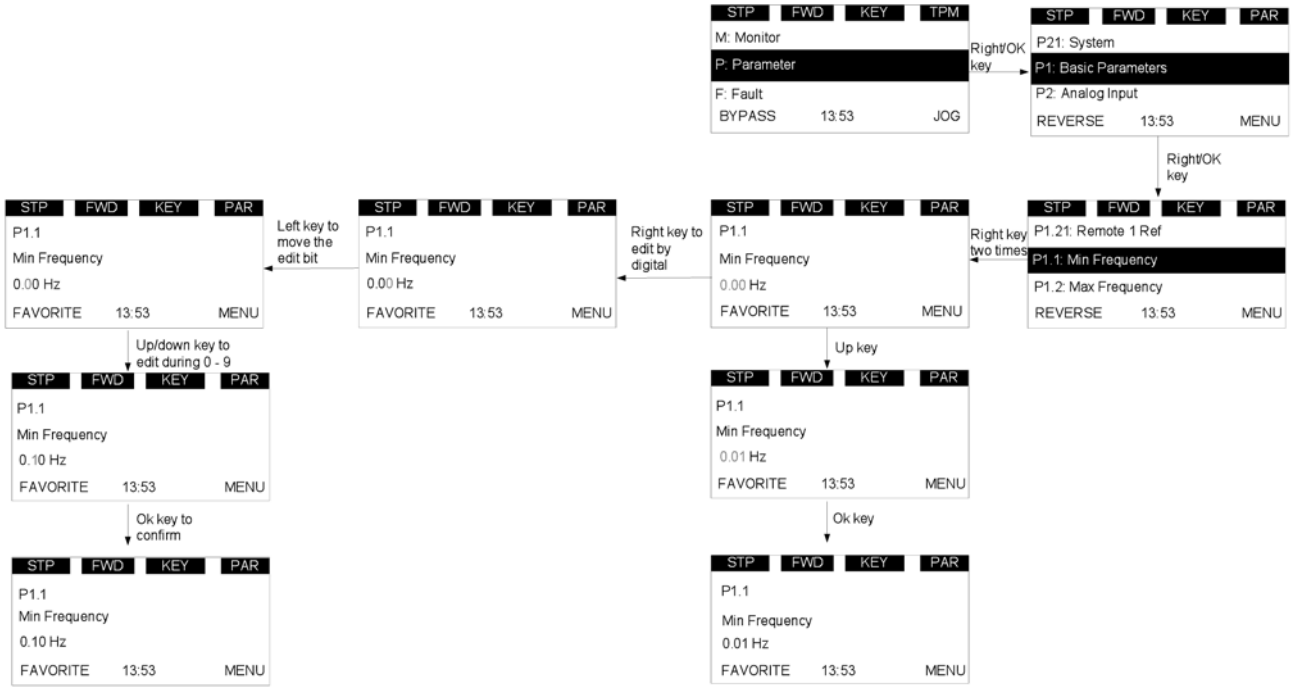
In parameter page, the parameter name shall be shown in the third line (such as Min Frequency), align the text to the left.

In parameter page, the value of parameter and unit shall be shown in the fourth line (0.00 Hz), align the text to the left.

If the parameter is read and write, then pressing the right key shall make the parameter value flash, which means that the value can be edited.

If the parameter is read only, then pressing the right key will not have any effect, which means that the value can't be edited.

Figure 20. Parameter Menu Overview



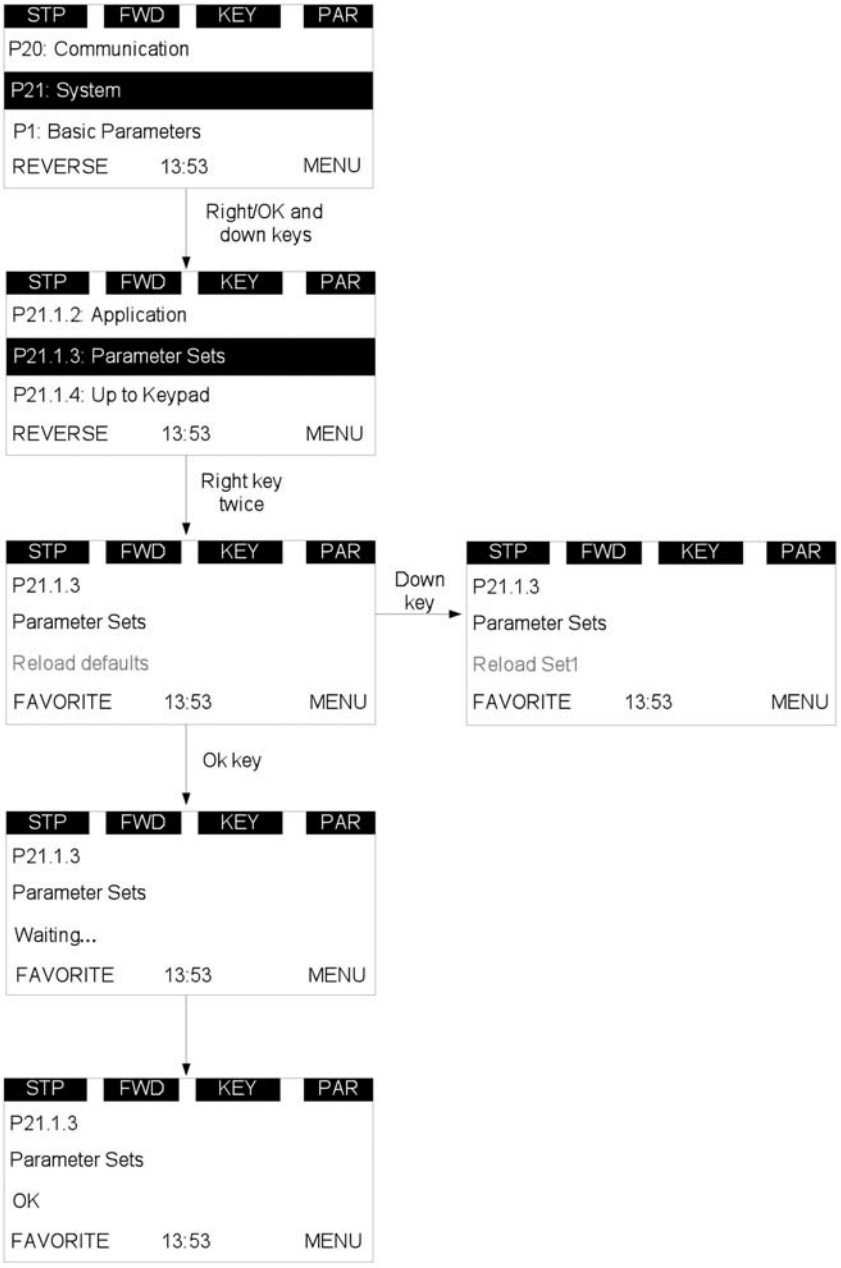
There are several special pages:

1. P21.1.3 Parameter Sets. See **Figure 21**.

User shall be able to load or store parameters. There are default, set1 and set2 parameters that can be used. The special points are:

- During this operation, "waiting…" shall flash, which means it is in process.
- When it is finished, "OK" shall be shown.
- Drive shall restart after default parameters are loaded.

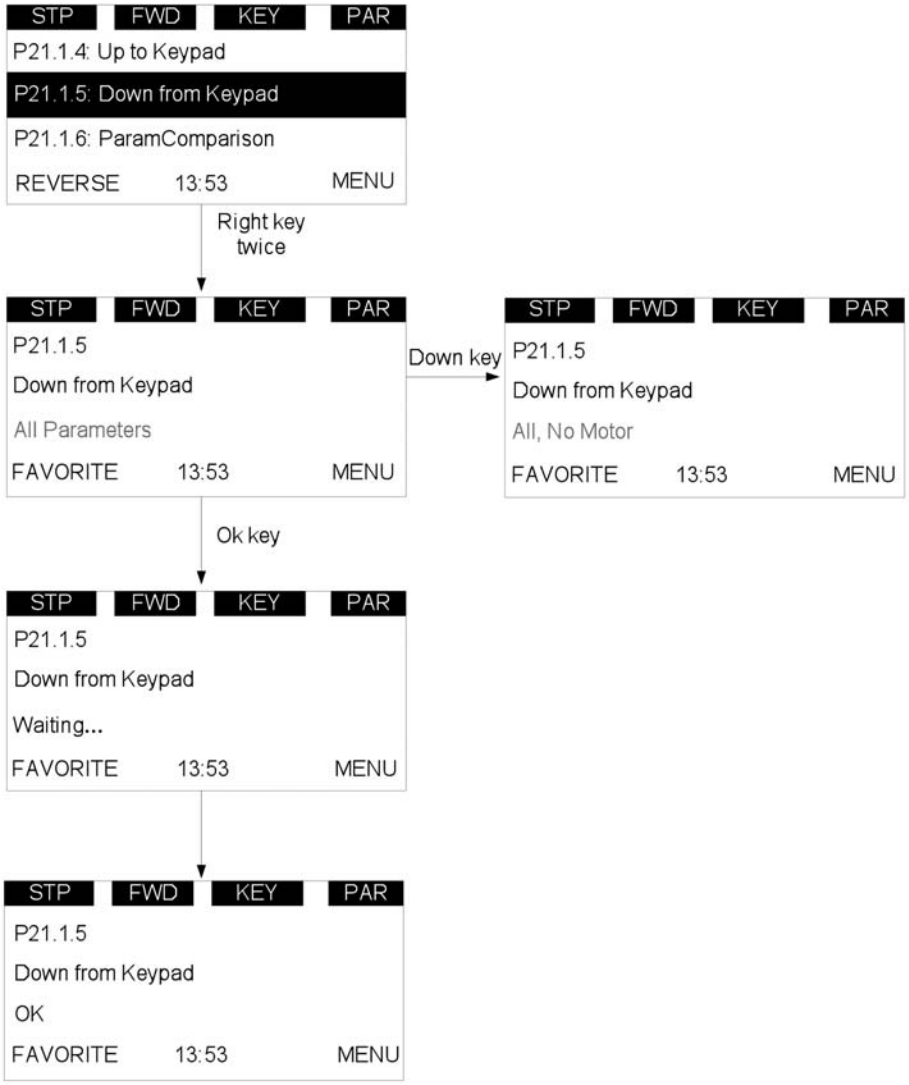
Figure 21. Parameter Sets



2. P21.1.4 Up to keypad and P21.1.5 Down from keypad

   During this operation, "waiting…" shall flash, which means it is in process. When it is finished, "OK" shall be shown.

Figure 22. Down From Keypad



3. P21.1.6 Parameters Comparison

   After the operation, the number of different parameter will be shown. Then press the right key; the first different parameter shall be shown.

   The parameter name shall be shown in the second line, and the value which is from keypad/default/set1/set2 shall be shown in the third line, the current value shall be shown in the fourth line.

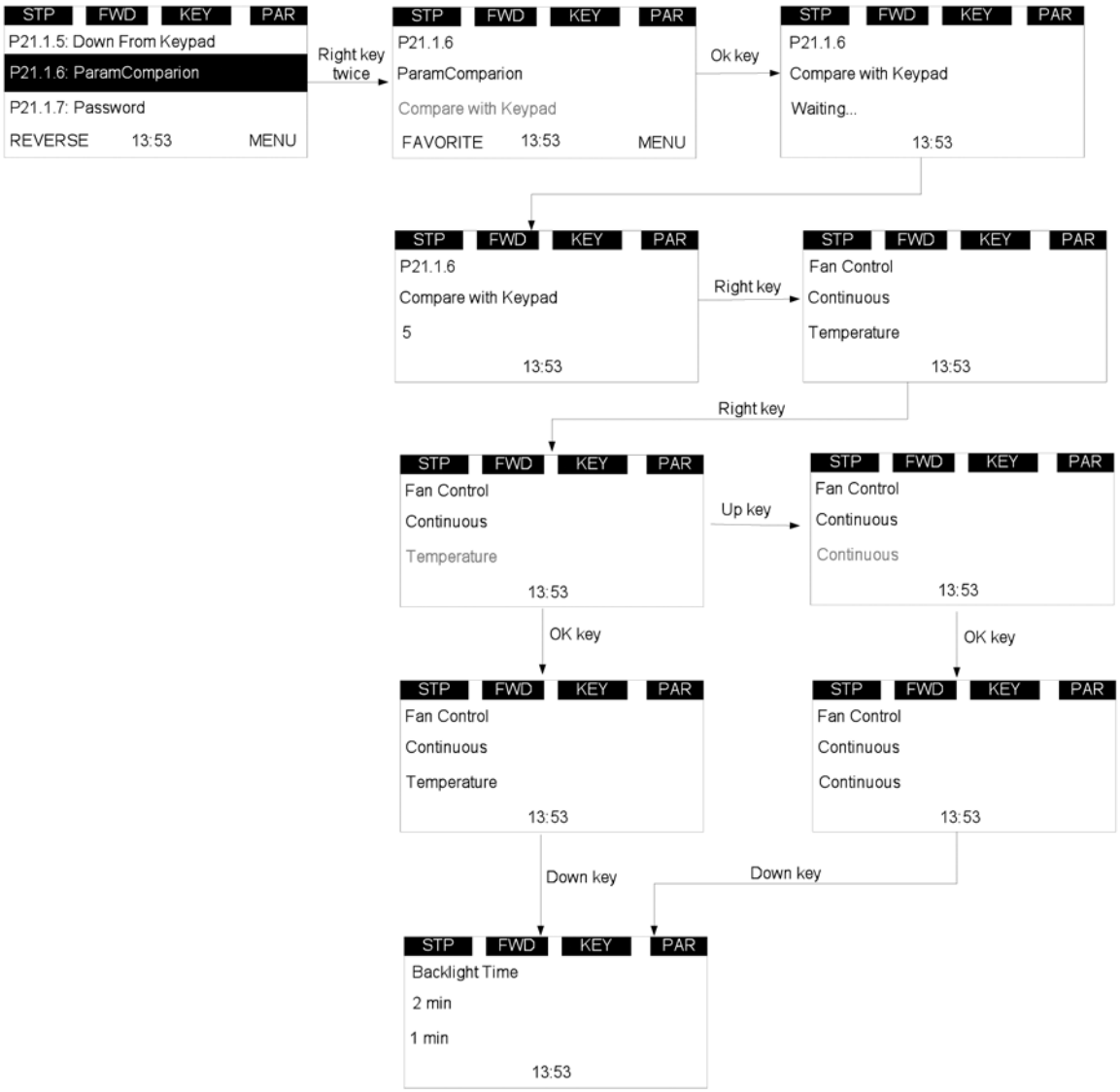
   If the user wants to modify the current value, user shall be able to enter the edit mode by right key.

   User shall be able to browse all the different parameters by up/down key.

   During this operation, "waiting…" shall flash, which means it is in process.

   When it is finished, "OK" shall be shown. See **Figure 23**.

Figure 23. Parameters Comparison



4. P21.1.7 Password

Password protects the parameters' security. Zero means not used, otherwise in use. If password is in use, user can still see the values of parameters, but needs to check the password before editing. And user has to check the old password before modifying it.

0000 shall mean that the password is not used, the password is 0000 by default.

The password range shall be 0001–9999, the setting of password and checking of password are as Figure 4-21.

Enter the password setting page. If the password is 0000, then the "Not use" shall be shown. If the password is not 0000, then the "in use" shall be shown.

If the password is in use, and user inputs the wrong password, then the "failed" shall be shown.

After "failed" is shown 3 seconds, the page shall return to the parameter read page.

If the password is in use, and user inputs the right password, then the value shall flash, which indicates that it can be edited.

Figure 24. Password

Note: Please contact Eaton customer support if password is forgotten.

Value Edit

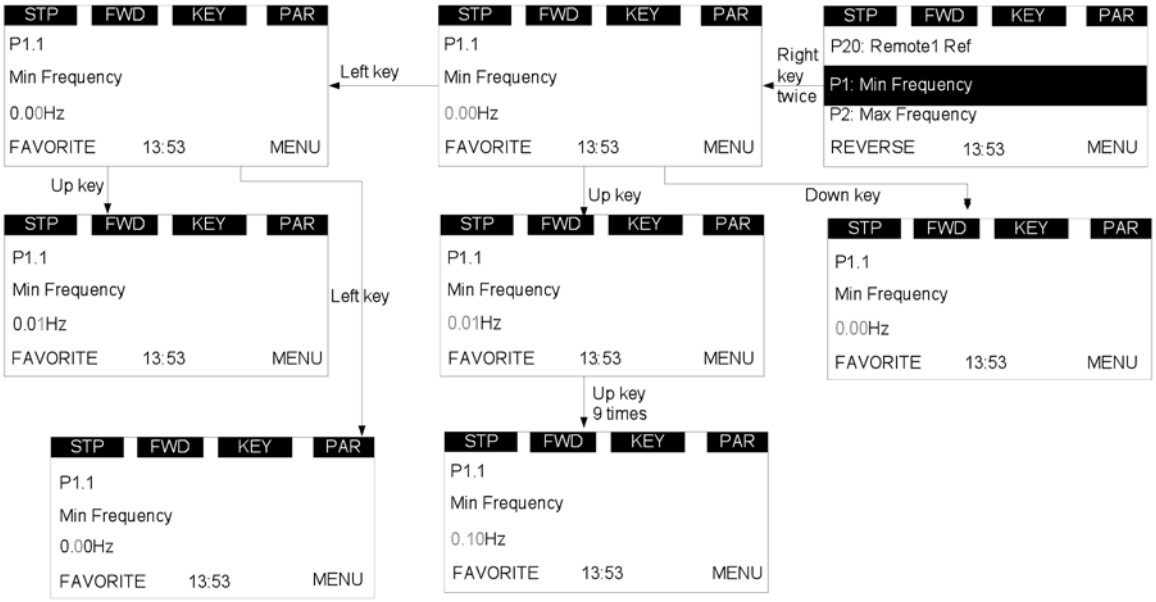
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

We have three methods to edit value: edit by key press-hold, edit bit by bit, edit click by click.

For details, please see **Figure 25**. For the editable parameter, press "Right" key once to enter the read mode (just read the value of this parameter), press "Right" key again to enter the edit mode (user can modify the value of this parameter), press "Right" key again to enter the bit-by-bit edit mode.

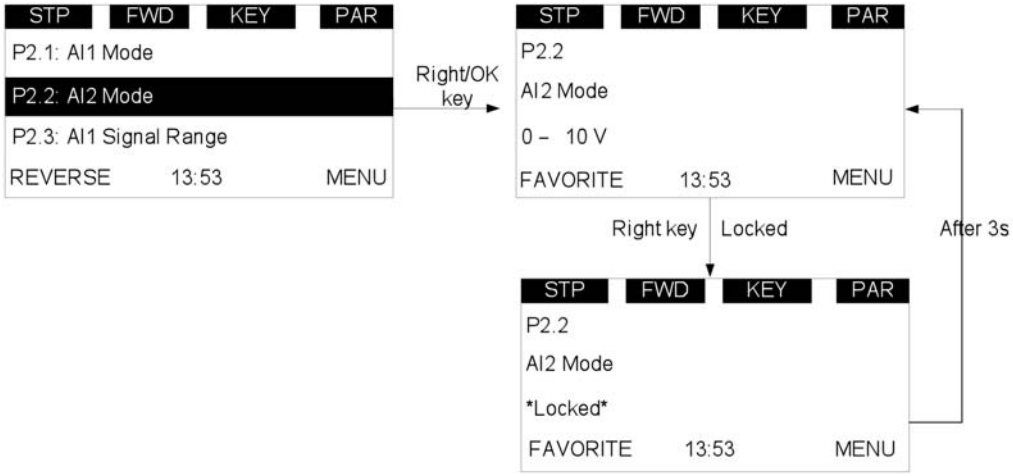
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

Figure 25. Edit Parameter Value



1. If password is in use, password shall be needed to check before edit parameter value.
2. If no action in 1min, the password shall need to be checked again.
3. If Parameter locked is enabled, *Locked* shall be shown if user tries to edit the parameter.

Figure 26. Parameter Locked



T1—Favorite

Favorites collect the user's favorite parameters. User can add one parameter into favorite list by "FAVORITE" soft key, and can delete it from favorite list by "DELETE" soft key.

If a parameter has not been added into the favorite list, the soft keys "FAVORITE" will be shown in parameter page (see **Figure 11** on **Page 11**). If it has been added into the favorite list, the soft key "FAVORITE" will not be shown.

If a parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, the soft keys "DELETE" will be shown. This allows you to remove the selected parameter from favorite list (see **Figure 12** on **Page 11**).

After one parameter is removed from favorite list, the next parameter in the favorite list will be selected by default.

Chapter 4—Startup

Startup Wizard Page

The Startup Wizard is a sub-menu of main menu. Once user enters into this menu, the Startup Wizard will begin.

In the Startup Wizard, you will be prompted for essential information needed by the drive so that it can start controlling your motor. During this process, you can also select the application that best suits your needs.

The parameters in Startup Wizard shall be in the following sequence: Language, Real Time Clock, Daylight Saving, Application, Min Frequency, Max Frequency, Motor Nom Current, Current Limit, Motor Nom Speed, Motor PF, Motor Nom Volt, Motor Nom Frequency, Motor Nom Power, Application Setup.

If user changes the Application, the drive and keypad will reset.

The Startup Wizard setup is as **Figure 27** shown on the following page.

Figure 27. Startup Wizard (1 of 2)

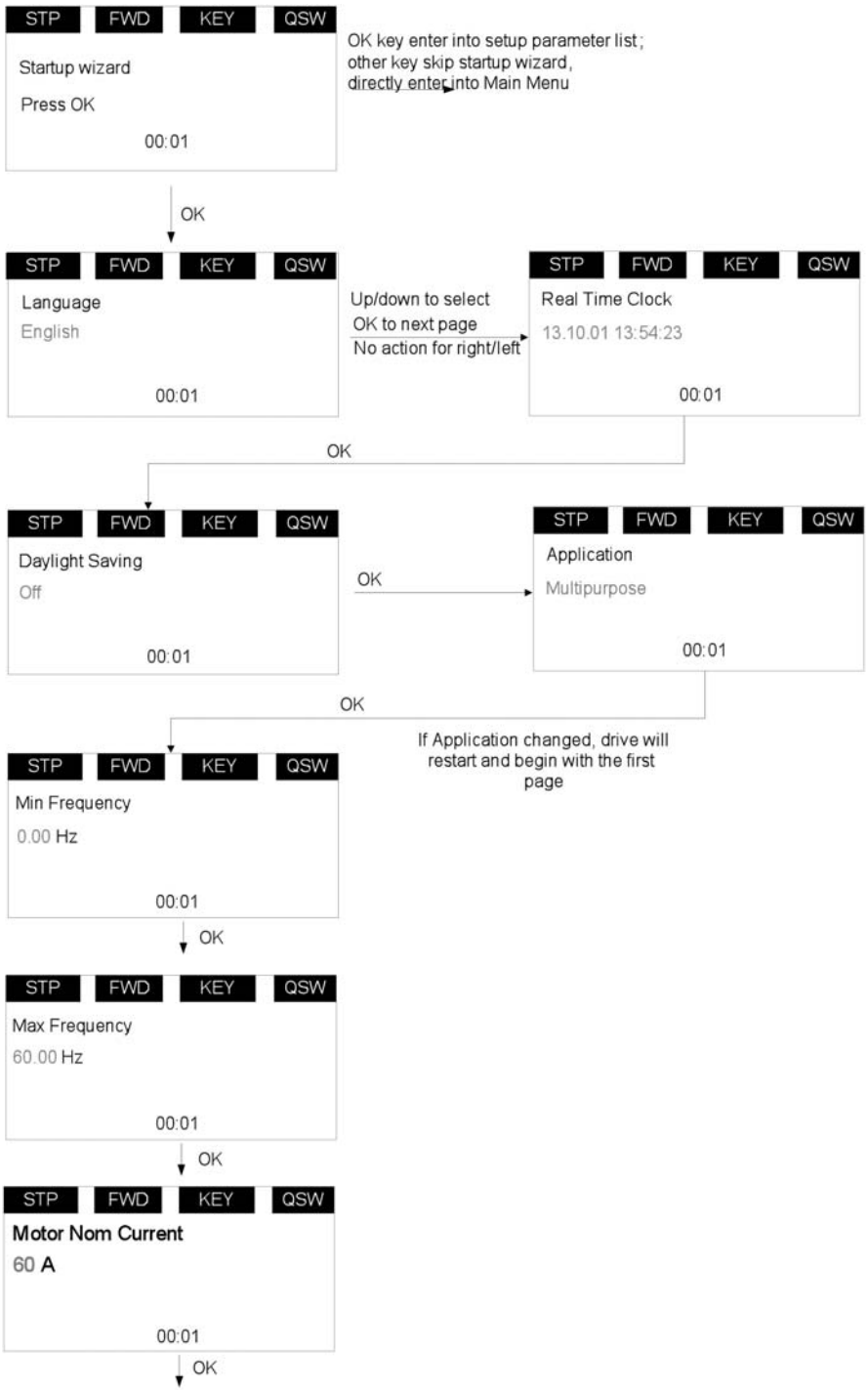


Figure 28. Startup Wizard (2 of 2)

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 10. 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.

Application Macro Mini-Wizard

Multi-Pump and Fan Control Mini-Wizard

Table 11. Multi-Pump and Fan Control

Item	Description	
16	PID 1 Process Unit	Select Units
17	PID 1 Set Point 1 Source	Select Function
18	PID 1 Keypad Set Point 1	Min: PID 1 Process Unit Min Max: PID 1 Process Unit Max
19	PID 1 Feedback 1 Source	Select Input
20	PID 1 Feedback 1 Min	Min: –200% Max: 200%
21	PID 1 Feedback 1 Max	Min: –200% Max: 200%
22	Motor Number	Min: 1 Max: 5
23	Bandwidth	Min: 0% Max: 100%
24	Bandwidth Delay	Min: 0s Max: 3600s
25	Interlock Enable	0 = Disabled 1 = Enabled

PID Mini-Wizard

The PID Mini-Wizard is activated in the Quick Setup menu. This Wizard assumes that you are going to use the PID controller in the "one feedback/one setpoint" mode. The control place will be I/O A and the default process unit "%". The PID Mini-Wizard asks for the following values to be set:

Table 12. PID Mini-Wizard Values

Item	Description	
16	PID 1 Process Unit	Select Units
17	PID 1 Set Point 1 Source	Select Function
18	PID 1 Keypad Set Point 1	Min: PID 1 Process Unit Min Max: PID 1 Process Unit Max
19	PID 1 Feedback 1 Source	Select Input
20	PID 1 Feedback 1 Min	Min: –200% Max: 200%
21	PID 1 Feedback 1 Min	Min: –200% Max: 200%

Chapter 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

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

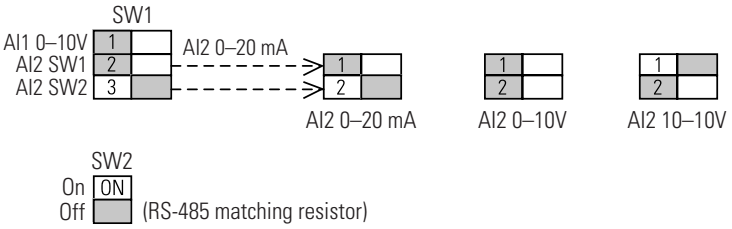
The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be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

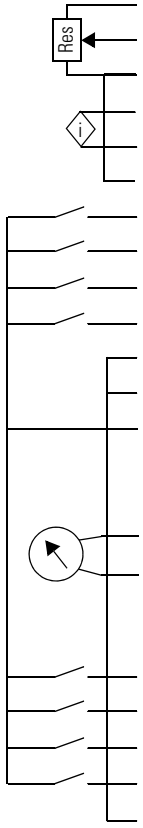
The parameters of the Standard Application are explained on **Page 130** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

Control I/O Configuration

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

Table 13. 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 130**, "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 14. 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 14. 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 15. 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	
R12②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	

Table 16. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2②	Max Frequency	Par. P1.1	400.00	Hz	Max Freq	102	
P1.3②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5①	Motor Nom Current	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7①	Motor PF	0.30	1.00		0.85	490	
P1.8①	Motor Nom Voltage	180	690	V	Motor Nom Voltage	487	
P1.9①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10②	Local/Remote Select				0	140	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11②	Remote1 Control Place				0	135	0 = I/O Terminal 1 = Fieldbus
P1.12	Local Control Place				0	1695	0 = Keypad 1 = I/O Terminal
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

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 17. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10V
P2.2 ②	AI1 Signal Range				0	175	0 = 0–100% 1 = 20–100% 2 = Customized
P2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ②	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
P2.12 ②	AI2 Signal Range				1	183	See P2.2
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
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	

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 18. 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
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2
P3.26 ②	DC Brake Enable				0	202	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 18. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.32 ②	Jog Enable				0	199	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.42 ②	Emergency Stop				8	747	See P3.2

Table 19. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10V
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
P4.3 ②	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 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	See P2.6
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				4	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
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 P2.6
P4.14 ②	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 20. 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	
P5.15 ②	Temp Limit Supv				0	165	See P5.11

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 20. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	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 21. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.12
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	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	

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. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 22. 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 23. 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	
P9.32 ②	External Fault Attempts	0	10		0	328	
P9.33 ②	Underload Attempts	0	10		1	336	

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 23. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 24. 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 25. 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 26. 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 27. Modbus RTU—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 = 57600 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	

Table 28. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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

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 29. 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
Note: Codes P20.3.15–P20.3.17 are for Modbus TCP.							
P20.3.15	Parity Error				0	614	
P20.3.16	Slave Failure				0	615	
P20.3.17	Last Fault Response				0	616	

Table 30. 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
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

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 30. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 31. 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 32. 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	

Table 33. 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.

Chapter 6—Multi-Pump and Fan Control Application

Introduction

The Multi-Pump and Fan Control Application is designed to be used in applications where multiple pumps or fan systems are used to maintain a desired flow rate, pressure, or temperature value. It gives the ability to use a single PID loop to control one drive and have auxiliary motors connected via drives or contactors start and stop based off the desired process. It also provides the ability to auto-change between the multiple motors to keep run times equal. Controlwise it allows for 2 control and reference place selections with 8 digital inputs and 2 analog inputs that are programmable. For monitoring the system and turning on aux motors, there are 3 programmable relay outputs, 1 digital output, and 2 sets of analog outputs that are programmable. The application allows for full customization of the motor control scheme with frequency or speed control along with customizing the V/Hz curve. Drive/Motor protections can be customized to defined actions. Below is a list of other features in addition to the Standard Application features that are available in the Multi-Pump and Fan Control Application.

Select the Multi-Pump and Fan Application in menu **P21.1.2**.

Multi-Pump and Fan includes all the functions in Standard Application and Additional functions:

- Damper control
- Fire mode
- Smoke purge mode
- Interlock for motors
- Multi-Pump control
- Auto change function
- Bypass
- Real time clock function—Timer
- Real time clock function—Interval
- PM setback
- Two independent set of motor Parameter
- PID

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 Multi-Pump and Fan Control Application are explained on **Page 130** of this manual, "Description of Parameters." The explanations are arranged according to the parameter

Control Examples

Figure 29. Example of Two-Pump Autochange, Main Diagram

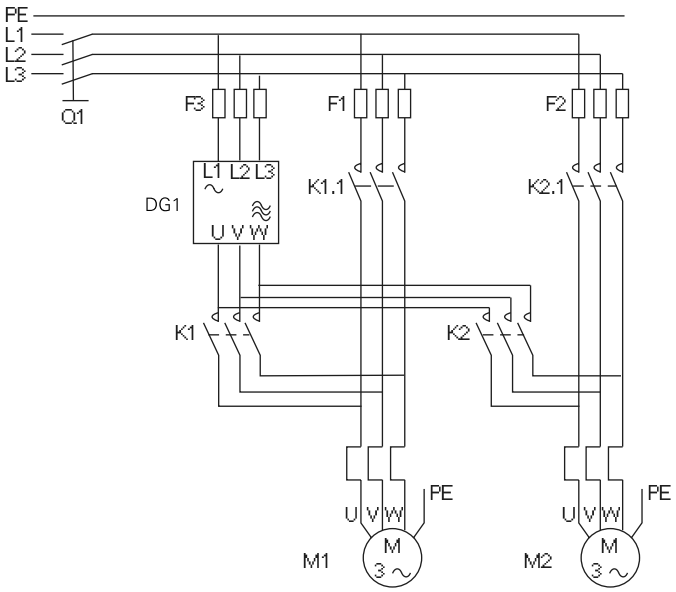


Figure 30. Two-Pump Autochange System Principal Control Diagram

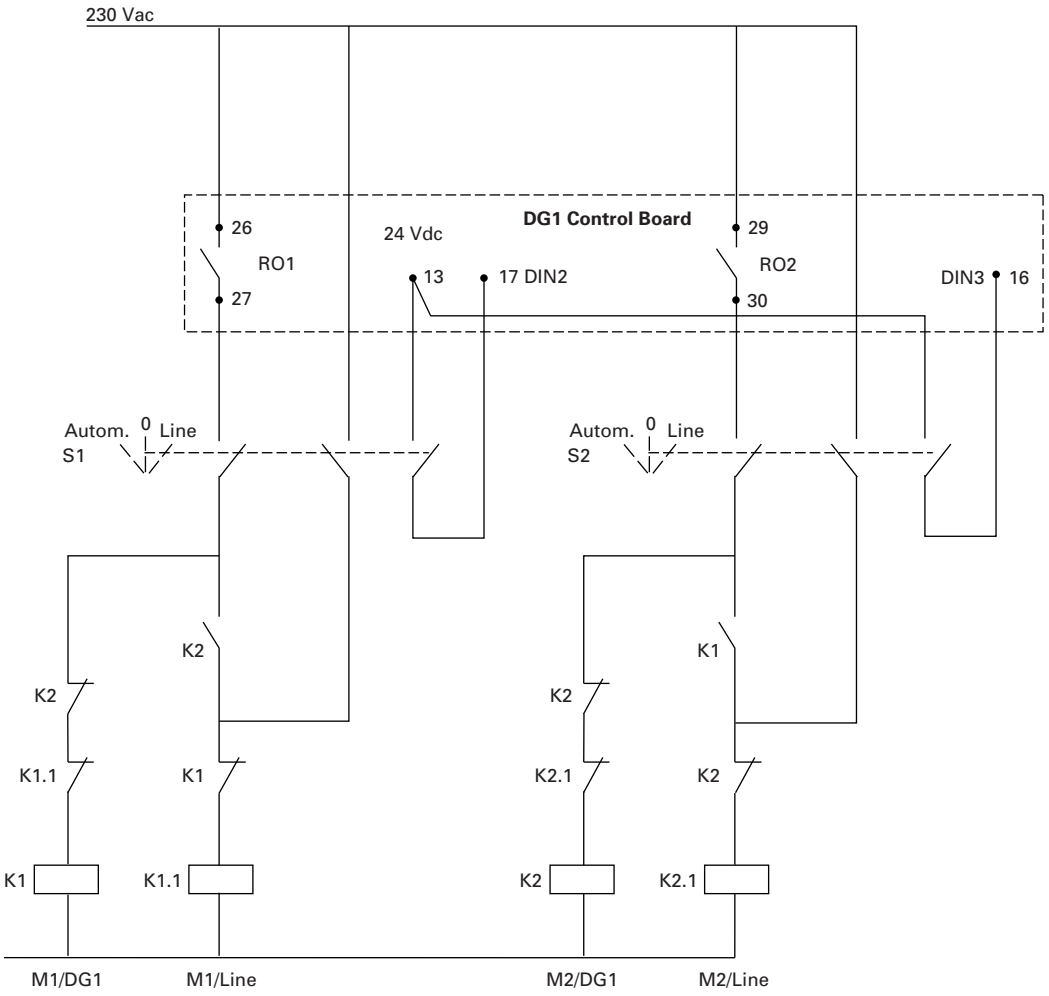


Figure 31. Example of Three-Pump Autochange, Main Diagram

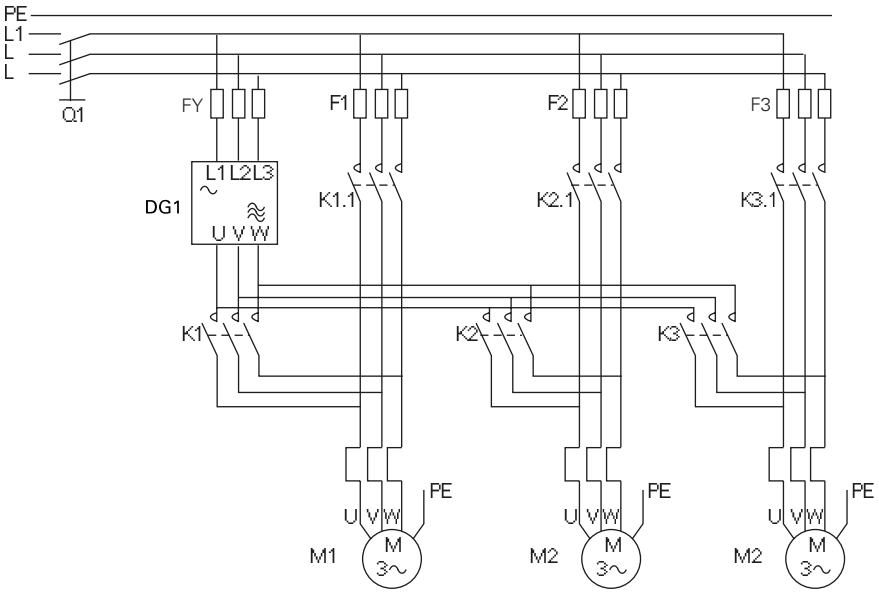


Figure 32. Three-Pump Autochange System Principal Control Diagram

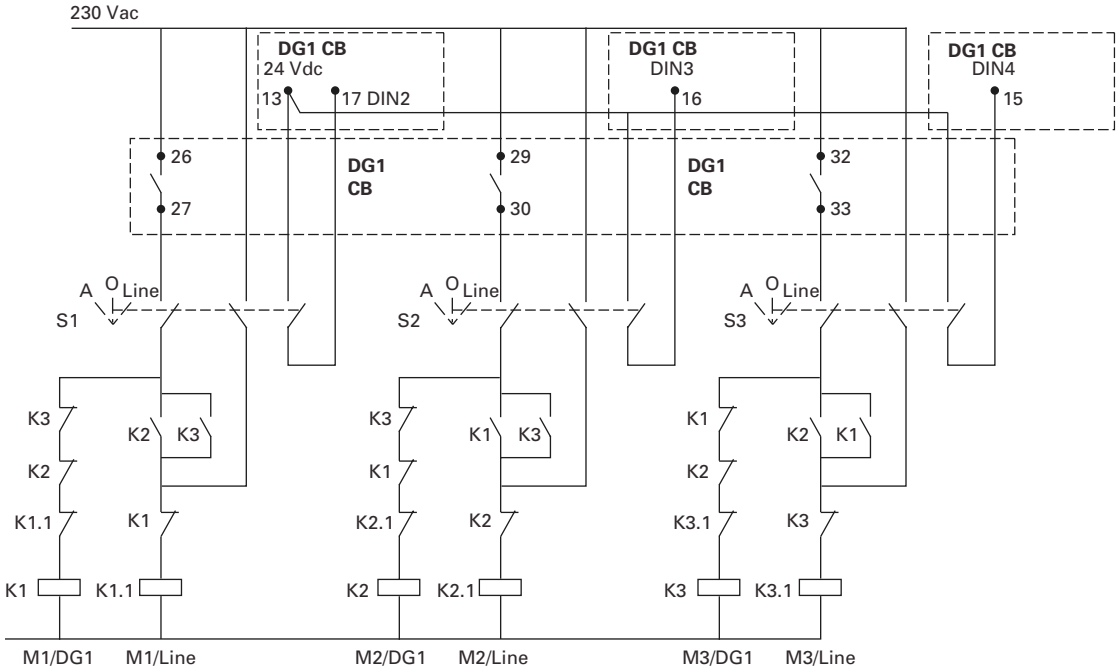
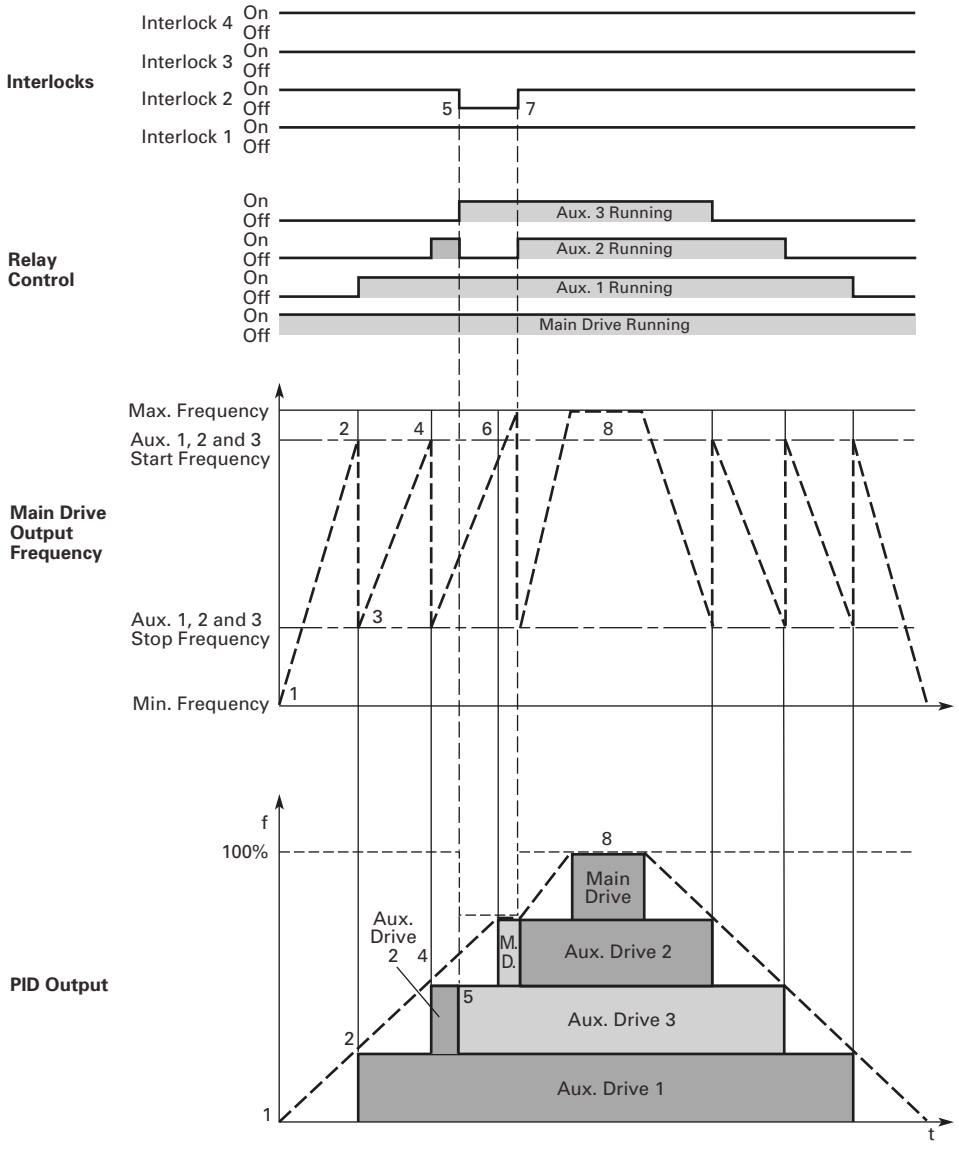


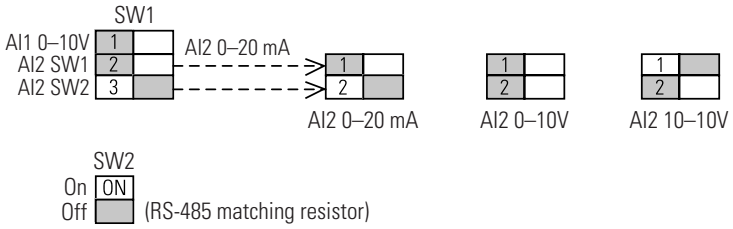
Figure 33. Example of the Function of the PFC Application with Three Auxiliary Drives

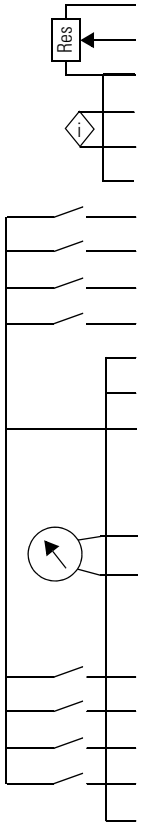


Control I/O Configuration

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

Table 34. Multi-Pump and Fan Application Default I/O Configuration





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		

Table 35. 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.

Pump and Fan 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 130**, "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 36. 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				0	14	
M20	RO1, RO2, RO3				0	557	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	
M32	PID1 Error Value			Varies	0.00	20	

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 36. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M33	PID1 Output			%	0.00	22	
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M40	Running Motors				0	26	
M41	PT100 Temperature			°C	1000.0	27	
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

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 36. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M43	RTC Battery Status					583	0 = Not Installed 1 = Installed 2 = Change Battery 3 = Over Voltage
M44	Instance Motor Power			kW	0.0	1686	
M45	Energy Savings			Varies		2119	
M46	Multi-Monitoring				0, 1, 2	30	

Table 37. 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 38. 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 Volt	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 38. 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) 17 = PID1 Control
P1.14①②	Remote1 Reference				1	137	See P1.12
P1.15①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 39. 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 39. 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 40. 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
P3.13 ②	PID1 Control Enable				0	550	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 40. 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
P3.24②	Second Motor Para Select				0	217	See P3.2
P3.25②	Bypass Start				0	218	See P3.2
P3.26②	DC Brake Enable				0	202	See P3.2
P3.27②	Smoke Mode				0	219	See P3.2
P3.28②	Fire Mode				0	220	See P3.2
P3.29②	Fire Mode Ref Select				0	221	See P3.2
P3.30②	PID1 Set Point Select				0	351	See P3.2
P3.32②	Jog Enable				0	199	See P3.2
P3.33②	Start Timer 1				0	224	See P3.2
P3.34②	Start Timer 2				0	225	See P3.2
P3.35②	Start Timer 3				0	226	See P3.2
P3.36②	AI Ref Source Select				0	208	See P3.2
P3.37②	Motor Interlock 1				0	210	See P3.2
P3.38②	Motor Interlock 2				0	211	See P3.2
P3.39②	Motor Interlock 3				0	212	See P3.2
P3.40②	Motor Interlock 4				0	213	See P3.2
P3.41②	Motor Interlock 5				0	214	See P3.2
P3.42②	Emergency Stop				8	747	See P3.2
P3.43②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	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 41. Analog Output—P4

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P4.1 ②	AO1 Mode				0	227	0 = 0–20 mA 1 = 0–10V
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 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 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
P4.3 ②	AO1 Minimum				1	149	0 = 0V / 0 mA 1 = 2V / 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	See P2.6
P4.7 ②	AO1 Offset	–100.00	100.00	%	0.00	173	
P4.8 ②	AO2 Mode				0	228	See P4.1
P4.9 ②	AO2 Function				4	229	See P4.2
P4.10 ②	AO2 Minimum				1	232	See P4.3
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 P2.6
P4.14 ②	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 42. 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 11 = PID1 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 25 = Fire Mode 26 = Bypass Run 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 35 = Damper Control 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 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep
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	

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 42. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.22 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25 ②	PID1 Superv Delay	0	3000	s	0	1351	
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 43. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.12
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	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	

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 43. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	
P7.22②	Power Loss Function				0	267	0 = Disabled 1 = Enabled
P7.23②	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 44. Motor Control—P8

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.1①②	Motor Control Mode				0	287	0 = Freq Control 1 = Speed Control
P8.2①	Current Limit	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom VT	107	
P8.3①②	V/Hz Optimization				0	109	0 = Disabled 1 = Enabled
P8.4①②	V/Hz Ratio				0	108	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.5①②	Field Weakening Point	8.00	400.00	Hz	Field Weakening Point Freq	289	
P8.6①②	Voltage at FWP	10.00	200.00	%	100.00	290	
P8.7①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Curve Midpoint Freq	291	
P8.8①②	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	
P8.9①②	Zero Frequency Voltage	0.00	40.00	%	0.00	293	
P8.10②	Switching Frequency	Min Switch Freq	Max Switch Freq	kHz	Default Switching Freq	288	
P8.11②	Sine Filter Enable				0	1665	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 44. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 45. 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

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 45. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 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

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 46. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P10.4 ①②	PID1 Process Unit				0	1297	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 = °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 = °F
P10.5 ②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	–99999.99	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See P2.6
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

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 46. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.30 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

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 46. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ①②	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.33 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ①②	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ①②	PID1 Feedforward Func				0	1338	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.39 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.43 ①②	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

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 47. 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 48. 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	

Table 49. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Disabled 1 = Enabled
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Table 50. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*1/10	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom V	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	581	

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 51. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

Table 52. Multi-Pump Control—P18

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1 ①②	Number of Motors	1	5		1	342	
P18.2 ②	Bandwidth	0.0	100.0	%	10.0	343	
P18.3 ②	Bandwidth Delay	0	3600	s	10	344	
P18.4 ②	Interlock Enable				1	350	0 = Disabled 1 = Enabled
P18.5 ②	Include Freq Converter				1	346	0 = Disabled 1 = Enabled
P18.6 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.7 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.8 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25.00	349	
P18.9 ②	Auto-Change Motor Limit	0	5		1	348	
P18.10 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.11 ①②	Damper Time Out	1	32500	s	5	484	
P18.12 ①②	Damper Delay	1	32500	s	5	485	

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 53. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See P19.3
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

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 54. 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 55. Modbus RTU—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 = 57600 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	

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 56. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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

Table 57. 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
Note: Codes P20.3.15–P20.3.17 are for Modbus TCP.							
P20.3.15	Parity Error				0	614	
P20.3.16	Slave Failure				0	615	
P20.3.17	Last Fault Response				0	616	

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 58. 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
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 59. 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	

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 60. 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	

Table 61. 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.

Chapter 7—Multi-PID Application

Introduction

The Multi-PID Application is designed to be used with up to 2 PID Control applications determined by the use of a digital input; it is typically used with pumps and fans to maintain a desired set-point. With PID, the frequency converter is given a set reference from a keypad, analog inputs, or fieldbus data-in. It also uses an analog probe that measures flow, temperature, and pressure in the system referred to as feedback. The frequency converter takes the feedback signal and compares it to the set point. From there based off the Gain, Integral time, and Derivative time, it corrects the speed of the motor to meet the set point value and maintain it; no additional components. Drive controlwise it provides the ability to have 2 control and reference locations with 8 digital inputs, 2 analog inputs, 3 relay outputs, 1 digital output, and 2 analog outputs that are programmable. Motor control is customizable to frequency or speed control, and the V/Hz curve can be programmable. Drive/Motor protection selections can be programmable to defined actions. Below is a list of additional features available in addition to the Standard and Multi-Pump and Fan Application features that are available in the Multi-PID Application.

Select the Multi-PID Application in menu **P21.1.2**.

Multi-PID Application includes all the functions in Multi-Pump and Fan Application, and Additional functions:

- The Second PID control

I/O Controls

- "Terminal To Function" (TTF) Programming

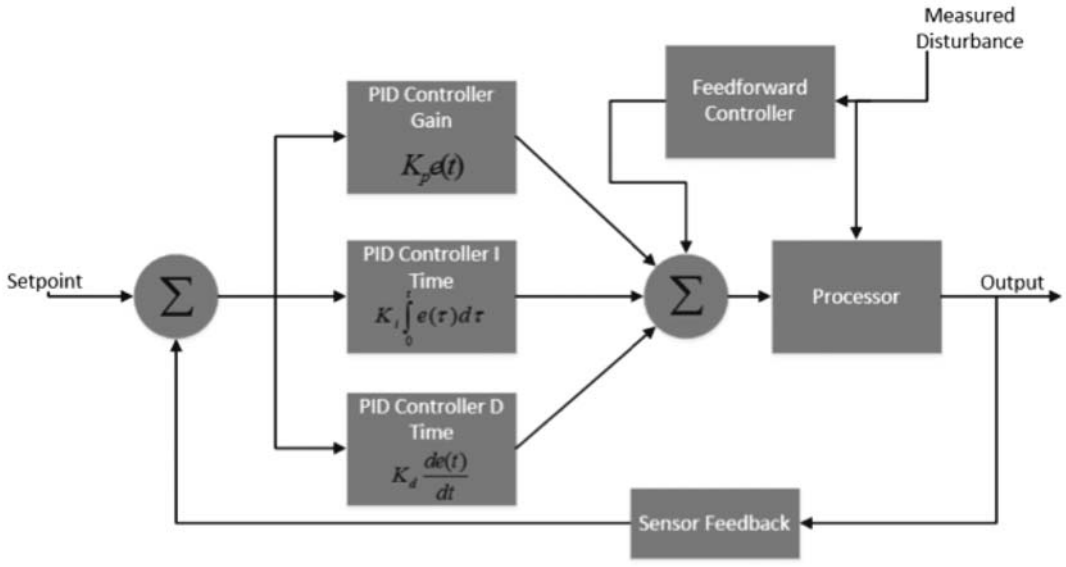
The design behind the programming of the digital inputs in the DG1 drive is to use "Terminal To Function" programming, which is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital 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 Multi-PID Application are explained on **Page 130** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

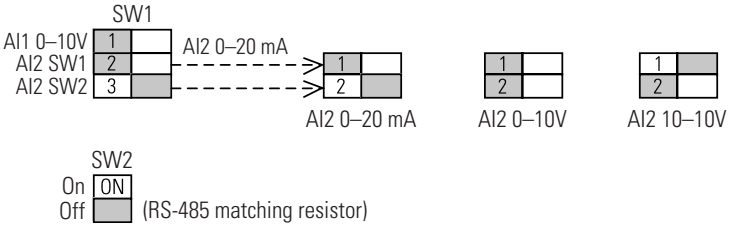
Figure 34. PID Controller Flowchart

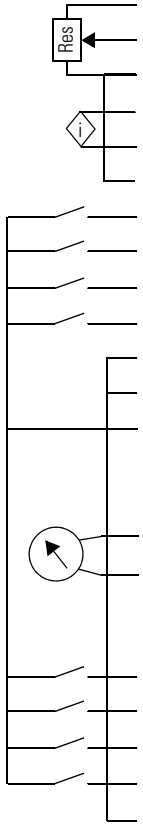


Control I/O Configuration

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

Table 62. Multi-PID Application Default I/O Configuration





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		

Multi-PID 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 130**, "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 63. 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				0	14	
M20	RO1, RO2, RO3				0	557	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	
M32	PID1 Error Value			Varies	0.00	20	

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 63. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M33	PID1 Output			%	0.00	22	
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies	0.00	32	
M36	PID2 Feedback			Varies	0.00	34	
M37	PID2 Error Value			Varies	0.00	36	
M38	PID2 Output			%	0.00	38	
M39	PID2 Status				0	39	See M34
M40	Running Motors				0	26	
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 63. 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	0.0	1686	
M45	Energy Savings			Varies		2119	
M46	Multi-Monitoring				0, 1, 2	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 64. 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 65. 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 Volt	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
P1.13 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) 17 = PID1 Control
P1.14 ①②	Remote1 Reference				1	137	See P1.12
P1.15 ①	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 66. Analog Input—P2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P2.1	AI1 Mode				1	222	0 = 0–20 mA 1 = 0–10V
P2.2 ②	AI1 Signal Range				0	175	0 = 0–100% 1 = 20–100% 2 = Customized
P2.3 ②	AI1 Custom Min	0.00	Par. P2.4	%	0.00	176	
P2.4 ②	AI1 Custom Max	Par. P2.3	100.00	%	100.00	177	
P2.5 ②	AI1 Filter Time	0.00	10.00	s	0.10	174	
P2.6 ②	AI1 Signal Invert				0	181	0 = Not Inverted 1 = Inverted
P2.7 ②	AI1 Joystick Hyst	0.00	20.00	%	0.00	178	
P2.8 ②	AI1 Sleep Limit	0.00	100.00	%	0.00	179	
P2.9 ②	AI1 Sleep Delay	0.00	320.00	s	0.00	180	
P2.10 ②	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
P2.12 ②	AI2 Signal Range				1	183	See P2.2
P2.13 ②	AI2 Custom Min	0.00	Par. P2.14	%	0.00	184	
P2.14 ②	AI2 Custom Max	Par. P2.13	100.00	%	100.00	185	
P2.15 ②	AI2 Filter Time	0.00	10.00	s	0.10	182	
P2.16 ②	AI2 Signal Invert				0	189	See P2.6
P2.17 ②	AI2 Joystick Hyst	0.00	20.00	%	0.00	186	
P2.18 ②	AI2 Sleep Limit	0.00	100.00	%	0.00	187	
P2.19 ②	AI2 Sleep Delay	0.00	320.00	s	0.00	188	
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	

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 67. 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
P3.13 ②	PID1 Control Enable				0	550	See P3.2
P3.14 ②	PID2 Control Enable				0	553	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	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 67. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.24 ②	Second Motor Para Select				0	217	See P3.2
P3.25 ②	Bypass Start				0	218	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.27 ②	Smoke Mode				0	219	See P3.2
P3.28 ②	Fire Mode				0	220	See P3.2
P3.29 ②	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②	PID1 Set Point Select				0	351	See P3.2
P3.31 ②	PID2 Set Point Select				0	352	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.33 ②	Start Timer 1				0	224	See P3.2
P3.34 ②	Start Timer 2				0	225	See P3.2
P3.35 ②	Start Timer 3				0	226	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.37 ②	Motor Interlock 1				0	210	See P3.2
P3.38 ②	Motor Interlock 2				0	211	See P3.2
P3.39 ②	Motor Interlock 3				0	212	See P3.2
P3.40 ②	Motor Interlock 4				0	213	See P3.2
P3.41 ②	Motor Interlock 5				0	214	See P3.2
P3.42 ②	Emergency Stop				8	747	See P3.2
P3.43 ②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	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 68. 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 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 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 69. 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 11 = PID1 Superv 12 = PID2 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 25 = Fire Mode 26 = Bypass Run 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 35 = Damper Control 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 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 49 = PID1 Sleep 50 = PID2 Sleep
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

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 69. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.8②	Freq Limit 2 Supv Val	0.00	Par. P1.2	Hz	0.00	158	
P5.9②	Torque Limit Supv				0	159	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.10②	Torque Limit Supv Val	–300.0	300.0	%	100.0	160	
P5.11②	Ref Limit Supv				0	161	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P5.12②	Ref Limit Supv Val	0.00	Par. P1.2	Hz	0.00	162	
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	
P5.22②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25②	PID1 Superv Delay	0	3000	s	0	1351	
P5.26②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.27②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.28②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.29②	PID2 Superv Delay	0	3000	s	0	1413	
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 70. 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	

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 70. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	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	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 71. 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 CT	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	

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 71. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.7 ①②	V/Hz Mid Frequency	0.00	Par. P8.5	Hz	V/Hz Curve 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	

Table 72. 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

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 72. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	
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 73. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	

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 73. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.4 ①②	PID1 Process Unit				0	1297	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 = ° 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 = °F
P10.5 ②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	–99999.99	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See P2.6
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

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 73. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.30 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

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 73. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ①②	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.33 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ①②	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ①②	PID1 Feedforward Func				0	1338	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.39 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.43 ①②	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

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 74. PID Controller 2—P11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1 ②	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P11.2 ②	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P11.3 ②	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P11.4 ①②	PID2 Process Unit				0	1359	See P10.4
P11.5 ②	PID2 Process Unit Min	–99999.99	99999.99	Varies	0.00	1360	
P11.6 ②	PID2 Process Unit Max	–99999.99	99999.99	Varies	100.00	1362	
P11.7 ②	PID2 Process Unit Decimal	0	4		2	1364	
P11.8 ①②	PID2 Error Inversion				0	1365	See P2.6
P11.9 ②	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P11.10 ②	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P11.11 ②	PID2 Keypad Set Point 1	Par. P11.5	Par. P11.6	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	Par. P11.5	Par. P11.6	Varies	0.00	1371	
P11.13 ②	PID2 Ramp Time	0.00	300.00	s	0.00	1373	
P11.14 ①②	PID2 Set Point 1 Source				1	1374	See P10.14
P11.15 ②	PID2 Set Point 1 Min	–200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	–200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1378	
P11.19 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.20 ②	PID2 Set Point 1 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1380	
P11.21 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.22 ①②	PID2 Set Point 2 Source				2	1383	See P10.14
P11.23 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.24 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.25 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.26 ②	PID2 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1387	
P11.27 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.28 ②	PID2 Set Point 2 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1389	
P11.29 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.30 ①②	PID2 Feedback Func				0	1392	See P10.30
P11.31 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	
P11.32 ①②	PID2 Feedback 1 Source				1	1394	See P10.32
P11.33 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.34 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.35 ①②	PID2 Feedback 2 Source				0	1397	See P10.32
P11.36 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.37 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.38 ①②	PID2 Feedforward Func				0	1400	See P10.38
P11.39 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	
P11.40 ①②	PID2 Feedforward 1 Source				0	1402	See P10.40
P11.41 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	

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 74. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.42 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.43 ①②	PID2 Feedforward 2 Source				0	1405	See P10.40
P11.44 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.45 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.46 ②	PID2 Set Point1 Comp Enable				0	1414	0 = Disabled 1 = Enabled
P11.47 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.48 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.49 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	

Table 75. 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 76. 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 77. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Disabled 1 = Enabled
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Table 78. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom Volt	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	581	

Table 79. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

Table 80. Multi-Pump Control—P18

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1 ①②	Number of Motors	1	5		1	342	
P18.2 ②	Bandwidth	0.0	100.0	%	10.0	343	
P18.3 ②	Bandwidth Delay	0	3600	s	10	344	
P18.4 ②	Interlock Enable				1	350	0 = Disabled 1 = Enabled
P18.5 ②	Include Freq Converter				1	346	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 80. Multi-Pump Control—P18, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.6 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.7 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.8 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25.00	349	
P18.9 ②	Auto-Change Motor Limit	0	5		1	348	
P18.10 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.11 ①②	Damper Time Out	1	32500	s	5	484	
P18.12 ①②	Damper Delay	1	32500	s	5	485	

Table 81. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See P19.3
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3

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.

Table 81. Real Time Clock—P19, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

Table 82. 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 83. Modbus RTU—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 = 57600 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	

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 84. BACnet MS/TP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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

Table 85. 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
Note: Codes P20.3.15–P20.3.17 are for Modbus TCP.							
P20.3.15	Parity Error				0	614	
P20.3.16	Slave Failure				0	615	
P20.3.17	Last Fault Response				0	616	

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 86. 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
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 87. 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 88. 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	

Table 89. 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.

Chapter 8—Multi-Purpose Application

Introduction

The Multi-Purpose Application is designed for a large set of applications with the ability to have advanced motor control systems. It takes the same functions provided in the Standard, Multi-Pump and Fan, and Multi-PID applications and adds in some additional control techniques. The application is designed with 2 control places that use 8 digital inputs, 2 analog inputs, 3 relay outputs, 1 digital output, and 2 analog outputs that are programmable. Motor controlwise it provides the ability to do frequency and speed control and adds Open Loop Speed Control as well as Torque Control. For tuning the V/Hz curve, it has the ability to go out and ID the motor characteristic and enters those specific measurements into its parameters for better control. Drive/Motor protections are programmable for desired actions depending on the application. Below is a list of additional features available in addition to the Standard, Multi-Pump and Fan, and Multi-PID Application features that are available in the Multi-Purpose Application.

- Motor potentiometer reference control
- External Brake control
- Droop function with multiple loads
- Motor Identification
- Motor Control modes
- 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. It 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 the what 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, then the IOY determines the type of card it is, which would be IO1 or IO5, and the Z would indicate which input is being used on that available option card.
  - "Function To Terminal" (FTT) Programming

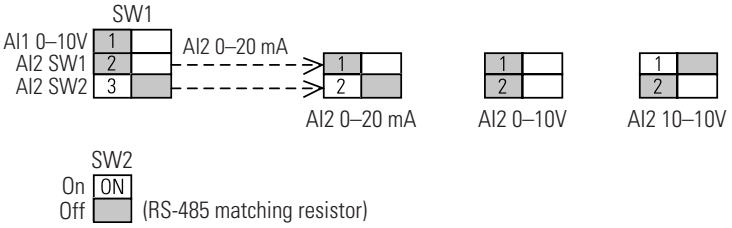
    The design behind the programming of the relay outputs and digital output in the DG1 drive is to use "Function To Terminal" programming. It is composed of a terminal be it a relay output or a digital output that is assigned a parameter. Within that parameter, it has different functions that can be set.

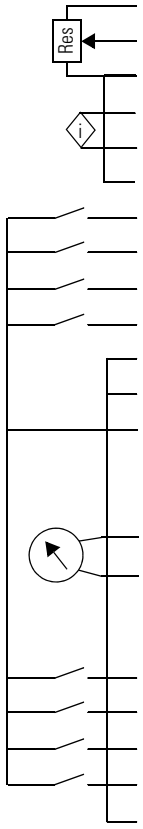
The parameters of the Multi-Purpose Application are explained on **Page 130** of this manual, "Description of Parameters." The explanations are arranged according to the parameter number.

Control I/O Configuration

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

Table 90. Multi-Purpose Application Default I/O Configuration





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		

Multi-Purpose 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 130**, "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 91. 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	
M11	Torque Reference			%	0.0	15	
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	
M21	TC1, TC2, TC3				0	558	
M22	Interval 1				0	559	0 = Inactive 1 = Active
M23	Interval 2				0	560	See M22
M24	Interval 3				0	561	See M22
M25	Interval 4				0	562	See M22
M26	Interval 5				0	563	See M22
M27	Timer 1			s	0	569	
M28	Timer 2			s	0	571	
M29	Timer 3			s	0	573	
M30	PID1 Set Point			Varies	0.00	16	
M31	PID1 Feedback			Varies	0.00	18	

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 91. Monitor—M, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
M32	PID1 Error Value			Varies	0.00	20	
M33	PID1 Output			%	0.00	22	
M34	PID1 Status				0	23	0 = Stopped 1 = Running 2 = Sleep Mode
M35	PID2 Set Point			Varies	0.00	32	
M36	PID2 Feedback			Varies	0.00	34	
M37	PID2 Error Value			Varies	0.00	36	
M38	PID2 Output			%	0.00	38	
M39	PID2 Status				0	39	See M34
M40	Running Motors				0	26	
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 91. 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	0.0	1686	
M45	Energy Savings			Varies		2119	
M46	Multi-Monitoring				0, 1, 2	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 92. 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	
R11	Keypad Torque Ref	–300.0	300.0	%	0.0	782	
R12②	Keypad Reference	Par. P1.1	Par. P1.2	Hz	0.00	141	

Table 93. Basic Parameters—P1

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P1.1②	Min Frequency	0.00	Par. P1.2	Hz	0.00	101	
P1.2②	Max Frequency	Par. P1.1	400.00	Hz	Max Freq	102	
P1.3②	Accel Time 1	0.1	3000.0	s	3.0	103	
P1.4②	Decel Time 1	0.1	3000.0	s	3.0	104	
P1.5①	Motor Nom Current	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	486	
P1.6①	Motor Nom Speed	300	20000	rpm	Motor Nom Speed	489	
P1.7①	Motor PF	0.30	1.00		0.85	490	
P1.8①	Motor Nom Voltage	180	690	V	Motor Nom Volt	487	
P1.9①	Motor Nom Frequency	8.00	400.00	Hz	Motor Nom Freq	488	
P1.10②	Local/Remote Select				0	140	0 = Hold Last 1 = Local Control 2 = Remote Control
P1.11②	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 93. 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 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
P1.14①②	Remote1 Reference				1	137	See P1.12
P1.15①	Reverse Enable				1	1679	0 = Disabled 1 = Enabled

Table 94. 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 94. 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 95. 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
P3.13 ②	PID1 Control Enable				0	550	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 95. Digital Input—P3, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P3.14 ②	PID2 Control Enable				0	553	See P3.2
P3.15 ②	Accel/Decel Time Set				0	195	See P3.2
P3.16 ②	Accel/Decel Prohibit				0	201	See P3.2
P3.17 ②	No Access To Param				0	215	See P3.2
P3.18 ②	Accel Pot Value				0	203	See P3.2
P3.19 ②	Decel Pot Value				0	204	See P3.2
P3.20 ②	Reset Pot Zero				0	216	See P3.2
P3.21 ②	Remote Control				9	196	See P3.2
P3.22 ②	Local Control				0	197	See P3.2
P3.23 ②	Remote1/2 Select				0	209	See P3.2
P3.24 ②	Second Motor Para Select				0	217	See P3.2
P3.25 ②	Bypass Start				0	218	See P3.2
P3.26 ②	DC Brake Enable				0	202	See P3.2
P3.27 ②	Smoke Mode				0	219	See P3.2
P3.28 ②	Fire Mode				0	220	See P3.2
P3.29 ②	Fire Mode Ref Select				0	221	See P3.2
P3.30 ②	PID1 Set Point Select				0	351	See P3.2
P3.31 ②	PID2 Set Point Select				0	352	See P3.2
P3.32 ②	Jog Enable				0	199	See P3.2
P3.33 ②	Start Timer 1				0	224	See P3.2
P3.34 ②	Start Timer 2				0	225	See P3.2
P3.35 ②	Start Timer 3				0	226	See P3.2
P3.36 ②	AI Ref Source Select				0	208	See P3.2
P3.37 ②	Motor Interlock 1				0	210	See P3.2
P3.38 ②	Motor Interlock 2				0	211	See P3.2
P3.39 ②	Motor Interlock 3				0	212	See P3.2
P3.40 ②	Motor Interlock 4				0	213	See P3.2
P3.41 ②	Motor Interlock 5				0	214	See P3.2
P3.42 ②	Emergency Stop				8	747	See P3.2
P3.43 ②	Bypass Overload				0	1246	See P3.2
P3.44	Fire Mode Reverse				0	2118	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 96. 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 9 = PID1 Setpoint 10 = PID1 Feedback 1 11 = PID1 Feedback 2 12 = PID1 Control Error Value 13 = PID1 Control Output 14 = PID2 Setpoint 15 = PID2 Feedback 1 16 = PID2 Feedback 2 17 = PID2 Control Error Value 18 = PID2 Control Output 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
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				1	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 97. 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 11 = PID1 Superv 12 = PID2 Superv 13 = Overheat Warning 14 = Overcurrent Regular 15 = Overvoltage Regular 16 = Undervoltage Regular 17 = 4 mA Ref Fault/Warning 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Un-Requested Rotation Direction 24 = Thermistor Fault Output 25 = Fire Mode 26 = Bypass Run 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 35 = Damper Control 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 43 = Motor 1 Control 44 = Motor 2 Control 45 = Motor 3 Control 46 = Motor 4 Control 47 = Motor 5 Control 48 = Logic Fulfilled 49 = PID1 Sleep 50 = PID2 Sleep
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 3 = Brake-on Control
P5.6 ②	Freq Limit 1 Supv Val	0.00	Par. P1.2	Hz	0.00	155	

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 97. Digital Output—P5, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P5.7 ②	Freq Limit 2 Supv				0	157	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control 4 = Brake-on/off Control
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 3 = Brake-off Control
P5.10 ②	Torque Limit Supv Val	–1000.0	1000.0	%	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	
P5.13 ②	Ext Brake Off Delay	0.0	100.0	s	0.5	163	
P5.14 ②	Ext Brake On Delay	0.0	100.0	s	1.5	164	
P5.15 ②	Temp Limit Supv				0	165	See P5.11
P5.16 ②	Temp Limit Supv Val	–10.0	75.0	°C	40.0	166	
P5.17 ②	Power Limit Supv				0	167	See P5.11
P5.18 ②	Power Limit Supv Val	0.0	200.0	%	0.0	168	
P5.19 ②	AI Supv Select				0	170	0 = AI1 1 = AI2
P5.20 ②	AI Limit Supv				0	171	See P5.11
P5.21 ②	AI Limit Supv Val	0.00	100.00	%	0.00	172	
P5.22 ②	PID1 Superv Enable				0	1346	0 = Disabled 1 = Enabled
P5.23 ②	PID1 Superv Upper Limit	Par. P10.5	Par. P10.6	Varies	0.00	1347	
P5.24 ②	PID1 Superv Lower Limit	Par. P10.5	Par. P10.6	Varies	0.00	1349	
P5.25 ②	PID1 Superv Delay	0	3000	s	0	1351	
P5.26 ②	PID2 Superv Enable				0	1408	0 = Disabled 1 = Enabled
P5.27 ②	PID2 Superv Upper Limit	Par. P11.5	Par. P11.6	Varies	0.00	1409	
P5.28 ②	PID2 Superv Lower Limit	Par. P11.5	Par. P11.6	Varies	0.00	1411	
P5.29 ②	PID2 Superv Delay	0	3000	s	0	1413	
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

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 98. Logic Function—P6

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.1 ②	Logic Function Select				0	751	0 = AND 1 = OR 2 = XOR
P6.2 ②	Logic Operation Input A				0	752	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 15 = Ext Brake Control 16 = Bypass Run 17 = At Speed 18 = Remote Control 19 = Freq Limit 1 Superv 20 = Freq Limit 2 Superv 22 = PID1 Superv 23 = PID2 Superv 24 = Overheat Warning 28 = 4 mA Ref Fault/Warning 29 = Overcurrent Regular 30 = Overvoltage Regular 31 = Undervoltage Regular 32 = Torq Limit Superv 33 = Ref Limit Superv 34 = Un-Requested Rotation Direction 35 = Thermal Fault/Warning 36 = Bypass Run 37 = Jog Speed Select 38 = Motor Therm Protection 39 = FB Digital Input 1 40 = FB Digital Input 2 41 = FB Digital Input 3 42 = FB Digital Input 4 43 = Damper Control 44 = TC1 Status 45 = TC2 Status 46 = TC3 Status 47 = In E-Stop 48 = Power Limit Superv 49 = Temp Limit Superv 50 = Analog Input Superv 51 = Motor 1 Control 52 = Motor 2 Control 53 = Motor 3 Control 54 = Motor 4 Control 55 = Motor 5 Control 56 = Logic Fulfilled

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 98. Logic Function—P6, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P6.3 ②	Logic Operation Input B				0	753	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 15 = Ext Brake Control 16 = Bypass Run 17 = At Speed 18 = Remote Control 19 = Freq Limit 1 Superv 20 = Freq Limit 2 Superv 22 = PID1 Superv 23 = PID2 Superv 24 = Overheat Warning 28 = 4 mA Ref Fault/Warning 29 = Overcurrent Regular 30 = Overvoltage Regular 31 = Undervoltage Regular 32 = Torq Limit Superv 33 = Ref Limit Superv 34 = Un-Requested Rotation Direction 35 = Thermal Fault/Warning 36 = Bypass Run 37 = Jog Speed Select 38 = Motor Therm Protection 39 = FB Digital Input 1 40 = FB Digital Input 2 41 = FB Digital Input 3 42 = FB Digital Input 4 43 = Damper Control 44 = TC1 Status 45 = TC2 Status 46 = TC3 Status 47 = In E-Stop 48 = Power Limit Superv 49 = Temp Limit Superv 50 = Analog Input Superv 51 = Motor 1 Control 52 = Motor 2 Control 53 = Motor 3 Control 54 = Motor 4 Control 55 = Motor 5 Control 56 = Logic Fulfilled

Table 99. Drive Control—P7

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.1 ②	Remote 2 Control Place				1	138	See P1.11
P7.2 ①②	Remote 2 Reference				7	139	See P1.12
P7.3 ②	Keypad Reference	Par. P1.1	Par. P1.2	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	Par. P1.1	Par. P1.2	Hz	0.00	117	

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 99. Drive Control—P7, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P7.7 ②	Motor Pot Ramp Time	0.1	2000.0	Hz/s	10.0	156	
P7.8 ②	Motor Pot Ref Reset				0	169	0 = No Reset 1 = Reset: Stop + Power Down 2 = Reset: Power Down
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	Par. P7.16	Hz	0.00	256	
P7.16 ②	Skip F1 High Limit	Par. P7.15	400.00	Hz	0.00	257	
P7.17 ②	Skip F2 Low Limit	0.00	Par. P7.18	Hz	0.00	258	
P7.18 ②	Skip F2 High Limit	Par. P7.17	400.00	Hz	0.00	259	
P7.19 ②	Skip F3 Low Limit	0.00	Par. P7.20	Hz	0.00	260	
P7.20 ②	Skip F3 High Limit	Par. P7.19	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	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 100. 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 5 = Overload Speed Control 6 = Overload Torque 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

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 100. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 Curve 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
P8.13 ②	Load Drooping	0.00	100.00	%	0.00	298	
P8.14 ②	Identification				0	299	0 = No Action 1 = Identification Only Stator Resistor 2 = Identification with Run 3 = Identification No Run
P8.15 ①②	Neg Frequency Limit	–400.00	Par. P8.16	Hz	–400.00	1574	
P8.16 ①②	Pos Frequency Limit	Par. P8.15	400.00	Hz	400.00	1576	
P8.17 ②	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585	
P8.18 ②	Speed Error Filter Time Constant	0	3000	ms	0	1591	
P8.19 ②	Speed Error Band Stop Frequency	0.00	320.00	Hz	0.00	1592	
P8.20 ②	Speed Control Kp	0.0	1000.0	%	30.0	1593	
P8.21 ②	Speed Control Ti	0.0	3200.0	ms	20.0	1594	
P8.22 ②	Speed Control Kp At Field Weakening	0.0	1000.0	%	100.0	1595	
P8.23 ②	Speed Control Kp Below F0	0.0	1000.0	%	0.0	1596	
P8.24 ②	Speed Control F0	0.00	Par. P8.25	Hz	0.00	1597	
P8.25 ②	Speed Control F1	Par. P8.24	Par. P8.5	Hz	0.00	1598	
P8.26 ②	Speed Control Kp Below T0	0.0	1000.0	%	0.0	1599	
P8.27 ②	Speed Control T0	0.0	100.0	%	0.0	1600	
P8.28 ②	Speed Control Kp Filter Time Constant	0	3000	ms	0	1601	
P8.29 ②	Motoring Torque Limit	0.0	300.0	%	300.0	1602	
P8.30 ②	Generator Torque Limit	0.0	300.0	%	300.0	1603	
P8.31 ②	Torque Limit Forward	0.0	300.0	%	300.0	1604	
P8.32 ②	Torque Limit Reverse	0.0	300.0	%	300.0	1605	
P8.33 ②	Motoring Power Limit	0.0	300.0	%	300.0	1607	
P8.34 ②	Generator Power Limit	0.0	300.0	%	300.0	1608	

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 100. Motor Control—P8, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P8.35 ②	Acc Compensation Time Constant	0.0	1000.0	%	0.0	1611	
P8.36 ②	Acc Compensation Filter Time Constant	0	3000	ms	0	1612	
P8.37 ②	Flux Reference	0.0	500.0	%	100.0	1620	
P8.38 ②	Stop State Magnetization	0.0	100.0	%	100.0	1621	
P8.39 ②	Start Boost Rise Time	–1	32000	s	0	1622	
P8.40 ②	Flux Current Ramp Time	0	32000	ms	200	1623	
P8.41 ②	Zero Speed Start Time	0	32000	ms	100	1624	
P8.42 ②	Zero Speed Stop Time	0	32000	ms	100	1625	
P8.43 ②	Droop Control Filter Time Constant	0	3000	ms	0	1630	
P8.44 ②	Startup Torque Selection				0	1631	0 = Not Used 1 = TorqueMemory 2 = TorqueReference 3 = StartupTorqueFWD/REV
P8.45 ②	Torque Memory Start	–300.0	300.0	%	0.0	1632	
P8.46 ②	Startup Torque Forward	–300.0	300.0	%	0.0	1633	
P8.47 ②	Startup Torque Reverse	–300.0	300.0	%	0.0	1634	
P8.48	Startup Torque Actual			%		1635	
P8.49 ②	Startup Torque Time	0	10000	ms	50	1667	
P8.50 ①	Stator Resistor	0.001	65.535	ohm	0.033	771	
P8.51 ①	Rotor Resistor	0.001	65.535	ohm	0.034	772	
P8.52 ①	Leak Inductance	0.001	65.535	mh	0.128	773	
P8.53 ①	Mutual Inductance	0.01	655.35	mh	3.44	774	
P8.54 ①	Excitation Current	0.1	Drive Nom CT*2	A	0.1	775	

Table 101. 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	

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 101. Protections—P9, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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	
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

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 102. PID Controller 1—P10

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.1 ②	PID1 Control Gain	0.00	200.00	%	100.00	1294	
P10.2 ②	PID1 Control ITime	0.00	600.00	s	1.00	1295	
P10.3 ②	PID1 Control DTime	0.00	100.00	s	0.00	1296	
P10.4 ①②	PID1 Process Unit				0	1297	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 = ° 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 = °F
P10.5 ②	PID1 Process Unit Min	–99999.99	99999.99	Varies	0.00	1298	
P10.6 ②	PID1 Process Unit Max	–99999.99	99999.99	Varies	100.00	1300	
P10.7 ②	PID1 Process Unit Decimal	0	4		2	1302	
P10.8 ①②	PID1 Error Inversion				0	1303	See P2.6
P10.9 ②	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304	
P10.10 ②	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306	
P10.11 ②	PID1 Keypad Set Point 1	Par. P10.5	Par. P10.6	Varies	0.00	1307	
P10.12 ②	PID1 Keypad Set Point 2	Par. P10.5	Par. P10.6	Varies	0.00	1309	
P10.13 ②	PID1 Ramp Time	0.00	300.00	s	0.00	1311	

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 102. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.14 ①②	PID1 Set Point 1 Source				1	1312	0 = Not Used 1 = PID1 Keypad Set Point 1 2 = PID1 Keypad Set Point 2 3 = AI1 4 = AI2 5 = Slot A: AI1 6 = Slot B: AI1 7 = FB Data Input 1 8 = FB Data Input 2 9 = FB Data Input 3 10 = FB Data Input 4 11 = FB Data Input 5 12 = FB Data Input 6 13 = FB Data Input 7 14 = FB Data Input 8
P10.15 ②	PID1 Set Point 1 Min	–200.00	200.00	%	0.00	1313	
P10.16 ②	PID1 Set Point 1 Max	–200.00	200.00	%	100.00	1314	
P10.17 ①②	PID1 Set Point 1 Sleep Enable				0	1315	0 = Disabled 1 = Enabled
P10.18 ②	PID1 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1316	
P10.19 ②	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317	
P10.20 ②	PID1 Set Point 1 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1318	
P10.21 ②	PID1 Set Point 1 Boost	–2.0	2.0		1.0	1320	
P10.22 ①②	PID1 Set Point 2 Source				2	1321	See P10.14
P10.23 ②	PID1 Set Point 2 Min	–200.00	200.00	%	0.00	1322	
P10.24 ②	PID1 Set Point 2 Max	–200.00	200.00	%	100.00	1323	
P10.25 ①②	PID1 Set Point 2 Sleep Enable				0	1324	0 = Disabled 1 = Enabled
P10.26 ②	PID1 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1325	
P10.27 ②	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326	
P10.28 ②	PID1 Set Point 2 Wake Up Level	Par. P10.5	Par. P10.6	Varies	0.00	1327	
P10.29 ②	PID1 Set Point 2 Boost	–2.0	2.0		1.0	1329	
P10.30 ①②	PID1 Feedback Function				0	1330	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.31 ②	PID1 Feedback Gain	–1000.0	1000.0	%	100.0	1331	

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 102. PID Controller 1—P10, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P10.32 ①②	PID1 Feedback 1 Source				1	1332	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.33 ②	PID1 Feedback 1 Min	–200.00	200.00	%	0.00	1333	
P10.34 ②	PID1 Feedback 1 Max	–200.00	200.00	%	100.00	1334	
P10.35 ①②	PID1 Feedback 2 Source				0	1335	See P10.32
P10.36 ②	PID1 Feedback 2 Min	–200.00	200.00	%	0.00	1336	
P10.37 ②	PID1 Feedback 2 Max	–200.00	200.00	%	100.00	1337	
P10.38 ①②	PID1 Feedforward Func				0	1338	0 = Source 1 1 = SQRT(Source 1) 2 = SQRT(Source 1–Source 2) 3 = SQRT(Source 1) + SQRT(Source 2) 4 = Source 1 + Source 2 5 = Source 1–Source 2 6 = MIN(Source 1,Source 2) 7 = MAX(Source 1,Source 2) 8 = MEAN(Source1,Source2)
P10.39 ②	PID1 Feedforward Gain	–1000.0	1000.0	%	100.0	1339	
P10.40 ①②	PID1 Feedforward 1 Source				0	1340	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Data Input 1 6 = FB Data Input 2 7 = FB Data Input 3 8 = FB Data Input 4 9 = FB Data Input 5 10 = FB Data Input 6 11 = FB Data Input 7 12 = FB Data Input 8
P10.41 ②	PID1 Feedforward 1 Min	–200.00	200.00	%	0.00	1341	
P10.42 ②	PID1 Feedforward 1 Max	–200.00	200.00	%	100.00	1342	
P10.43 ①②	PID1 Feedforward 2 Source				0	1343	See P10.40
P10.44 ②	PID1 Feedforward 2 Min	–200.00	200.00	%	0.00	1344	
P10.45 ②	PID1 Feedforward 2 Max	–200.00	200.00	%	100.00	1345	
P10.46 ②	PID1 Set Point 1 Comp Enable				0	1352	0 = Disabled 1 = Enabled
P10.47 ②	PID1 Set Point 1 Comp Max	–200.00	200.00	%	0.00	1353	
P10.48 ②	PID1 Set Point 2 Comp Enable				0	1354	0 = Disabled 1 = Enabled
P10.49 ②	PID1 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1355	

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 103. PID Controller 2—P11

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.1 ②	PID2 Control Gain	0.00	200.00	%	100.00	1356	
P11.2 ②	PID2 Control I Time	0.00	600.00	s	1.00	1357	
P11.3 ②	PID2 Control D Time	0.00	100.00	s	0.00	1358	
P11.4 ①②	PID2 Process Unit				0	1359	See P10.4
P11.5 ②	PID2 Process Unit Min	–99999.99	99999.99	Varies	0.00	1360	
P11.6 ②	PID2 Process Unit Max	–99999.99	99999.99	Varies	100.00	1362	
P11.7 ②	PID2 Process Unit Decimal	0	4		2	1364	
P11.8 ①②	PID2 Error Inversion				0	1365	See P2.6
P11.9 ②	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366	
P11.10 ②	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368	
P11.11 ②	PID2 Keypad Set Point 1	Par. P11.5	Par. P11.6	Varies	0.00	1369	
P11.12 ②	PID2 Keypad Set Point 2	Par. P11.5	Par. P11.6	Varies	0.00	1371	
P11.13 ②	PID2 Ramp Time	0.00	300.00	s	0.00	1373	
P11.14 ①②	PID2 Set Point 1 Source				1	1374	See P10.14
P11.15 ②	PID2 Set Point 1 Min	–200.00	200.00	%	0.00	1375	
P11.16 ②	PID2 Set Point 1 Max	–200.00	200.00	%	100.00	1376	
P11.17 ①②	PID2 Set Point 1 Sleep Enable				0	1377	0 = Disabled 1 = Enabled
P11.18 ②	PID2 Set Point 1 Sleep Freq	0.00	400.00	Hz	0.00	1378	
P11.19 ②	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379	
P11.20 ②	PID2 Set Point 1 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1380	
P11.21 ②	PID2 Set Point 1 Boost	–2.0	2.0		1.0	1382	
P11.22 ①②	PID2 Set Point 2 Source				2	1383	See P10.14
P11.23 ②	PID2 Set Point 2 Min	–200.00	200.00	%	0.00	1384	
P11.24 ②	PID2 Set Point 2 Max	–200.00	200.00	%	100.00	1385	
P11.25 ①②	PID2 Set Point 2 Sleep Enable				0	1386	0 = Disabled 1 = Enabled
P11.26 ②	PID2 Set Point 2 Sleep Freq	0.00	400.00	Hz	0.00	1387	
P11.27 ②	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388	
P11.28 ②	PID2 Set Point 2 WakeUp Level	Par. P11.5	Par. P11.6	Varies	0.00	1389	
P11.29 ②	PID2 Set Point 2 Boost	–2.0	2.0		1.0	1391	
P11.30 ①②	PID2 Feedback Func				0	1392	See P10.30
P11.31 ②	PID2 Feedback Gain	–1000.0	1000.0	%	100.0	1393	
P11.32 ①②	PID2 Feedback 1 Source				1	1394	See P10.32
P11.33 ②	PID2 Feedback 1 Min	–200.00	200.00	%	0.00	1395	
P11.34 ②	PID2 Feedback 1 Max	–200.00	200.00	%	100.00	1396	
P11.35 ①②	PID2 Feedback 2 Source				0	1397	See P10.32
P11.36 ②	PID2 Feedback 2 Min	–200.00	200.00	%	0.00	1398	
P11.37 ②	PID2 Feedback 2 Max	–200.00	200.00	%	100.00	1399	
P11.38 ①②	PID2 Feedforward Func				0	1400	See P10.38
P11.39 ②	PID2 Feedforward Gain	–1000.0	1000.0	%	100.0	1401	
P11.40 ①②	PID2 Feedforward 1 Source				0	1402	See P10.40
P11.41 ②	PID2 Feedforward 1 Min	–200.00	200.00	%	0.00	1403	

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 103. PID Controller 2—P11, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P11.42 ②	PID2 Feedforward 1 Max	–200.00	200.00	%	100.00	1404	
P11.43 ①②	PID2 Feedforward 2 Source				0	1405	See P10.40
P11.44 ②	PID2 Feedforward 2 Min	–200.00	200.00	%	0.00	1406	
P11.45 ②	PID2 Feedforward 2 Max	–200.00	200.00	%	100.00	1407	
P11.46 ②	PID2 Set Point1 Comp Enable				0	1414	0 = Disabled 1 = Enabled
P11.47 ②	PID2 Set Point1 Comp Max	–200.00	200.00	%	0.00	1415	
P11.48 ②	PID2 Set Point 2 Comp Enable				0	1416	0 = Disabled 1 = Enabled
P11.49 ②	PID2 Set Point 2 Comp Max	–200.00	200.00	%	0.00	1417	

Table 104. 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 105. Torque Control—P13

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.1 ②	Torque Limit	0.0	400.0	%	400.0	295	
P13.2 ②	Torque Limit Control P	0.00	320.00		30.00	296	
P13.3 ②	Torque Limit Control I	0.00	320.00		2.00	297	
P13.4 ②	Torque Ref Select				0	303	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = AI1 Joystick 6 = AI2 Joystick 7 = Keypad Torque Ref 8 = FB Data Input 1
P13.5	Keypad Torque Ref	–300.0	300.0	%	0.0	782	
P13.6 ②	Torque Ref Max	–300.0	300.0	%	100.0	304	
P13.7 ②	Torque Ref Min	–300.0	300.0	%	0.0	305	
P13.8 ②	Torque Control Freq Min	0.00	Par. P1.2	Hz	3.00	300	
P13.9 ②	OL Torque Control P	0.00	320.00		1.50	301	
P13.10 ②	OL Torque Control I	0.00	320.00		1.00	302	
P13.11 ②	Torque Control Freq Max				0	1666	0 = Max Frequency 1 = Selected Freq. Ref 2 = Preset Speed 7
P13.12 ②	Window Pos Width	0.00	50.00	Hz	2.00	1636	
P13.13 ②	Window Neg Width	0.00	50.00	Hz	2.00	1637	
P13.14 ②	Window Pos Off Limit	0.00	Par. P13.12	Hz	0.00	1638	

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 105. Torque Control—P13, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P13.15 ②	WindowNeg Off Limit	0.00	Par. P13.13	Hz	0.00	1639	
P13.16 ②	Torque Reference Filter TC	0	32000	ms	0	1640	
P13.17	Pull Out Torque	0	1000.0	%	250.0	1606	
P13.18	Startup Torque Time	0	10000	ms	50	1667	
P13.19	Stop State Magnetization Time	0	32000	S	0	1684	

Table 106. 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	

Table 107. Fire Mode—P15

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P15.1 ①②	Fire Mode Function				0	535	0 = Closing Contact 1 = Opening Contact
P15.2 ①②	Fire Mode Ref Select Function				0	536	0 = Disabled 1 = Enabled
P15.3 ②	Fire Mode Min Frequency	Par. P1.1	Par. P1.2	Hz	15.00	537	
P15.4 ②	Fire Mode Freq Ref 1	0.0	100.0	%	75.0	565	
P15.5 ②	Fire Mode Freq Ref 2	0.0	100.0	%	100.0	564	
P15.6 ①②	Smoke Purge Frequency	0.0	100.0	%	50.0	554	

Table 108. Second Motor Parameter—P16

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.1 ①	Motor Nom Current 2	Drive Nom CT*1/10	Drive Nom CT*2	A	Drive Nom CT	577	
P16.2 ①	Motor Nom Speed 2	300	20000	rpm	2nd Motor Nom Speed	578	
P16.3 ①	Motor PF 2	0.30	1.00		0.85	579	
P16.4 ①	Motor Nom Volt 2	180	690	V	2nd Motor Nom Volt	580	
P16.5 ①	Motor Nom Freq 2	8.00	400.00	Hz	2nd Motor Nom Freq	581	
P16.6 ①	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	
P16.7 ①	Rotor Resistor 2	0.001	65.535	ohm	0.034	1420	

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 108. Second Motor Parameter—P16, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P16.8 ①	Leak Inductance 2	0.001	65.535	mh	0.128	1421	
P16.9 ①	Mutual Inductance 2	0.01	655.35	mh	3.44	1422	
P16.10 ①	Excitation Current 2	0.1	Drive Nom CT*2	A	0.1	1423	

Table 109. Bypass—P17

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P17.1 ①②	Bypass Enable				0	1418	0 = Disabled 1 = Enabled
P17.2 ①②	Bypass Start Delay	1	32765	s	5	544	
P17.3 ①②	Auto Bypass				0	542	0 = Disabled 1 = Enabled
P17.4 ①②	Auto Bypass Delay	0	32765	s	10	543	
P17.5 ①②	Overcurrent Bypass Enable				0	547	0 = Disabled 1 = Enabled
P17.6 ①②	IGBT Fault Bypass Enable				0	546	0 = Disabled 1 = Enabled
P17.7 ①②	4 mA Fault Bypass Enable				0	548	0 = Disabled 1 = Enabled
P17.8 ①②	Undervoltage Bypass Enable				0	545	0 = Disabled 1 = Enabled
P17.9 ①②	Overvoltage Bypass Enable				0	549	0 = Disabled 1 = Enabled

Table 110. Multi-Pump Control—P18

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P18.1 ①②	Number of Motors	1	5		1	342	
P18.2 ②	Bandwidth	0.0	100.0	%	10.0	343	
P18.3 ②	Bandwidth Delay	0	3600	s	10	344	
P18.4 ②	Interlock Enable				1	350	0 = Disabled 1 = Enabled
P18.5 ②	Include Freq Converter				1	346	0 = Disabled 1 = Enabled
P18.6 ②	Auto-Change Enable				0	345	0 = Disabled 1 = Enabled
P18.7 ②	Auto-Change Interval	0.0	3000.0	h	48.0	347	
P18.8 ②	Auto-Change Freq Limit	Par. P1.1	Par. P1.2	Hz	25.00	349	
P18.9 ②	Auto-Change Motor Limit	0	5		1	348	
P18.10 ①②	Damper Start				0	483	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P18.11 ①②	Damper Time Out	1	32500	s	5	484	
P18.12 ①②	Damper Delay	1	32500	s	5	485	

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 111. Real Time Clock—P19

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
P19.1 ②	Interval 1 On Time				0,0,0	491	
P19.2 ②	Interval 1 Off Time				0,0,0	493	
P19.3 ②	Interval 1 From Day				0	517	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P19.4 ②	Interval 1 To Day				0	518	See P19.3
P19.5 ②	Interval 1 Channel				0	519	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.6 ②	Interval 2 On Time				0,0,0	495	
P19.7 ②	Interval 2 Off Time				0,0,0	497	
P19.8 ②	Interval 2 From Day				0	520	See P19.3
P19.9 ②	Interval 2 To Day				0	521	See P19.3
P19.10 ②	Interval 2 Channel				0	522	See P19.5
P19.11 ②	Interval 3 On Time				0,0,0	499	
P19.12 ②	Interval 3 Off Time				0,0,0	501	
P19.13 ②	Interval 3 From Day				0	523	See P19.3
P19.14 ②	Interval 3 To Day				0	524	See P19.3
P19.15 ②	Interval 3 Channel				0	525	See P19.5
P19.16 ②	Interval 4 On Time				0,0,0	503	
P19.17 ②	Interval 4 Off Time				0,0,0	505	
P19.18 ②	Interval 4 From Day				0	526	See P19.3
P19.19 ②	Interval 4 To Day				0	527	See P19.3
P19.20 ②	Interval 4 Channel				0	528	See P19.5
P19.21 ②	Interval 5 On Time				0,0,0	507	
P19.22 ②	Interval 5 Off Time				0,0,0	509	
P19.23 ②	Interval 5 From Day				0	529	See P19.3
P19.24 ②	Interval 5 To Day				0	530	See P19.3
P19.25 ②	Interval 5 Channel				0	531	See P19.5
P19.26 ②	Timer 1 Duration	0	72000	s	0	511	
P19.27 ②	Timer 1 Channel				0	532	0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P19.28 ②	Timer 2 Duration	0	72000	s	0	513	
P19.29 ②	Timer 2 Channel				0	533	See P19.27
P19.30 ②	Timer 3 Duration	0	72000	s	0	515	
P19.31 ②	Timer 3 Channel				0	534	See P19.27

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 112. 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 113. Modbus RTU—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 = 57600 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	

Table 114. Modbus MS/TCP—P20.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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

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 115. 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
Note: Codes P20.3.15–P20.3.17 are for Modbus TCP.							
P20.3.15	Parity Error				0	614	
P20.3.16	Slave Failure				0	615	
P20.3.17	Last Fault Response				0	616	

Table 116. 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
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

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 116. Basic Setting—P21.1, continued

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
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 117. 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 118. 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	

Table 119. 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.

Appendix A—Description of Parameters

On the following pages you will find the parameter descriptions arranged according to the parameter number.

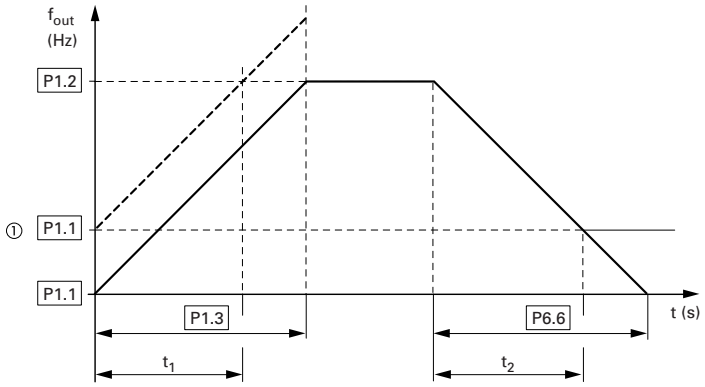
Some parameter names are followed by a number code indicating the applications in which the parameter is included. See the list of applications below. The parameter numbers under which the parameter appears in different applications are also given.

Application Level

1 Standard Application
2 Multi-Pump and Fan Application
3 Multi-PID Application
4 Multi-Purpose Application

Code	Modbus ID	Parameter	Application	RO/RW
P1.1	**101**	**Min Frequency**	**1, 2, 3, 4**	RW
P1.2	**102**	**Max Frequency** These define the frequency limits of the frequency converter. The maximum value for these parameters is 400 Hz.	**1, 2, 3, 4**	RW
P1.3	**103**	**Accel Time 1** The time required for the output frequency to accelerate from zero frequency to Max frequency (P1.2).	**1, 2, 3, 4**	RW
P1.4	**104**	**Decel Time 1** The time required for the output frequency to decelerate from Max frequency (P1.2) to zero frequency.	**1, 2, 3, 4**	RW

Figure 35. Acceleration and Deceleration Time



The values for the acceleration time t_1 and the deceleration time t_2 are calculated as follows:

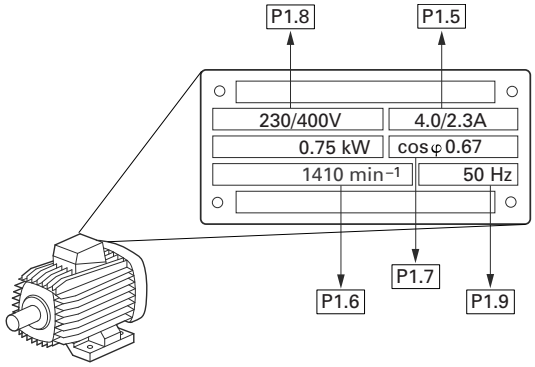
$$t_1 = \frac{(P1.2–P1.1) \times P1.3}{P1.2} \qquad t_2 = \frac{(P1.2–P1.1) \times P1.4}{P1.2}$$

The defined acceleration (P1.3) and deceleration times (P1.4) apply for all changes to the frequency setpoint value.

If the start-release (FWD, REV) is switched off, the output frequency (f_{Out}) is immediately set to zero. The motor runs down uncontrolled.

If a controlled run-down is requested (with value from P1.4), parameter P7.10 must be 1.

① When setting a minimum output frequency (P1.4 greater than 0 Hz), the acceleration and deceleration time of the drive is reduced to t_1 or t_2.

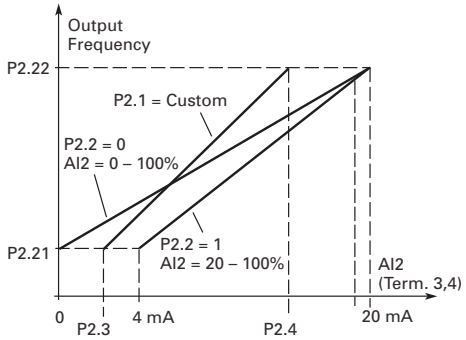
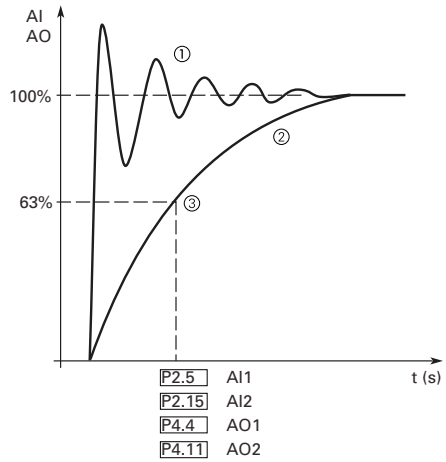
Code	Modbus ID	Parameter	Application	RO/RW
P1.5	**486**	**Motor Nom Current** Motor nominal nameplate full load current. Find this value on the rating plate of the motor. **Figure 36. Motor Parameters from Ratings Plate** 	**1, 2, 3, 4**	RW
P1.6	**489**	**Motor Nom Speed** Motor nominal nameplate base speed. Find this value on the rating plate of the motor.	**1, 2, 3, 4**	RW
P1.7	**490**	**Motor PF** Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.	**1, 2, 3, 4**	RW
P1.8	**487**	**Motor Nom Voltage** Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.	**1, 2, 3, 4**	RW
P1.9	**488**	**Motor Nom Frequency** Motor nominal nameplate base frequency. Find this value on the rating plate of the motor. This parameter sets the Field Weakening Point (P8.4) to the same value.	**1, 2, 3, 4**	RW
P1.10	**140**	**Local/Remote Select** This parameter determines the control source. There are two different places from which the frequency converter can be controlled: Local, Remote, or it will hold last place on power cycle. The active control place can also be changed by pressing the LOC/REM button on the keypad, using a programed digital input, or this parameter. Local control means keypad. Remote control can be a remote control panel or communication bus. With remote there are two different control places, remote1 and remote2, which can be selected based on a digital input setting. For each control place, the actual control source is selected with this parameter; a different symbol will appear on the alphanumeric display.	**1, 2, 3, 4**	RW
P1.11	**135**	**Remote1 Control Place** Selects where the drive will look for the start command. I/O terminals would be from the digital hardwired inputs. Fieldbus would be a communication bus. Keypad display will indicate which mode is selected.	**1, 2, 3, 4**	RW
P1.12	**1695**	**Local Control Place** Selects where the drive will look for the start command. I/O terminals would be from the digital hardwired inputs or keypad Start/Stop buttons. Keypad display will indicate which mode is selected.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P1.13	136	**Local Reference** This parameter determines the reference for Local control mode.	1, 2, 3, 4	RW

Application—Selection	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = AI1—analog input on terminals 2–3	■	■	■	■
1 = AI2—analog input on terminals 4–5	■	■	■	■
2 = Slot A: AI1—analog input on expander board in slot A	■	■	■	■
3 = Slot B: AI1—analog input on expander board in slot B	■	■	■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control	■	■	■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control	■	■	■	■
6 = Keypad—keypad reference (P1.7.3)	■	■	■	■
7 = Fieldbus Ref—reference sent of communication bus	■	■	■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed	—	—	—	■
9 = Max Frequency—maximum frequency value (P1.1.2)	■	■	■	■
10 = AI1+AI2—sums the analog input values	■	■	■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2	■	■	■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1	■	■	■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2	■	■	■	■
14 = AI1 or AI2—selects analog inputs based off of digital input	■	■	■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value	■	■	■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value	■	■	■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value	—	■	■	■

Code	Modbus ID	Parameter	Application	RO/RW
P1.14	137	**Remote1 Ref** This parameter determines the reference for Remote1 control mode.	1, 2, 3, 4	RW

Application—Selection	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = AI1—analog input on terminals 2–3	■	■	■	■
1 = AI2—analog input on terminals 4–5	■	■	■	■
2 = Slot A: AI1—analog input on expander board in slot A	■	■	■	■
3 = Slot B: AI1—analog input on expander board in slot B	■	■	■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control	■	■	■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control	■	■	■	■
6 = Keypad—keypad reference (P1.7.3)	■	■	■	■
7 = Fieldbus Ref—reference sent of communication bus	■	■	■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed	—	—	—	■
9 = Max Frequency—maximum frequency value (P1.1.2)	■	■	■	■
10 = AI1+AI2—sums the analog input values	■	■	■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2	■	■	■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1	■	■	■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2	■	■	■	■
14 = AI1 or AI2—selects analog inputs based off of digital input	■	■	■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value	■	■	■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value	■	■	■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value	—	■	■	■

Code	Modbus ID	Parameter	Application	RO/RW
P1.15	**1679**	**Reverse Enable** Enables or disables the reverse motor direction.	**1, 2, 3, 4**	RW
P2.1	**222**	**AI1 Mode** Selects the analog input mode for AI1 terminals 2 and 3 for current or voltage, also need to set DIP switches on control board.	**1, 2, 3, 4**	RW
P2.2	**175**	**AI1 Signal Range** With this parameter you can select the analog input 1 signal range. For selection "Customized," see P2.3 and P2.4. **Figure 37. Analog Input AI Scaling**  	**1, 2, 3, 4**	RW
P2.3	**176**	**AI1 Custom Min**	**1, 2, 3, 4**	RW
P2.4	**177**	**AI1 Custom Max** These parameters set the analog input signal for any input signal span within 0–100%. AI1 Custom Min <= AI1 Custom Max.	**1, 2, 3, 4**	RW
P2.5	**174**	**AI1 Filter Time** When this parameter is given a value greater than 0, the function that filters out disturbances from the incoming analog signal is activated. A long filtering time makes the regulation response slower. **Figure 38. AI1 Signal Filtering**  ***Notes*** ① Analog signal with faults (unfiltered). ② Filtered analog signal. ③ Filter time constant at 63% of the set value.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.6	**181**	**AI1 Signal Invert**	**1, 2, 3, 4**	RW

Inverts the reference signal. Maximum reference becomes minimum frequency and minimum reference becomes maximum frequency.

If this parameter = 0, no inversion of analog V_{in} signal takes place.

If this parameter = 1, inversion of analog signal takes place.

Figure 39. AI1 No Signal Inversion

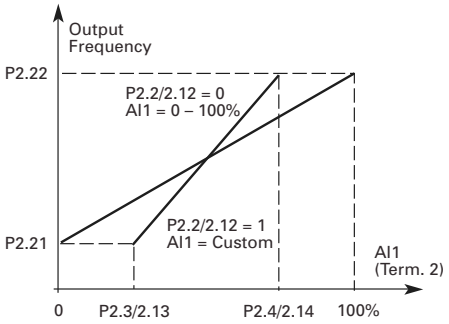
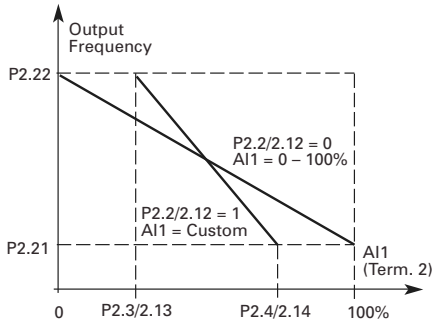
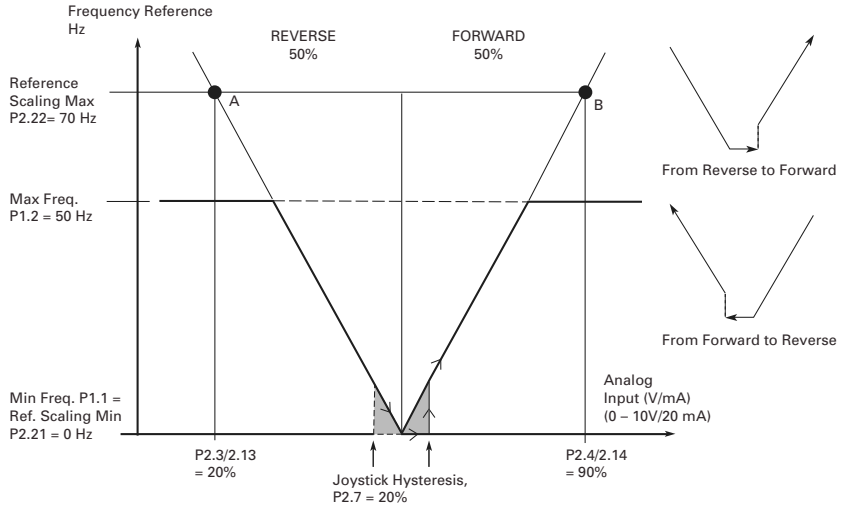
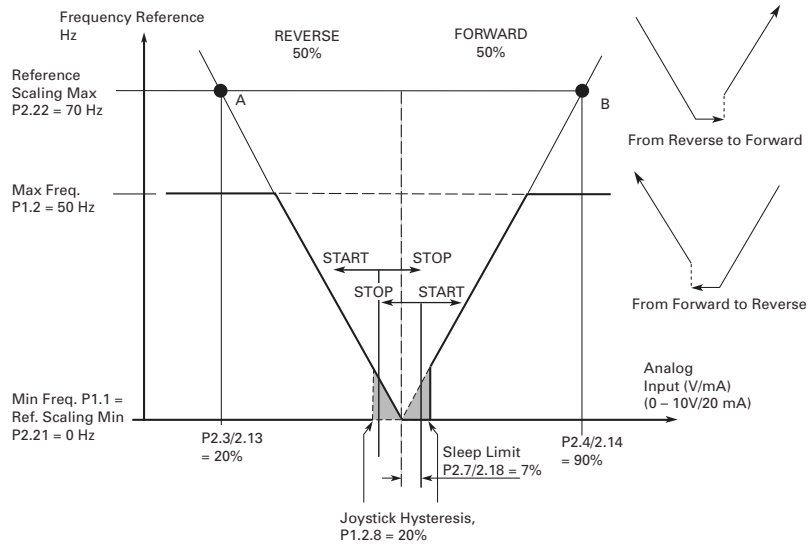


Figure 40. AI1 Signal Inversion



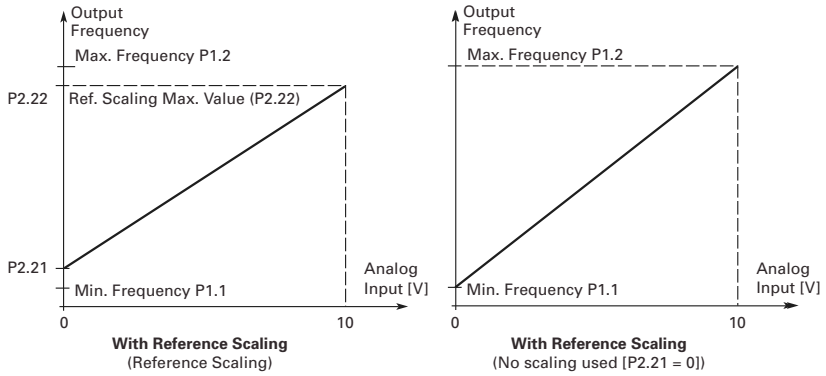
Maximum AI1 signal = minimum set speed.

Minimum AI1 signal = maximum set speed.

Code	Modbus ID	Parameter	Application	RO/RW
P2.7	**178**	**AI1 Joystick Hyst** This parameter defines the joystick hysteresis between 0 and 20%. When the joystick is turned from reverse to forward, the output frequency falls linearly to the selected minimum frequency (joystick in middle position) and stays there until the joystick is turned toward the forward command. How much the joystick must be turned to start the increase of the frequency toward the selected maximum frequency is dependent on the amount of joystick hysteresis defined with this parameter. If the value of this parameter is 0, the frequency starts to increase linearly immediately when the joystick is turned toward the forward command from the middle position. When the control is changed from forward to reverse, the frequency follows the same pattern the other way around. See **Figure 41**. **Figure 41. Example of Joystick Hysteresis**  In this example, the value of P1.2.9 (Sleep limit) =0.	**1, 2, 3, 4**	RW
P2.8	**179**	**AI1 Sleep Limit** The frequency converter keeps on output min frequency if the AI signal level falls below the Sleep limit defined within this parameter. This will allow the output to be shut off after the sleep delay until converter AI signal level rises again. **Figure 42. Example of Sleep Limit Function**  	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P2.9	**180**	**AI1 Sleep Delay** This parameter defines that the time the analog input signal has to stay under the Sleep limit determined with parameter P2.9 in order to make the frequency converter output min frequency.	**1, 2, 3, 4**	RW
P2.10	**133**	**AI1 Joystick Offset** The frequency zero point is the middle of AI range. Joystick offset means how much the zero point is moved in the forward or reverse direction.	**1, 2, 3, 4**	RW
P2.11	**223**	**AI2 Mode** Selects the analog input mode for AI2 terminal 4 and 5 for current or voltage, also need to set DIP switches on control board.	**1, 2, 3, 4**	RW
P2.12	**183**	**AI2 Signal Range**	**1,2,3,4**	RW
P2.13	**184**	**AI2 Custom Min**	**1, 2, 3, 4**	RW
P2.14	**185**	**AI2 Custom Max**	**1, 2, 3, 4**	RW
P2.15	**182**	**AI2 Filter Time**	**1, 2, 3, 4**	RW
P2.16	**189**	**AI2 Signal Invert**	**1, 2, 3, 4**	RW
P2.17	**186**	**AI2 Joystick Hyst**	**1, 2, 3, 4**	RW
P2.18	**187**	**AI2 Sleep Limit**	**1, 2, 3, 4**	RW
P2.19	**188**	**AI2 Sleep Delay**	**1, 2, 3, 4**	RW
P2.20	**134**	**AI2 Joystick Offset** See AI1 parameters.	**1, 2, 3, 4**	RW
P2.21	**144**	**AI Ref Scale Min Value**	**1, 2, 3, 4**	RW
P2.22	**145**	**AI Ref Scale Max Value** 0.00 <= P2.21 <= P2.22 <= 400.00. With values set at 0 scaling will follow the minimum and maximum frequency values.	**1, 2, 3, 4**	RW

Figure 43. With and Without Reference Scaling

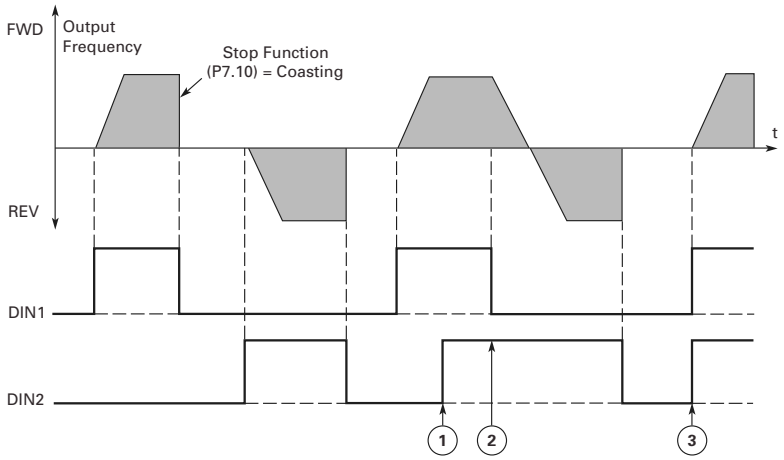


Code	Modbus ID	Parameter	Application	RO/RW
P3.1	**143**	**Start/Stop Logic**	**1, 2, 3, 4**	RW

For the DI function, we use Terminal programming method to function (TTF), where there is a fixed input or output to define a certain function for.

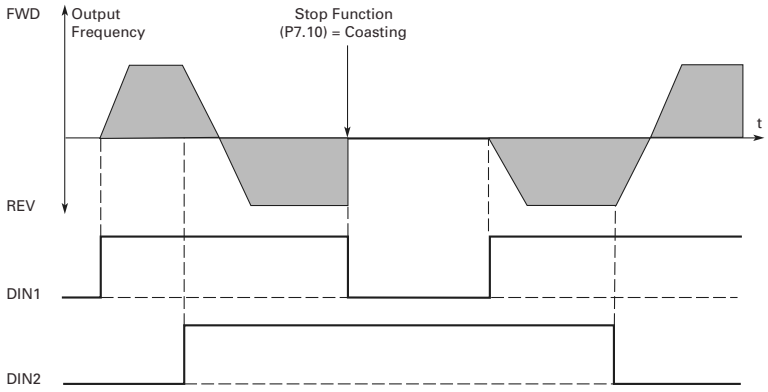
0 P3.2: DI closed contact = start forward P3.3: DI closed contact = start reverse

Figure 44. Start Forward / Start Reverse



1 P3.2: DI closed contact = start /open contact = stop P3.3: DI closed contact = reverse / open contact = forward

Figure 45. Start, Stop and Reverse

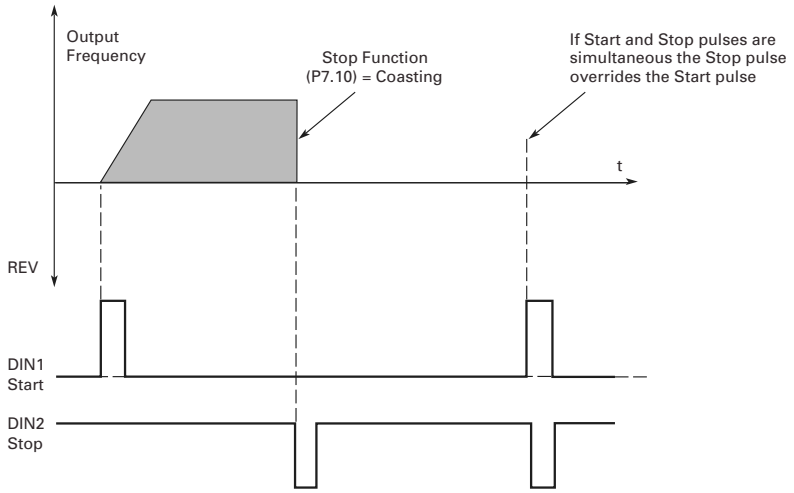


Notes

① The first selected direction has the highest priority.

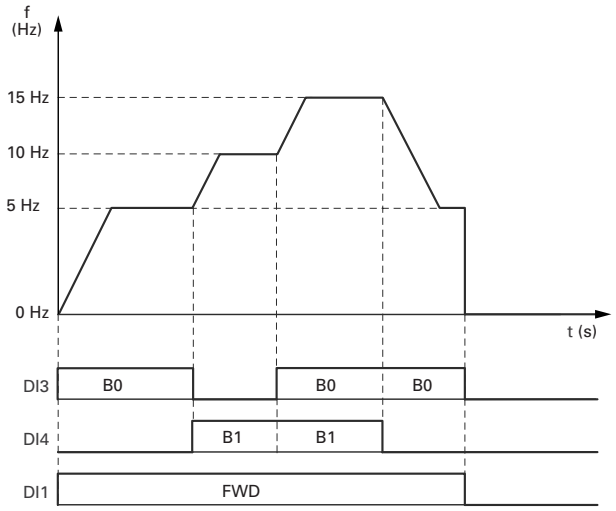
② When the DIN1 contact opens the direction of rotation starts to change.

③ If Start forward (DIN1) and Start reverse (DIN2) signals are active simultaneously the Start forward signal (DIN1) has priority.

Code	Modbus ID	Parameter	Application	RO/RW
P3.1	**143**	**2** P3.2: DI closed contact = start / open contact = stop P3.3: DI closed contact = start enabled / open contact = start disabled and drive stopped if running Motor direction keeps forward **3** Three-wire connection (pulse control): P3.2: DI changes from open to closed = start pulse P3.3: DI changes from closed to open = stop pulse P3.5: DI closed contact = reverse/ open contact = forward **Figure 46. Start Pulse / Stop Pulse** 	1, 2, 3, 4	RW
P3.2	**190**	**Start Signal 1** Signal selection 1 for the start/stop logic. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X.	**1, 2, 3, 4**	RW
P3.3	**191**	**Start Signal 2** Signal selection 2 for the start/stop logic. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X.	**1, 2, 3, 4**	RW
P3.4	**881**	**Thermistor Input Sel** This parameter defines DIN7, and DIN8 is digital input or thermistor input.	**1, 2, 3, 4**	RW
P3.5	**198**	**Reverse** Allows for switching the direction of the motor when using 3 wire start/stop logic. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Contact Open = Forward direction. Contact Close = Reverse direction.	**1, 2, 3, 4**	RW
P3.6	**192**	**Ext. Fault Close** Allows for external input causing drive to fault. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact = external fault. Open contact = no external fault.	**1, 2, 3, 4**	RW
P3.7	**193**	**Ext. Fault Open** Allows for external input causing drive to fault. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact = no external fault. Open contact = external fault.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.8	**200**	**Fault Reset** Allows for external fault reset input. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. DI change from open contact to closed contact: reset fault.	**1, 2, 3, 4**	RW
P3.9	**194**	**Run Enable** Allows for safety start input that is required along with start command for frequency converter to turn on output. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact = Start of motor enabled. Open contact = Start of motor disabled.	**1, 2, 3, 4**	RW
P3.10	**205**	**Preset Speed B0**	**1, 2, 3, 4**	RW
P3.11	**206**	**Preset Speed B1**	**1, 2, 3, 4**	RW
P3.12	**207**	**Preset Speed B2** Preset bit select inputs to select preset speed reference values. Validating three digital inputs will allow for seven preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X.	**1, 2, 3, 4**	RW

Figure 47. Activation of Fixed Frequencies



Fixed Frequency

Input (Binary)			Fixed Frequency
B0	B1	B2	(Factory setting)
X	—	—	Preset Speed 1, P12.1 = 5 Hz
—	X	—	Preset Speed 2, P12.2 = 10 Hz
X	X	—	Preset Speed 3, P12.3 = 15 Hz
—	—	X	Preset Speed 4, P12.4 = 20 Hz
X	—	X	Preset Speed 5, P12.5 = 25 Hz
—	X	X	Preset Speed 6, P12.6 = 30 Hz
X	X	X	Preset Speed 7, P12.7 = 35 Hz

Code	Modbus ID	Parameter	Application	RO/RW
P3.13	**550**	**PID1 Control Enable** Allows for activating PID1 control mode when it is not set as a reference P1.1.19 or P1.1.20. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Contact Close: Enables PID 1 control mode.	**2, 3, 4**	RW
P3.14	**553**	**PID2 Control Enable** Allows for activating PID2 control mode. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Contact Close: Enables PID 2 control mode.	**3, 4**	RW
P3.15	**195**	**Accel/Decel Time Set** Selects between accel/decel time 1 and accel/decel time 2. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact = 2nd set of acc/dec time applied. Open contact = 1st set of acc/dec time applied.	**1, 2, 3, 4**	RW
P3.16	**201**	**Accel/Decel Prohibit** Disables the ability to change speed. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive output frequency cannot rise or fall, it keeps on current output.	**1, 2, 3, 4**	RW
P3.17	**215**	**No Access To Param** Locks out the ability to change parameters. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: all writable parameters cannot be edited.	**1, 2, 3, 4**	RW
P3.18	**203**	**Accel Pot Value** Motor Potentiometer increases reference value till contact opens. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value keeps on rising.	**4**	RW
P3.19	**204**	**Decel Pot Value** Motor Potentiometer decreases reference value till contact opens. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value keeps on falling.	**4**	RW
P3.20	**216**	**Reset Pot Zero** Sets Motor Potentiometer reference value to zero till contact opens. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Potentiometer value reset to zero.	**4**	RW
P3.21	**196**	**Remote Control** Selection allows for external control panel to control frequency converters control place. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed Contact: force to remote control.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.22	**197**	**Local Control** Selection allows for external control panel to control frequency converters control place. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: force to local control.	**1, 2, 3, 4**	RW
P3.23	**209**	**Remote1/2 Select** Selection allows for switching between Remote control 1 and control 2. Different settings: DigiIN:X indicates on-board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot. DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control.	**1, 2, 3, 4**	RW
P3.24	**217**	**Second Motor Para Select** Selection allows for switching between motor parameter set 1 and set 2. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: the 2nd motor parameters are applied.	**2, 3, 4**	RW
P3.25	**218**	**Bypass Start** Selection allows for switching between bypass and drive modes. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: switch to bypass. Open contact: switch to drive.	**2, 3, 4**	RW
P3.26	**202**	**DC Brake Enable** Selection enables DC brake on a closed contact. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: DC brake function is enabled.	**1, 2, 3, 4**	RW
P3.27	**219**	**Smoke Mode** Selection enables the smoke purge preset. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive is in smoke purge mode.	**2, 3, 4**	RW
P3.28	**220**	**Fire Mode** Selection enables drive into fire mode where faults will be ignored and preset speeds are given for reference. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive is in fire mode. Ignores all the faults.	**2, 3, 4**	RW
P3.29	**221**	**Fire Mode Ref Select** Selection allows for switching between fire mode speed reference 1 and reference 2. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive output reference frequency selection 2.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P3.30	**351**	**PID1 Set Point Sel**	**2, 3, 4**	RW
P3.31	**352**	**PID2 Set Point Sel** Selection allows for selecting between Setpoint 1 and Setpoint 2 when in the PID control mode. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: setpoint2 is selected for PID1. Open contact: setpoint1 is selected for PID1.	**3, 4**	RW
P3.32	**199**	**Jog Enable** Selection enables the jog frequency reference. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: drive is under jog mode.	**1, 2, 3, 4**	RW
P3.33	**224**	**Start Timer 1**	**2, 3, 4**	RW
P3.34	**225**	**Start Timer 2**	**2, 3, 4**	RW
P3.35	**226**	**Start Timer 3** Selection enables the timer functions to begin counting. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: Timer1,Timer2 or Timer3 will be started.	**2, 3, 4**	RW
P3.36	**208**	**AI Ref Source Select** Selection switches between AI1 and AI2 reference signals. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	**1, 2, 3, 4**	RW
P3.37	**210**	**Motor Interlock 1**	**2, 3, 4**	RW
P3.38	**211**	**Motor Interlock 2**	**2, 3, 4**	RW
P3.39	**212**	**Motor Interlock 3**	**2, 3, 4**	RW
P3.40	**213**	**Motor Interlock 4**	**2, 3, 4**	RW
P3.41	**214**	**Motor Interlock 5** Selects inputs that are allowed to verify aux motors are connected to allow them to run. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	**2, 3, 4**	RW
P3.42	**747**	**Emergency Stop** Function disables the frequency converter from running the motor. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Contact Open: Disables the ability for the motor to Run. Contact Close: Enables the ability for the motor to Run.	**1, 2, 3, 4**	RW
P3.43	**1246**	**BypassOverLoad** Function faults frequency converter when using an overload block input. Different settings: DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, or Timer Channel X. Closed contact: motor is over load in bypass. Use TTF method to realize the above functions.	**2, 3, 4**	RW

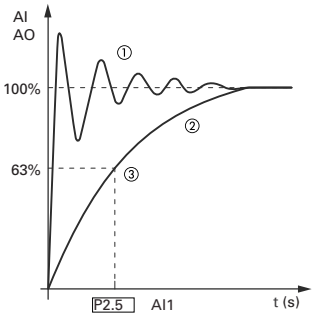
Code	Modbus ID	Parameter	Application	RO/RW
P3.44	**2118**	**Fire Mode Reverse** Function allows motor to run in reverse when in fire mode. Different settings: DigiIN:X indicates on-board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot and DigiIN:B:IOX:X indicates optional board inputs in B slot or Timer Channel X.	**2, 3, 4**	RW
P4.1	**227**	**AO1 Mode** Selects the analog output mode for AO1 current or voltage.	**1, 2, 3, 4**	RW
P4.2	**146**	**AO1 Function** Selects the desired function for the AO1 terminal 22.	**1, 2, 3, 4**	RW

Application—Function	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = Not used—no function	■	■	■	■
1 = O/P Frequency—frequency output to motor (0–F_{max})	■	■	■	■
2 = Frequency Ref—reference frequency (F_{min}–F_{max})	■	■	■	■
3 = Motor Speed—motor speed (0–Motor Nominal Speed)	■	■	■	■
4 = Motor Current—output motor current (0–$I_n$motor)	■	■	■	■
5 = Motor Torque—motor torque (0–$T_n$motor)	■	■	■	■
6 = Motor Power—calculated motor power (0–$P_n$motor)	■	■	■	■
7 = Motor Voltage—output motor voltage (0–$U_n$motor)	■	■	■	■
8 = DC Bus Voltage—DC bus voltage level (0–1000V)	■	■	■	■
9 = PID1 Setpoint—PID setpoint value (setpoint min–setpoint max)	—	■	—	■
10 = PID1 Feedback1—PID actual value 1 (feedback1 min–feedback1 max)	—	■	—	■
11 = PID1 Feedback2—PID actual 2 value (feedback2 min–feedback2 max)	—	■	—	■
12 = PID1 Control Error Value—PID error value	—	■	—	■
13 = PID1 Control O/P—PID controller output	—	■	—	■
14 = PID2 Setpoint—PID setpoint value (setpoint min–setpoint max)	—	—	■	■
15 = PID2 Feedback1—PID actual value 1 (feedback1 min–feedback1 max)	—	—	■	■
16 = PID2 Feedback2—PID actual 2 value (feedback2 min–feedback2 max)	—	—	■	■
17 = PID2 Control Error Value—PID error value	—	—	■	■
18 = PID2 Control O/P—PID controller output	—	—	■	■
19 = AI1—Analog input 1	■	■	■	■
20 = AI2—Analog input 2	■	■	■	■
21 = O/P Frequency—Output frequency (–2 to +2x nominal frequency)	■	■	■	■
22 = Motor Torque—Motor output torque (–2 to +2x $T_n$motor)	■	■	■	■
23 = Motor Power—Motor calculated power (–2 to +2x $P_n$motor)	■	■	■	■
24 = PT100 Temp—Thermistor input temperature	■	■	■	■

P4.3	**149**	**AO1 Minimum** Defines the signal minimum to be either 0 mA or 4 mA (AO1 mode = 0–20 mA); 0V or 2V (AO1 mode = 0–10V). Note the difference in analog output scaling in ID311 (**Figure 39**). **0** Set minimum value to 0V/0 mA **1** Set minimum value to 2V/4 mA	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P4.4	**147**	**AO1 Filter Time** Defines the filtering time for the analog output signal. Setting this parameter value to 0.00 will deactivate filtering.	**1, 2, 3, 4**	RW

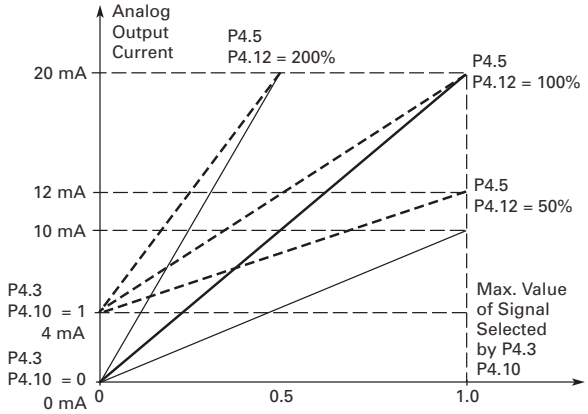
Figure 48. Analog Output Filtering



Notes
① Analog signal with faults (unfiltered).
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

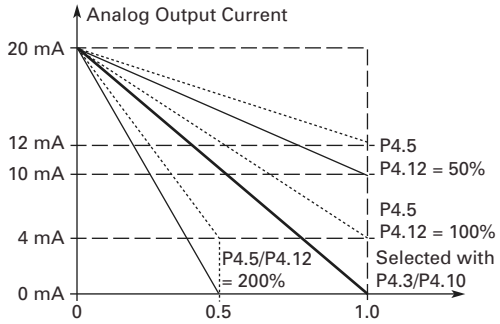
P4.5	**150**	**AO1 Scale** Scaling factor for analog output.	**1, 2, 3, 4**	RW

Figure 49. Analog Output Scaling



P4.6	**148**	**AO1 Inversion** Inverts the analog output signal: Maximum output signal = Minimum set value. Minimum output signal = Maximum set value.	**1, 2, 3, 4**	RW

Figure 50. Analog Output Invert



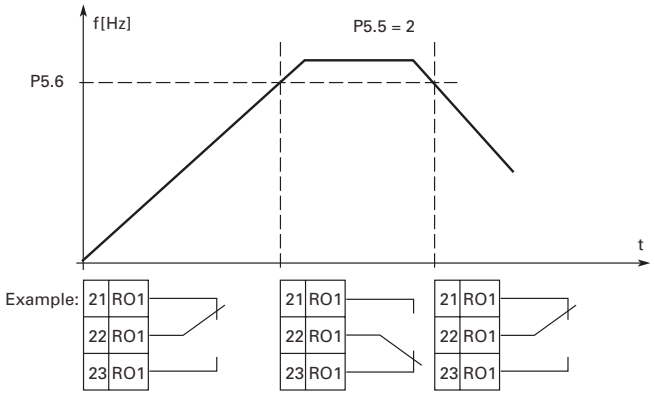
Code	Modbus ID	Parameter	Application	RO/RW
P4.7	**375**	**AO1 Offset** Add –100.0 to 100.0% to the analog output.	**1, 2, 3, 4**	RW
P4.8	**228**	**AO2 Mode** Selects the analog output mode for AO2 current or voltage.	**1, 2, 3, 4**	RW
P4.9	**229**	**AO2 Function** Selects the desired function for the AO1 terminal 24, see P4.2 for settings.	**1, 2, 3, 4**	RW
P4.10	**232**	**AO2 Minimum**	**1, 2, 3, 4**	RW
P4.11	**230**	**AO2 Filter Time**	**1, 2, 3, 4**	RW
P4.12	**233**	**AO2 Scale**	**1, 2, 3, 4**	RW
P4.13	**231**	**AO2 Inversion**	**1, 2, 3, 4**	RW
P4.14	**234**	**AO2 Offset** See AO1 parameters.	**1, 2, 3, 4**	RW
P5.1	**151**	**DO1 Function**	**1, 2, 3, 4**	RW
P5.2	**152**	**RO1 Function**	**1, 2, 3, 4**	RW
P5.3	**153**	**RO2 Function**	**1, 2, 3, 4**	RW

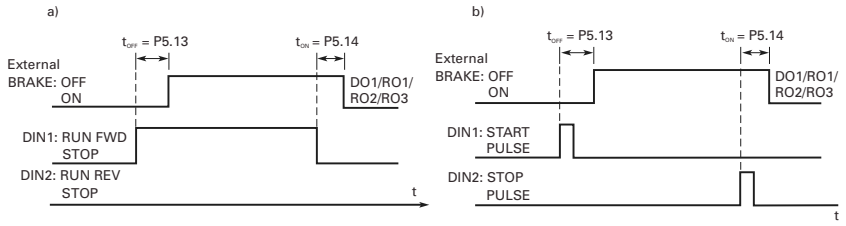
Code	Modbus ID	Parameter	Application	RO/RW
P5.4	**538**	**RO3 Function**	**1, 2, 3, 4**	RW

Application	Function	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = Not used	Not operational	■	■	■	■
1 = Ready	Frequency converter is ready for operations	■	■	■	■
2 = Run	Frequency converter is running motor	■	■	■	■
3 = Fault	A fault trip has occurred on NO contact close	■	■	■	■
4 = Fault inverted	A fault trip has not occurred on NO contact close	■	■	■	■
5 = Warning	Warning exists in frequency converter	■	■	■	■
6 = Reverse	Reverse command has been activated	■	■	■	■
7 = At speed	Output frequency has reached reference	■	■	■	■
8 = Zero frequency	Motor output is at zero frequency	■	■	■	■
9 = Frequency Limit1 supervision	Frequency limit1 achieved	■	■	■	■
10 = Frequency Limit2 supervision	Frequency limit2 achieved	■	■	■	■
11 = PID1 supervision	PID1 controller level achieved	■	■	■	■
12 = PID2 supervision	PID2 controller level achieved	■	■	■	■
13 = Over heat warning	Drive over heat has occurred	■	■	■	■
14 = Over current regulator	Over current controller activated	■	■	■	■
15 = Over voltage regulator	Over voltage controller activated	■	■	■	■
16 = Under voltage regulator	Under voltage controller activated	■	■	■	■
17 = 4 mA fault	4 mA reference fault	■	■	■	■
18 = External brake	External brake activated on contact close	—	—	—	■
19 = External brake inverter	External brake non-activate on contact close	—	—	—	■
20 = Torque limit supervision	Torque limit value achieved	■	■	■	■
21 = Reference limit supervision	Reference limit achieved	■	■	■	■
22 = Control from IO	Control place I/O is activated	■	■	■	■
23 = Unrequired rotation direction	Active direction is different than reference direction	■	■	■	■
24 = Thermal fault	Frequency converter thermal fault	■	■	■	■
25 = Fire mode	Fire mode is activated	■	■	■	■
26 = Bypass running	Bypass mode is activated	■	■	■	■
27 = External fault	External fault input is activated	■	■	■	■
28 = Remote control	Remote control place is activated	■	■	■	■
29 = Jog speed	Jog preset speed mode is activated	■	■	■	■
30 = Motor thermal protection	Motor calculated temperature fault activated	■	■	■	■
31 = Fieldbus input1	—	■	■	■	■
32 = Fieldbus input2	—	■	■	■	■
33 = Fieldbus input3	—	■	■	■	■
34 = Fieldbus input4	—	■	■	■	■
35 = Damper control	Damper control input is activated	■	■	■	■
36 = Timer1 status	Timer1 activated	■	■	■	■
37 = Timer2 status	Timer2 activated	■	■	■	■
38 = Timer3 status	Timer3 activated	■	■	■	■
39 = Emergency stop	Emergency stop input activated	■	■	■	■
40 = Power limit supervision	Power limit value achieved	■	■	■	■
41 = Temperature limit supervision	Temperature limit value achieved	■	■	■	■
42 = Analog input supervision	Analog limit value achieved	■	■	■	■
43 = Motor1 control	Auxiliary motor1 activated	—	■	■	■
44 = Motor2 control	Auxiliary motor2 activated	—	■	■	■
45 = Motor3 control	Auxiliary motor3 activated	—	■	■	■
46 = Motor4 control	Auxiliary motor4 activated	—	■	■	■
47 = Motor5 control	Auxiliary motor5 activated	—	■	■	■
48 = Logic fulfilled	Logic function is activated	—	—	—	■
49 = PID1 sleep	PID1 controller sleep mode active	—	■	■	■
50 = PID2 sleep	PID2 controller sleep mode active	—	—	■	■

Code	Modbus ID	Parameter	Application	RO/RW
P5.4	**538**	**RO3 Function, continued**	**1, 2, 3, 4**	RW

Setting Value	Signal Content	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = Not used	Out of operation	■	■	■	■
1 = Ready	Frequency converter is ready for operation	■	■	■	■
2 = Run	Frequency converter is operating (motor is running)	■	■	■	■
3 = Fault	A fault trip has occurred	■	■	■	■
4 = Fault inverted	A fault trip has not occurred	■	■	■	■
5 = Warning	Always if a warning exists	■	■	■	■
6 = Reverse	The reverse command has been selected	■	■	■	■
7 = At speed	The output frequency has reached the set reference	■	■	■	■
8 = Zero frequency	Motor output is at zero frequency	■	■	■	■
9 = Frequency Limit1 supervision	Supervision for frequency limit1	■	■	■	■
10 = Frequency Limit2 supervision	Supervision for frequency limit2	■	■	■	■
11 = PID1 supervision	Supervision for PID1 controller	■	■	■	■
12 = PID2 supervision	Supervision for PID2 controller	■	■	■	■
13 = Over heat warning	Drive over heat has occurred	■	■	■	■
14 = Over current regulator	Over current regular is enabled	■	■	■	■
15 = Over volt regulator	Over volt regular is enabled	■	■	■	■
16 = Under volt regulator	Under volt regular is enabled	■	■	■	■
17 = 4 mA fault	4 mA fault has occurred	■	■	■	■
18 = External brake	External brake is working	—	—	—	■
19 = External brake inverter	External brake isn't working	—	—	—	■
20 = Torque limit supervision	Supervision for torque limit	■	■	■	■
21 = Reference limit supervision	Supervision for reference limit	■	■	■	■
22 = Control from IO	I/O is the control place	■	■	■	■
23 = Unrequired rotation direction	The active direction isn't the same with the reference direction	■	■	■	■
24 = Thermal fault	Thermal fault has occurred	■	■	■	■
25 = Fire mode	Drive is in fire mode	■	■	■	■
26 = Bypass running	Drive is in bypass mode	■	■	■	■
27 = External fault	External fault has occurred	■	■	■	■
28 = Remote control	Remote is the control place	■	■	■	■
29 = Jog speed	Drive is in jog mode	■	■	■	■
30 = Motor thermal protection	Motor is thermal protected	■	■	■	■
31 = Fieldbus input1	—	■	■	■	■
32 = Fieldbus input2	—	■	■	■	■
33 = Fieldbus input3	—	■	■	■	■
34 = Fieldbus input4	—	■	■	■	■
35 = Damper control	Drive is in damper control	■	■	■	■
36 = Timer1 status	The status of timer1	■	■	■	■
37 = Timer2 status	The status of timer2	■	■	■	■
38 = Timer3 status	The status of timer3	■	■	■	■
39 = Emergency stop	Emergency stop has occurred	■	■	■	■
40 = Power limit supervision	Supervision for power limit	■	■	■	■
41 = Temperature limit supervision	Supervision for temperature limit	■	■	■	■
42 = Analog input supervision	Supervision for analog input	■	■	■	■
43 = Motor1 control	Motor1 is controlled	—	■	■	■
44 = Motor2 control	Motor2 is controlled	—	■	■	■
45 = Motor3 control	Motor3 is controlled	—	■	■	■
46 = Motor4 control	Motor4 is controlled	—	■	■	■
47 = Motor5 control	Motor5 is controlled	—	■	■	■
48 = Logic fulfilled	The status of logic function	—	—	—	■
49 = PID1 sleep	PID1 controller is in sleep mode	—	■	■	■
50 = PID2 sleep	PID2 controller is in sleep mode	—	—	■	■

Code	Modbus ID	Parameter	Application	RO/RW
P5.5	**154**	**Freq Limit 1 Supv** Selects how the Frequency converter functions upon the value setting. **0** No supervision **1** Low limit supervision **2** High limit supervision **3** Brake-on control (Application 4 only)	**1, 2, 3, 4**	RW
P5.6	**155**	**Freq Limit 1 Supv Val.** Selects the frequency value supervised by P1.5.5. If the output frequency goes under/over the set limit (P1.5.6), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P1.5.1 to P1.5.2, P1.5.3, and P1.5.4. **Figure 51. Supervision Function** 	**1, 2, 3, 4**	RW
P5.7	**157**	**Freq Limit 2 Supv** Selects how the Frequency converter functions upon the value setting. **0** No limit **1** Low limit supervision **2** High limit supervision **3** Brake-off control (Application 4 only) **4** Brake-on/-off control (Application 4 only)	**1, 2, 3, 4**	RW
P5.8	**158**	**Freq Limit 2 Supv Val.** Selects the frequency value supervised by P5.7. See **Figure 51**. If the output frequency goes under/over the set limit (P5.7), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.9	**159**	**Torque Limit Supv** Selects how the frequency converter functions upon the value setting. **0** No limit **1** Low limit supervision **2** High limit supervision **3** Brake-off control (Application 4 only)	**1, 2, 3, 4**	RW
P5.10	**160**	**Torque Limit Supv Val.** Set here the torque value to be supervised by P5.9. If the output frequency goes under/over the set limit (P5.10), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P5.11	**161**	**Ref Limit Supv** Selects how the frequency converter functions upon the value setting. **0** No supervision **1** Low limit supervision **2** High limit supervision	**1, 2, 3, 4**	RW
P5.12	**162**	**Ref Limit Supv Val** The frequency value to be supervised by P5.11. If the output frequency goes under/over the set limit (P5.12), this function generates a warning message via the digital output DO1 or via the relay outputs RO1 or RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.13	**163**	**Ext Brake Off Delay**	**4**	RW
P5.14	**164**	**Ext Brake On Delay** The function of the external brake can be timed to the start and stop control signals with these parameters. See **Figure 52**. The brake control signal can be programmed via digital output DO1 or via one of the relay outputs RO1, RO2 and RO3; see P5.1 to P5.2, P5.3, and P5.4. **Figure 52. External Brake Control**  a) Start/Stop Logic Selection, P3.1 = 0, 1 or 2 b) Start/Stop Logic Selection, P3.1 = 3	**4**	RW
P5.15	**165**	**Temp Limit Supv** Selects how the frequency converter functions upon the value setting. **0** No supervision **1** Low limit supervision **2** High limit supervision	**1, 2, 3, 4**	RW
P5.16	**166**	**Temp Limit Supv Val** This temperature value is supervised by P5.15. If the temperature of the frequency converter unit falls below or exceeds the set limit (P5.16), this function generates a warning message via the digital output DO1 or via a relay output RO1, RO2 or RO3 depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.17	**167**	**Power Limit Supv** Selects how the frequency converter functions upon the value setting. **0** No supervision **1** Low limit supervision **2** High limit supervision	**1, 2, 3, 4**	RW

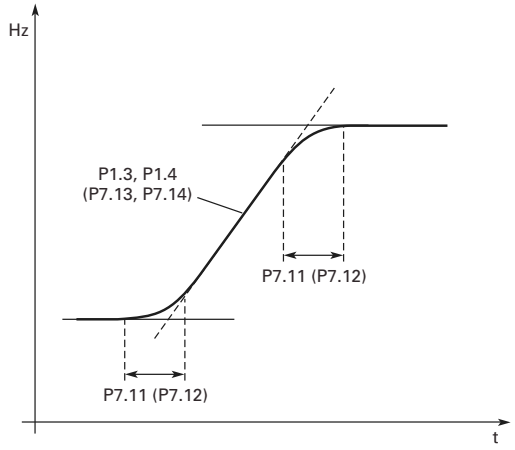
Code	Modbus ID	Parameter	Application	RO/RW
P5.18	**168**	**Power Limit Supv Val** This power value is supervised by P5.17. If the calculated power value falls below or exceeds the set limit (P5.18), this function generates a warning message via the digital output DO1 or via a relay output RO1, RO2 or RO3, depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.19	**170**	**AI Supv Select** Selects analog signal to use for the AI supervision. **0** Analog reference from AI1 (terminals 2 and 3, e.g., potentiometer) **1** Analog reference from AI2 (terminals 4 and 5, e.g., transducer)	**1, 2, 3, 4**	RW
P5.20	**171**	**AI Limit Supv** Selects how the frequency converter functions upon the value setting. **0** No supervision **1** Low limit supervision **2** High limit supervision	**1, 2, 3, 4**	RW
P5.21	**172**	**AI Limit Supv Val** The value of the selected analog input to be supervised by P5.20. If the value of the selected analog input goes under/over the set limit (P5.21), this function generates a warning message through the digital output or the relay outputs depending on the settings of P5.1 to P5.2, P5.3, and P5.4.	**1, 2, 3, 4**	RW
P5.22	**1346**	**PID1 Superv Enable**	**2, 3, 4**	RW
P5.23	**1347**	**PID1 Superv Upper Limit**	**2, 3, 4**	RW
P5.24	**1349**	**PID1 Superv Lower Limit**	**2, 3, 4**	RW
P5.25	**1351**	**PID1 Superv Delay**	**2, 3, 4**	RW
P5.26	**1408**	**PID2 Superv Enable**	**3, 4**	RW
P5.27	**1409**	**PID2 Superv Upper Limit**	**3, 4**	RW
P5.28	**1411**	**PID2 Superv Lower Limit**	**3, 4**	RW
P5.29	**1413**	**PID2 Superv Delay** Upper and lower limits around the reference are set. When the actual value goes above or below these, a counter starts counting up toward the Delay. When the actual value is within the allowed area, the same counter counts down instead. After the delay time it will turn on an relay output value.	**3, 4**	RW
P5.30	**2111**	**RO1 On Delay** Delay time for RO1 to turn on.	**1, 2, 3, 4**	RW
P5.31	**2112**	**RO1 Off Delay** Delay time for RO1 to turn off.	**1, 2, 3, 4**	RW
P5.32	**2113**	**RO2 On Delay** Delay time for RO2 to turn on.	**1, 2, 3, 4**	RW
P5.33	**2114**	**RO2 Off Delay** Delay time for RO2 to turn off.	**1, 2, 3, 4**	RW
P5.34	**2115**	**RO3 On Delay** Delay time for RO3 to turn on.	**1, 2, 3, 4**	RW
P5.35	**2116**	**RO3 Off Delay** Delay time for RO3 to turn off.	**1, 2, 3, 4**	RW
P5.36	**2117**	**RO3 Reverse** Inverts the operation of RO3. **1** Not Inverted **2** Inverted	**1, 2, 3, 4**	RW

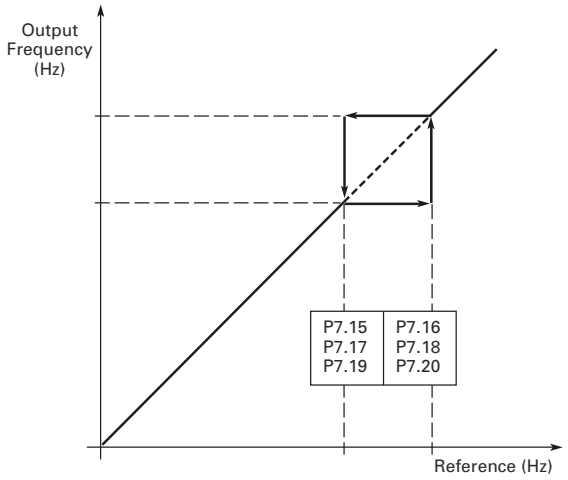
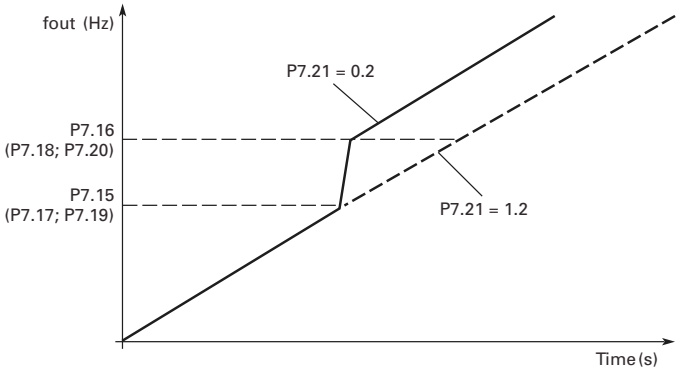
Code	Modbus ID	Parameter	Application	RO/RW
P6.1	**751**	**Logic Function Select** The logic function enables you to link both parameters P6.2(A) and P6.3 (B) logically with each other. The result (LOG) can then be assigned to the digital outputs DO, RO1, RO2 and RO3. The type of operation is defined in parameter P6.1: **0** AND **1** OR **2** XOR	**4**	RW
P6.2	**752**	**Logic Operation Input A** Input A for Logic function calculation defined in P6.1.	**4**	RW
P6.3	**753**	**Logic Operation Input B** Input B for Logic function calculation defined in P6.1.	**4**	RW
P7.1	**138**	**Remote 2 Control Place** Selects where the drive will look for the 2nd start command. I/O terminals would be from the Digital hardwired inputs. Fieldbus would be a communication bus. Keypad will indicate what mode is selected. Digital input will select between control place 1 and control place 2.	**1, 2, 3, 4**	RW
P7.2	**139**	**Remote 2 Reference** Selects what frequency reference source to look at when in the Remote 2 control mode.	**1, 2, 3, 4**	RW

Application—Selection	Standard	Multi-Pump and Fan	Multi-PID	Multi-Purpose
0 = AI1—analog input on terminals 2–3	■	■	■	■
1 = AI2—analog input on terminals 4–5	■	■	■	■
2 = Slot A: AI1—analog input on expander board in slot A	■	■	■	■
3 = Slot B: AI1—analog input on expander board in slot B	■	■	■	■
4 = AI1 joystick—analog input on terminals 2–3, used for joystick control	■	■	■	■
5 = AI2 joystick—analog input on terminals 4–5, used for joystick control	■	■	■	■
6 = Keypad—keypad reference (P1.7.3)	■	■	■	■
7 = Fieldbus Ref—reference sent of communication bus	■	■	■	■
8 = Motor Pot—selects digital inputs for digital inputs to increase/decrease speed	—	—	—	■
9 = Max Frequency—maximum frequency value (P1.1.2)	■	■	■	■
10 = AI1+AI2—sums the analog input values	■	■	■	■
11 = AI1–AI2—subtracts the analog inputs AI1 from AI2	■	■	■	■
12 = AI2–AI1—subtracts the analog inputs AI2 from AI1	■	■	■	■
13 = AI1*AI2—multiplies analog inputs AI1 and AI2	■	■	■	■
14 = AI1 or AI2—selects analog inputs based off of digital input	■	■	■	■
15 = Min (AI1, AI2)—selects analog inputs that have the least value	■	■	■	■
16 = Max (AI1, AI2)—selects analog inputs that have the higher value	■	■	■	■
17 = PID1 Control—selects the PID calculation for output to maintain reference value	—	■	■	■

P7.3	**141**	**Keypad Reference** The frequency reference can be adjusted from the keypad with this parameter. This parameter is linked to R1.12 Keypad reference in the operate menu.	**1, 2, 3, 4**	RW
P7.4	**116**	**Keypad Direction** **0** Forward: The rotation of the motor is forward when the keypad is the active control place. **1** Reverse: The rotation of the motor is reversed when the keypad is the active control place.	**1, 2, 3, 4**	RW
P7.5	**114**	**Keypad Stop** To make the STOP button a "hotspot" that always stops the drive regardless of the selected control place. Set the value of this parameter to Always Enabled for being used in local and remote. Enable - Keypad operation activates the stop button only in keypad mode.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.6	**117**	**Jog Reference** Defines the jogging speed selected with the digital input that can be programmed for Jogging speed. This parameter's value is automatically limited between minimum and maximum frequency (P1.1.1 and P1.1.2).	**1, 2, 3, 4**	RW
P7.7	**156**	**Motor Pot Ramp Time** Defines the speed of change of the motor potentiometer reference value.	**4**	RW
P7.8	**169**	**Motor Pot Ref Reset** Defines how the reference signal is handled on shutting down frequency converter output or powering down the frequency converter. **0** No reset **1** Memory reset in stop and power down **2** Memory reset in power down	**4**	RW
P7.9	**252**	**Start Mode** **0** Ramp: The frequency converter starts from 0 Hz and accelerates to the set reference frequency within the set acceleration time. (Load inertia or starting friction may cause prolonged acceleration times.) **1** Flying start: The frequency converter is able to start into a running motor by applying a small voltage to the motor to search for the frequency corresponding to the speed the motor is running at. Searching starts from the maximum frequency toward the actual frequency until the correct value is detected. Thereafter, the output frequency will be increased/decreased to the set reference value according to the set acceleration/deceleration parameters Use this mode if the motor is coasting when the start command is given, with the flying start.	**1, 2, 3, 4**	RW
P7.10	**253**	**Stop Mode** **0** Coasting: The motor coasts to a halt without any control from the frequency converter after the Stop command. Slows based off the interia loss **1** Ramp: After the Stop command, the speed of the motor is decelerated according to the set deceleration parameters. If the regenerated energy is high and a faster deceleration is required, it may be necessary to use an external braking resistor for faster deceleration Enabled Normal stop: Ramp/Run Disable stop: Coasting	**1, 2, 3, 4**	RW
P7.11	**247**	**Ramp 1 Shape**	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.12	**248**	**Ramp 2 Shape** The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.0 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.1 to 10 seconds for this parameter produces an S-shaped acceleration/deceleration. The acceleration time is determined with P1.3 and P1.4 or P7.13 and P7.14. **Figure 53. Acceleration/Deceleration (S-shaped)**  	**1, 2, 3, 4**	RW
P7.13	**249**	**Accel Time 2**	**1, 2, 3, 4**	RW
P7.14	**250**	**Decel Time 2** These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency (P1.2). These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.	**1, 2, 3, 4**	RW
P7.15	**256**	**Skip F1 Low Lim**	**1, 2, 3, 4**	RW
P7.16	**257**	**Skip F1 High Lim**	**1, 2, 3, 4**	RW
P7.17	**258**	**Skip F2 Low Lim**	**1, 2, 3, 4**	RW
P7.18	**259**	**Skip F2 High Lim**	**1, 2, 3, 4**	RW
P7.19	**260**	**Skip F3 Low Lim**	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.20	**261**	**Skip F3 High Lim** In some systems it may be necessary to avoid certain frequencies because of mechanical resonance problems. With these parameters, limits are set for the "skip frequency" regions. The frequency converter will skip the set frequencies, ramp time will be the same. See **Figure 54**. **Figure 54. Example of Skip Frequency Area Setting** 	**1, 2, 3, 4**	RW
P7.21	**264**	**PH Accel/Decel Ramp** Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor. e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits. **Figure 55. Ramp Speed Scaling between Skip Frequencies** 	**1, 2, 3, 4**	RW
P7.22	**267**	**Power Loss Function** This enables the drive to reduce output voltage to the motor to keep the drive up as long as possible. **1** Enable power loss function **0** Disable power loss function	**1, 2, 3, 4**	RW
P7.23	**268**	**Power Loss Time** Allowable power loss max time before the drive shuts down. If AC input voltage recovers before this time setting, drive will continue to work.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P7.24	**2121**	**Currency** Sets the currency used for energy saving calculator. **0** $ **1** GBP **2** Eur **3** JPY **4** Rs **5** R$ **6** Fr **7** Kr	**1, 2, 3, 4**	RW
P7.25	**2122**	**Energy Cost** Local energy cost per kWh in the drives area.	**1, 2, 3, 4**	RW
P7.26	**2123**	**Data Type** Selects the format to view energy savings. The drive will take four recordings in an hour and then calculate out averages for other values. **0** Cumulative **1** Daily Avg **2** Monthly Avg **3** Yearly Avg	**1, 2, 3, 4**	RW
P7.27	**2124**	**Energy Savings Reset** Resets the energy calculation.	**1, 2, 3, 4**	RW
P8.1	**287**	**Motor Ctrl Mode** **0** Frequency control: Motor is controlled by giving a frequency reference to it. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve (output frequency resolution = 0.01 Hz). The frequency reference can be from I/O terminal, keypad, or communication bus. **1** Speed control: Motor is controlled by giving a frequency reference to it with slip compensation. Voltage reference is calculated from scalar U/f ratio according to preprogrammed curve (output frequency resolution = 0.01 Hz). The speed reference can be from I/O terminal, keypad, or communication bus (accuracy ±0.5%). **5** Speed control (open loop): Similar to the standard Speed Control mode, but it internally calculates for the amount of slip feedback from the motor. **6** Torque control (open loop): Motor is controlled based on a torque reference given to the drive. Then, based on the motor load, the drive will maintain that torque level.	**1, 2, 3, 4**	RW
P8.2	**107**	**Current Limit** This parameter determines the maximum motor current allowed from the frequency converter. The parameter value range differs from size to size.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.3	**109**	**V/Hz optimization** **Automatic torque boost** The voltage to the motor changes automatically, which makes the motor produce sufficient torque to start and run at low frequencies. The voltage increase depends on the motor type and power. Automatic torque boost can be used in applications where starting torque due to starting friction is high, e.g., in conveyors. *Example:* What changes are required to start the load from 0 Hz? First set the motor nominal values (Parameter group P1.1). Option 1: Activate the Automatic torque boost. Option 2: Programmable V/Hz curve. To obtain the required torque, the zero point voltage and midpoint voltage/frequency (in parameter group P1.8) need to be set, so that the motor can draw enough current at the low frequencies. First set parameter P1.8.3 to Programmable V/Hz curve (value 2). Increase the zero point voltage P1.8.8 to get enough current at zero speed. Then set the midpoint voltage P1.8.7 to 1.4142*P1.8.8 and the midpoint frequency P1.8.6 to value P1.8.8/100%*P1.1.10. **Note**: In high torque—low speed applications—it is likely that the motor will overheat. If the motor has to run a prolonged time under these conditions, special attention must be paid to cooling the motor. Use external cooling for the motor if the temperature tends to rise too high.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.4	**108**	**V/Hz Ratio**	**1, 2, 3, 4**	RW

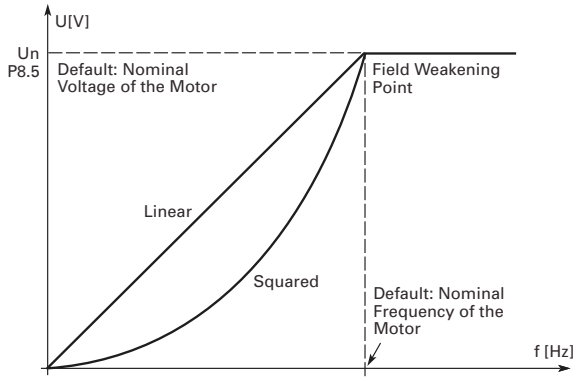
Linear

0 The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. A linear V/Hz ratio should be used in constant torque applications. **This default setting should be used if there is no special need for another setting**.

Squared

1 The voltage of the motor changes following a squared curve form with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed, e.g., in centrifugal fans and pumps.

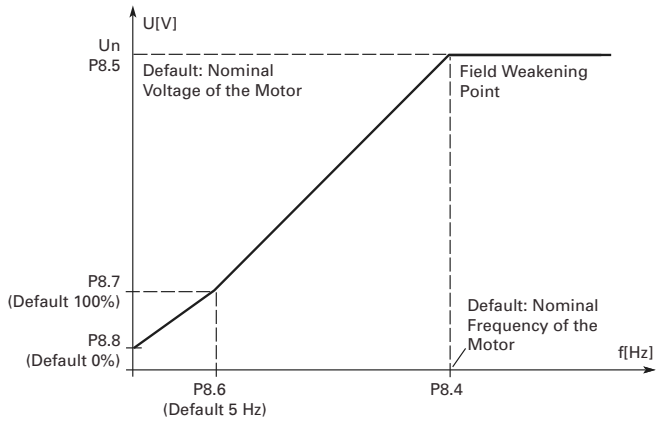
Figure 56. Linear and Squared Change of Motor Voltage



Programmable V/Hz curve

2 The V/Hz curve can be programmed with three different points. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application.

Figure 57. Programmable V/Hz Curve



Linear with flux optimization

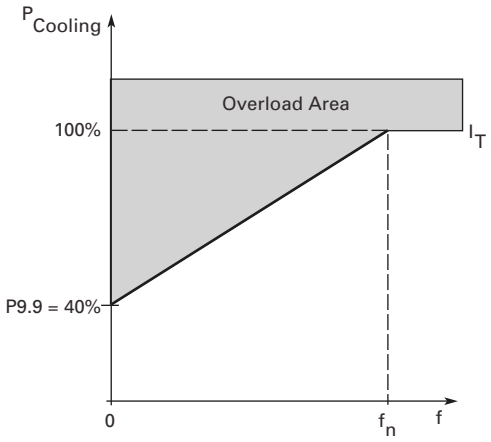
3 The frequency converter starts to search for the minimum motor current in order to save energy and lower the disturbance level and the noise. This function can be used in applications with constant motor load, such as fans, pumps, etc.

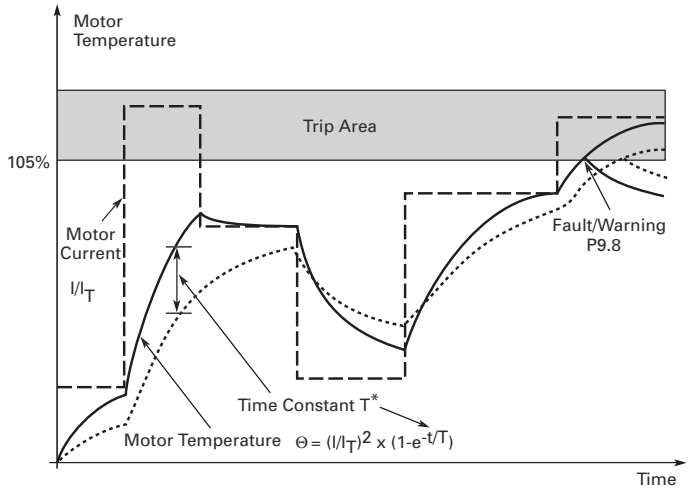
Code	Modbus ID	Parameter	Application	RO/RW
P8.5	**289**	**Field Weakening Point** The field weakening point is the output frequency at which the output voltage reaches the set (P8.6) maximum value.	**1, 2, 3, 4**	RW
P8.6	**290**	**Voltage at FWP** Above the frequency at the field weakening point, the output voltage remains at the set maximum value. Below the frequency at the field weakening point, the output voltage depends on the setting of the V/Hz curve parameters. See P1.8.2, P1.8.3, P1.8.6 and P1.8.7. When the parameters P1.1.9 and P1.1.10 (nominal voltage and nominal frequency of the motor) are set, the parameters P1.8.4 and P1.8.5 are automatically set to the corresponding values. If you need different values for the field weakening point and the maximum output voltage, change these parameters after setting P1.1.9 and P1.1.10.	**1, 2, 3, 4**	RW
P8.7	**291**	**V/Hz Mid Freq** If the programmable V/Hz curve has been selected with P8.4, this parameter defines the middle point frequency of the curve. See **Figure 57**.	**1, 2, 3, 4**	RW
P8.8	**292**	**V/Hz Mid Volt** If the programmable V/Hz curve has been selected with the P8.4, this parameter defines the middle point voltage of the curve. See **Figure 57**.	**1, 2, 3, 4**	RW
P8.9	**293**	**Zero Frequency Volt** If the programmable V/Hz curve has been selected with the P1.8.3, this parameter defines the zero frequency voltage of the curve. See **Figure 57**.	**1, 2, 3, 4**	RW
P8.10	**288**	**Switching Frequency** Motor noise can be minimized using a high switching frequency, but the amount of heat dissipation increases. Increasing the switching frequency reduces the capacity of the frequency converter unit. For protection against thermal overload, the switching frequency automatically is reduced in the fact that the ambient temperature is high as well as high load currents.	**1, 2, 3, 4**	RW
P8.11	**1665**	**Sine Filter Enable** Enables the frequency converter to have a sine filter connected to the output motor leads.	**1,2,3,4**	RW
P8.12	**294**	**Overvolt Contr** These parameters allow the overvoltage controllers to be switched out of operation. This may be useful, for example, if the main supply voltage varies more than –15% to +10% and the application will not tolerate this overvoltage. In this case, the regulator controls the output frequency taking the supply fluctuations into account. **0** Controller switched off **1** Controller switched on	**1, 2, 3, 4**	RW
P8.13	**298**	**Load Drooping** The drooping function enables speed drop as a function of load. This parameter sets that amount corresponding to the nominal torque of the motor.	**4**	RW
P8.14	**299**	**Identification** With this parameter, the drive will identify the motor and adjust tuning parameters to improve starting torque and closed loop current control. Upon running this operation it will be active until test is performed and then set back to 0. **0** Not active **1** Identification only stator resistor **2** Identification with run **3** Identification no run	**4**	RW
P8.15	**1574**	**Neg Frequency Limit** Frequency limit in the negative direction.	**4**	RW
P8.16	**1576**	**Pos Frequency Limit** Frequency limit in the positive direction.	**4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.17	**1585**	**Frequency Ramp Out Filter Time Constant** Filter time used when ramping the drive to a stop.	**1,2,3,4**	RW
P8.18	**1591**	**Speed Error Filter Time Constant** Speed control filter time in open loop speed control mode.	**4**	RW
P8.19	**1592**	**Speed Error Band Stop Frequency** Stop frequency band when in speed control mode.	**4**	RW
P8.20	**1593**	**Speed Control Kp** Open loop speed control gain.	**4**	RW
P8.21	**1594**	**Speed Control Ti** Open loop speed control integral time.	**4**	RW
P8.22	**1595**	**Speed Control Kp at Field Weakening** Open loop speed control gain at Field Weakening Point.	**4**	RW
P8.23	**1596**	**Speed Control Kp Below F0** Open loop speed control gain below 0 Hz.	**4**	RW
P8.24	**1597**	**Speed Control F0** Open loop speed control at frequency 0.	**4**	RW
P8.25	**1598**	**Speed Control F1** Open loop speed control at frequency 1.	**4**	RW
P8.26	**1599**	**Speed Control Kp Below T0** Open loop speed gain below torque 0.	**4**	RW
P8.27	**1600**	**Speed Control T0** Open loop speed torque 0.	**4**	RW
P8.28	**1601**	**Speed Control Kp Filter Time Constant** Open loop speed control gain filter time.	**4**	RW
P8.29	**1602**	**Motor Torque Ilmit** Torque limit setting in open loop torque control mode.	**4**	RW
P8.30	**1603**	**Generator Torque Limit** Torque limit setting for generator.	**4**	RW
P8.31	**1604**	**Torque Limit Forward** Torque limit setting in forward direction.	**4**	RW
P8.32	**1605**	**Torque Limit Reverse** Torque limit setting in reverse direction.	**4**	RW
P8.33	**1607**	**Motor Power Limit** Motor power limit setting in open loop torque control mode.	**4**	RW
P8.34	**1608**	**Generator Power Limit** Generator power limit setting in open loop torque control mode.	**4**	RW
P8.35	**1611**	**Acc Compensation Time Constant** Acceleration compensation time.	**4**	RW
P8.36	**1612**	**Acc Compensation Filter Time Constant** Acceleration compensation filter time.	**4**	RW
P8.37	**1620**	**Flux Reference** Reference selection for the amount of flux to output to the motor when using advanced programming.	**4**	RW
P8.38	**1621**	**Stop State Magnetization** Magnetization current % level when performing advanced programming of motor identification.	**4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P8.39	**1622**	**Start Boost Rise Time** Acceleration time used with auto torque boost.	**1,2,3,4**	RW
P8.40	**1623**	**Flux Current Ramp Time** Time to use the flux ramp level when advanced motor control is needed.	**4**	RW
P8.41	**1624**	**Zero Speed Start Time** Zero speed delay time when starting the motor.	**4**	RW
P8.42	**1625**	**Zero Speed Stop Time** Zero speed delay time when stopping the motor.	**4**	RW
P8.43	**1630**	**Droop Control Filter Time Constant** Filter time when using droop control.	**4**	RW
P8.44	**1631**	**Start Torque Selection** Selects where the startup torque reference comes from (either Start Memory, Torque Reference, and Start Torque FWD/REV).	**4**	RW
P8.45	**1632**	**Start Memory Start** Torque value is stored in memory. If you look at P8.47, you can select where the torque on startup is given from. This is a preset value for both forward and reverse if both are required to be equal.	**4**	RW
P8.46	**1633**	**Start Torque Forward** Selects the amount of starting torque in the Forward direction.	**4**	RW
P8.47	**1634**	**Start Torque Reverse** Selects the amount of starting torque Reverse direction.	**4**	RW
P8.48	**1635**	**Start Torque Actual** Actual start torque.	**4**	RW
P8.49	**1667**	**Startup Torque Time** This is the amount of time that the startup torque boost is active in either forward or reverse during startup.	**4**	RW
P8.50	**771**	**Stator Resistor** Motor stator resistor real value. This value is the stator winding resistance of the windings in the motor. Value is measured when performing Identification (P8.14).	**4**	RW
P8.51	**772**	**Rotor Resistor** Motor rotor resistor real value. This value is the rotor resistance of the motor. Value is measured when performing Identification (P8.14).	**4**	RW
P8.52	**773**	**Leak Inductance** Motor leakage inductance real value. This value is the amount of magnetic inductance that does not link to a winding in the motor. Value is measured when performing Identification (P8.14).	**4**	RW
P8.53	**774**	**Mutual Inductance** Motor mutual inductance real value. This value is the amount of inductance between 2 sets of windings in the motor. Value is measured when performing Identification (P8.14).	**4**	RW
P8.54	**775**	**Excitation Current** Motor no-load current real value. This value is the amount of electrical current required to generate a rotating magnetic field in the motor. Value is measured when performing Identification (P8.14).	**4**	RW

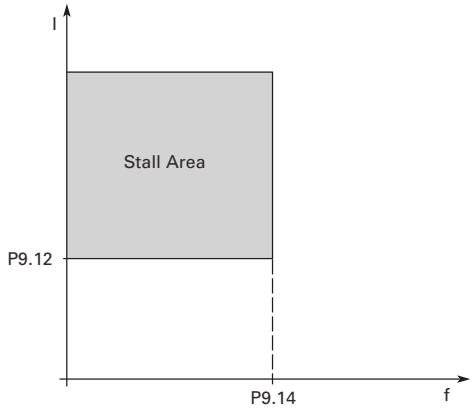
Code	Modbus ID	Parameter	Application	RO/RW
P9.1	**306**	**4 mA Input Fault** A warning or a fault action and message is generated if the 4–20 mA reference signal is used and the signal falls below 4 mA for 5 seconds or below 0.5 mA for 0.5 seconds. The information can also be programmed into digital output DO1 or relay outputs RO1 and RO2. **0** No response **1** Warning **2** Warning, the frequency from 10 seconds back is set as reference **3** Warning, the Preset Frequency P9.2 is set as reference **4** Fault, stop mode after fault according to P7.10 **5** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.2	**331**	**4 mA Fault Freq** When 4 mA fault happens, the output frequency of drive. Need to set P9.1 = 3.	**1, 2, 3, 4**	RW
P9.3	**307**	**External Fault** A warning or a fault action and message is generated from the external fault signal in the programmable digital inputs DIN3. The information can also be programmed into digital output DO1 and into relay outputs RO1 and RO2. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.4	**332**	**Input Phase Fault** The input phase supervision ensures that the input phases of the frequency converter have approximately equal currents. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.5	**330**	**Undervoltage Fault Resp** Frequency converter monitors DC Bus Voltage if drops below set level will respond corresponding to this setting. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.6	**308**	**OutputPhaseFault** Output phase supervision of the motor ensures that the motor phases have equal currents, if phases are 5% away from one another frequency converter will respond corresponding to this setting. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.7	**309**	**Ground Fault** Earth fault protection ensures that the sum of the motor phase currents is zero. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency Converter will cores pond the setting below. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.8	**310**	**Motor Therm Prot** If tripping is selected, the drive will stop and activate the fault stage based off the% calculated motor temperature. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%. **0** No response **1** Warning **2** Fault, stop mode after fault according to ID506 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.9	**311**	**Motor Therm F0 Current** The current can be set between 0–150.0% x I_nMotor. This parameter sets the value for thermal current at zero frequency. See **Figure 58**. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter Different settings: 90% (or even higher). **Note**: The value is set as a percentage of the motor nameplate data, P1.5 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter Nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive, which is determined by P1.16 alone. **Figure 58. Motor Thermal Current I_T Curve**  	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.10	**312**	**Motor Thermal Time** This time can be set between 1 and 200 minutes. This is the thermal time constant of the motor; the larger the motor, the longer the time constant. The time constant is the time within which the calculated thermal stage has reached 63% of its final value. The motor thermal time is specific to the motor design and it varies between different motor manufacturers. If the motor's t6–time (t6 is the time in seconds the motor can safely operate at six times the rated current) is known (given by the motor manufacturer) the time constant parameter can be set based on it. As a rule of thumb, the motor thermal time constant in minutes is equal to 2 x t6. If the drive is in stop stage, the time constant is internally increased to three times the set parameter value. The cooling in the stop stage is based on convection and the time constant is increased. See **Figure 59**. **Figure 59. Motor Temperature Calculation**  * Changes by motor size and adjusted with P9.10.	**1, 2, 3, 4**	RW
P9.11	**313**	**Stall Protection** Stall protection is a type of overcurrent protection. It protects the motor from short time overload situations like a stalled shaft. This is customer selectable based off of current level, frequency level and time. **0** No Action **1** Warning **2** Fault **3** Fault, Coast	**1, 2, 3, 4**	RW

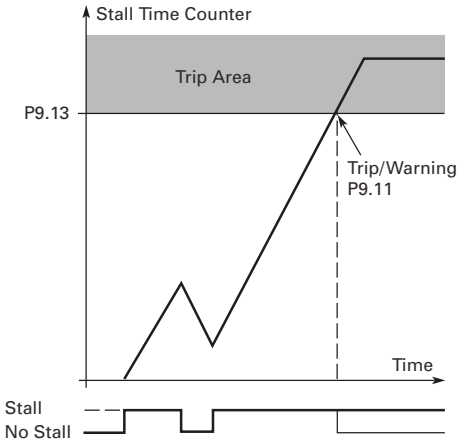
Code	Modbus ID	Parameter	Application	RO/RW
P9.12	**314**	**Stall Current Limit** The current can be set to 0.1–I_nMotor*2. For a stall stage to occur, the current must have exceeded this limit. See **Figure 60**. The software does not allow entering a greater value than I_nMotor*2. If P1.5, nominal motor current is changed, this parameter is automatically restored to the default value (I_L).	**1, 2, 3, 4**	RW

Figure 60. Stall Characteristics Settings

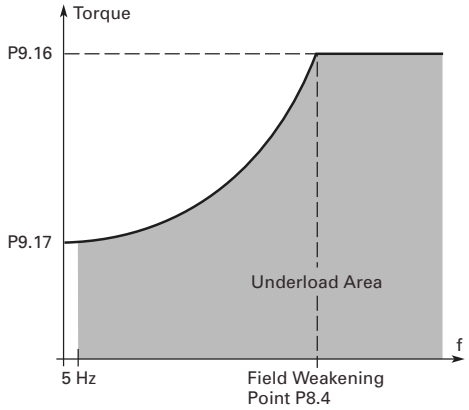


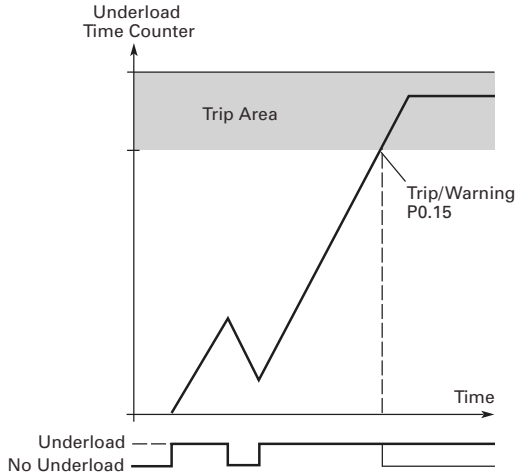
P9.13	**315**	**Stall Time Limit** This time can be set between 1.0 and 120.0s. This is the maximum time allowed for a stall stage. The stall time is counted by an internal up/down counter. If the stall time counter value goes above this limit the protection will cause a trip (see P9.11).	**1, 2, 3, 4**	RW

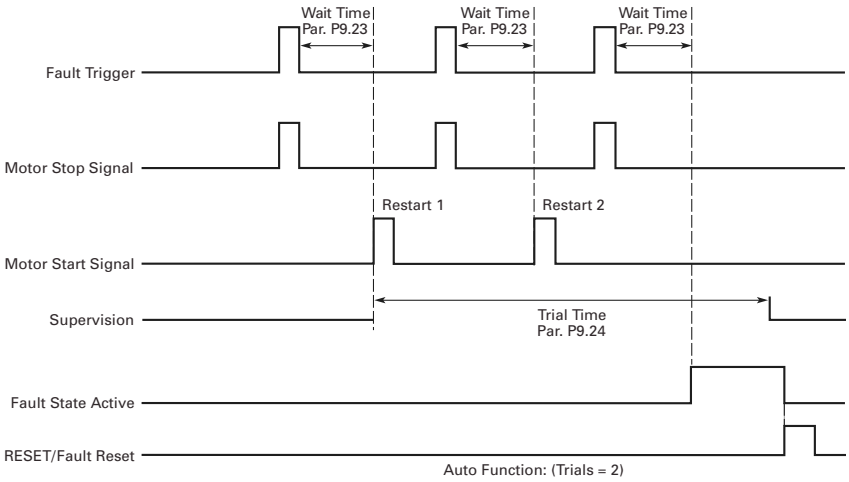
Figure 61. Stall Time Count



P9.14	**316**	**Stall Frequency Limit** The frequency can be set between 1–fmax (P1.1.2). For a stall state to occur, the output frequency must have remained below this limit.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.15	**317**	**Underload Protection** If tripping is set active, the drive will stop and activate the fault stage. Deactivating the protection by setting the parameter to zero will reset the underload time counter to zero. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.16	**318**	**Underload Fnom Torque** The torque limit can be set between 10.0–150.0% x T_nMotor. This parameter gives the value for the minimum torque allowed when the output frequency is above the field weakening point. See **Figure 62**. If you change P1.5, nominal motor current, this parameter is automatically restored to the default value. **Figure 62. Setting of Minimum Load**  	**1, 2, 3, 4**	RW
P9.17	**319**	**Underload F0 Torque** The torque limit can be set between 5.0–150.0% x T_nMotor. This parameter gives value for the minimum torque allowed with zero frequency. See **Figure 63**. If you change the value of P1.5, nominal motor current, this parameter is automatically restored to the default value.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.18	**320**	**Underload Time Limit** This time can be set between 2.0s and 600.0s. This is the maximum time allowed for an underload state to exist. An internal up/down counter counts the accumulated underload time. If the underload counter value goes above this limit, the protection will cause a trip according to P9.15. If the drive is stopped, the underload counter is reset to zero. See **Figure 63**. **Figure 63. Underload Time Counter Function**  	**1, 2, 3, 4**	RW
P9.19	**333**	**Thermistor Fault Response** Setting the parameter to 0 will deactivate the protection. If used with motor thermistors in the winding of the motor, P9.8 Motor Thermal Protection can be deactivated. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.20	**750**	**Line Start Lockout** Determines the response of frequency converter starting motor on power cycle if I/O run command is still active. **0** Response I/O command when power is on. No response to I/O commands when control source is changed to I/O location **1** Do not respond I/O command when power is on. No response to I/O commands when control source is changed to I/O location **2** Response I/O command when power is on. Respond to I/O command when control source is changed to I/O location **3** Do not respond I/O command when power is on. Respond to I/O command when control sources are changed to I/O location	**1, 2, 3, 4**	RW
P9.21	**334**	**Fieldbus Fault Response** This sets the response mode for the fieldbus fault when a fieldbus board is used and communication is lost between the PLC and communication card. See P9.19.	**1, 2, 3, 4**	RW
P9.22	**335**	**OPTCard Fault Response** This sets the response mode for a board slot fault caused by a missing or failed board not communicating to the Central Processor. See P9.19.	**1, 2, 3, 4**	RW
P9.23	**1564**	**Unit Under Temp Prot** This protection sets the response to a low frequency converter temperature. See P9.19.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.24	**321**	**Wait Time** Defines the time before the frequency converter tries to automatically restart the motor after the fault condition has been received.	**1, 2, 3, 4**	RW
P9.25	**322**	**Trial Time** The Automatic restart function restarts the frequency converter when the faults selected with P9.27 to P9.32 have cleared and the waiting time has elapsed. **Figure 64. Example of Automatic Restarts with Two Restarts**  P9.27 to P9.32 determine the maximum number of automatic restarts during the trial time set by P9.25. The time count starts from the first autorestart. If the number of faults occurring during the trial time exceeds the values of P9.27 to P9.32 the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed and the next fault starts the trial time count again. If a single fault remains during the trial time, a fault state is true.	**1, 2, 3, 4**	RW
P9.26	**323**	**Start Function** The Start function for Automatic restart is selected with this parameter. The parameter defines the start mode: **0** Start with ramp **1** Flying start **2** Start according to P7.9	**1, 2, 3, 4**	RW
P9.27	**324**	**Undervoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25 after an undervoltage trip. **0** No automatic restart >**0** Number of automatic restarts after undervoltage fault. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level	**1, 2, 3, 4**	RW
P9.28	**325**	**Overvoltage Attempts** This parameter determines how many automatic restarts can be made during the trial Time set by P9.25 after an overvoltage trip. **0** No automatic restart after overvoltage fault trip >**0** Number of automatic restarts after overvoltage fault trip. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.29	**326**	**Overcurrent Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **Note**: An IGBT temperature fault, Saturation Fault and Overcurrent Faults are included as part of this fault. **0** No automatic restart after overcurrent fault trip >**0** Number of automatic restarts after an overcurrent trip, saturation trip or IGBT temperature fault	**1, 2, 3, 4**	RW
P9.30	**327**	**4 mA Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **0** No automatic restart after reference fault trip >**0** Number of automatic restarts after the analog current signal (4–20 mA) has returned to the normal level (>4 mA)	**1, 2, 3, 4**	RW
P9.31	**329**	**Motor Temp Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **0** No automatic restart after Motor temperature fault trip >**0** Number of automatic restarts after the motor temperature has returned to its normal level	**1, 2, 3, 4**	RW
P9.32	**328**	**External Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **0** No automatic restart after External fault trip >**0** Number of automatic restarts after External fault trip	**1, 2, 3, 4**	RW
P9.33	**336**	**Underload Attempts** This parameter determines how many automatic restarts can be made during the trial time set by P9.25. **0** No automatic restart after an Underload fault trip >**0** Number of automatic restarts after an Underload fault trip	**1, 2, 3, 4**	RW
P9.34	**955**	**RTC Fault** RTC fault protection ensures the real time display is correct, the interval and timer function can run normally. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.35	**337**	**PT100 Fault Response** PT100 Thermistor protection used with motor thermistors to fault frequency converter. If using thermistors P9.8 Motor Thermal Protection can be disabled. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P9.36	**1256**	**Replace Battery Fault Response** Sets how the frequency converter responds to a low voltage on the Real Time Clock battery. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.37	**1257**	**Replace Fan Fault Response** Replace Fan Fault will show when the fan life is less than 2 months; remind user to replace the fan. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.38	**1678**	**IP Address Conflict Response** Indicates there is a conflict in the IP address assigned. **0** No response **1** Warning **2** Fault, stop mode after fault according to P7.10 **3** Fault, stop mode after fault always by coasting	**1, 2, 3, 4**	RW
P9.39	**2126**	**Cold Weather Mode** With this parameter, you are able to enable the cold weather function of the drive, causing the frequency converter's under temp limit to drop from –10°C to –30°C. This then enables a warmup feature when the frequency converter is between –30°C and –20°C. The motor, when given a run command, will turn on for the Cold Weather Timeout (ID1492) and output the Cold Weather Voltage (ID1491) at 0.5 Hz to allow the motor to warm up. If it does not warm up above –20°C, after that the time frequency converter will fault on Under temp fault. If the frequency converter does go above –20°C, output will begin to follow reference. **0** No **1** Yes	**1, 2, 3, 4**	RW
P9.40	**2127**	**Cold Weather Voltage Level** With this parameter, you are able to select the % of the motor voltage that is output to the motor when in the cold weather warmup period.	**1, 2, 3, 4**	RW
P9.41	**2128**	**Cold Weather Time Out** With this parameter, you are able to select the time limit that the frequency converter will run in the warmup period.	**1, 2, 3, 4**	RW
P10.1	**1294**	**PID1 Control Gain** Defines the gain of the PID Controller. If this value is set to 100% a change of 10% in the error value causes the controller output to change 10%.	**2, 3, 4**	RW
P10.2	**1295**	**PID1 Control ITime** Defines the integration time of the PID Controller. If this value is set to 1.00 sec, a change of 10% in the error value causes the controller output to change by 10.00%/s. With value set to 0.0, frequency converter operates as PD controller.	**2, 3, 4**	RW
P10.3	**1296**	**PID1Control DTime** Defines the derivation time of the PID Controller. If this value is set to 1.00 sec, a change of %10 in error value during 1.00 sec causes the control output to change by %10.00. If value is set to 0.0, frequency converter operates as PI controller	**2, 3, 4**	RW
P10.4	**1297**	**PID1 Process Unit** Defines the unit type for PID Feedback.	**2, 3, 4**	RW
P10.5	**1298**	**PID1 Process Unit Min** Minimum process unit Value.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.6	**1300**	**PID1 Process Unit Min** Minimum process unit Value.	**2, 3, 4**	RW
P10.7	**1302**	**PID1 Process Unit Decimal** Decimal places in process unit Value.	**2, 3, 4**	RW
P10.8	**1303**	**PID1 Error Inversion** **0** Normal, If feedback is less than setpoint, PID controller output increases **1** Inverted, If feedback is less than setpoint, PID controller output decreases	**2, 3, 4**	RW
P10.9	**1304**	**PID1 Dead Band** PID Dead band around setpoint in process units. The PID output is locked if the feedback stays within the deadband area for a delay.	**2, 3, 4**	RW
P10.10	**1306**	**PID1 Dead Band Delay** If the feedback stays within the dead band area for a delay time, output is locked.	**2, 3, 4**	RW
P10.11	**1307**	**PID1 Keypad Set Point 1** Keypad setpoint 1.	**2, 3, 4**	RW
P10.12	**1309**	**PID1 Keypad Set Point 2** Keypad setpoint 2.	**2, 3, 4**	RW
P10.13	**1311**	**PID1 Ramp Time** Defines the rising and falling ramp times for setpoint changes.	**2, 3, 4**	RW
P10.14	**1312**	**PID1 Set Point 1 Source** Defines source of the setpoint.	**2, 3, 4**	RW
P10.15	**1313**	**PID1 Set Point 1 Min** Defines Minimum Value.	**2, 3, 4**	RW
P10.16	**1314**	**PID1 Set Point 1 Max** Defines Maximum Value.	**2, 3, 4**	RW
P10.17	**1315**	**PID1 Set Point 1 Sleep Enable** Enable PID Set Point Sleep mode.	**2, 3, 4**	RW
P10.18	**1316**	**PID1 Set Point 1 Sleep Freq** Drive goes to sleep mode when the output frequency stays below this limit for a time greater than that defined by parameter Sleep delay.	**2, 3, 4**	RW
P10.19	**1317**	**PID1 Set Point 1 Sleep Delay** The minimum amount of time the frequency has to remain below the sleep level before the drive is stopped.	**2, 3, 4**	RW
P10.20	**1318**	**PID1 Set Point 1 Wake-Up Level** Defines the level for the PID feedback value wake-up supervision. Uses selected process units.	**2, 3, 4**	RW
P10.21	**1320**	**PID1 Set Point 1 Boost** The setpoint can be boosted with a digital input.	**2, 3, 4**	RW
P10.22	**1321**	**PID1 Set Point 2 Source** Defines source of the setpoint.	**2, 3, 4**	RW
P10.23	**1322**	**PID1 Set Point 2 Min** Defines Minimum Value.	**2, 3, 4**	RW
P10.24	**1323**	**PID1 Set Point 2 Max** Defines Maximum Value.	**2, 3, 4**	RW
P10.25	**1324**	**PID1 Set Point 2 Sleep Enable** Enable PID sleep function.	**2, 3, 4**	RW
P10.26	**1325**	**PID1 Set Point2 Sleep Freq** Drive goes to sleep mode when the output frequency stays below this limit for a time greater than that defined by parameter Sleep delay.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.27	**1326**	**PID1 Set Point 2 Sleep Delay** The minimum amount of time the frequency has to remain below the sleep level before the drive is stopped.	**2, 3, 4**	RW
P10.28	**1327**	**PID1 Set Point 2 Wake-Up Level** Defines the level for the PID feedback value wake-up supervision. Uses selected process units.	**2, 3, 4**	RW
P10.29	**1329**	**PID1 Set Point 2 Boost** The setpoint can be boosted with a digital input.	**2, 3, 4**	RW
P10.30	**1330**	**PID1 Feedback Function** Choose a single signal used as feedback.	**2, 3, 4**	RW
P10.31	**1331**	**PID1 Feedback Gain** Define Gain associated with feedback.	**2, 3, 4**	RW
P10.32	**1332**	**PID1 Feedback 1 Source** Define where feedback signal is from.	**2, 3, 4**	RW
P10.33	**1333**	**PID1 Feedback 1 Min** Minimum Unit Value.	**2, 3, 4**	RW
P10.34	**1334**	**PID1 Feedback 1 Max** Maximum Unit Value.	**2, 3, 4**	RW
P10.35	**1335**	**PID1 Feedback 2 Source** Define where feedback signal is from.	**2, 3, 4**	RW
P10.36	**1336**	**PID1 Feedback 2 Min** Define feedback2 Minimum Value.	**2, 3, 4**	RW
P10.37	**1337**	**PID1 Feedback 2 Max** Define feedback2 Maximum Value.	**2, 3, 4**	RW
P10.38	**1338**	**PID1 Feedforward Func** Choose a single signal used as feed forward.	**2, 3, 4**	RW
P10.39	**1339**	**PID1 Feedforward Gain** Define feed forward gain.	**2, 3, 4**	RW
P10.40	**1340**	**PID1 Feedforward 1 Source** Define where feed forward signal is from.	**2, 3, 4**	RW
P10.41	**1341**	**PID1 Feedforward 1 Min** Define feed forward Minimum Value.	**2, 3, 4**	RW
P10.42	**1342**	**PID1 Feedforward 1 Max** Define feed forward Maximum Unit Value.	**2, 3, 4**	RW
P10.43	**1343**	**PID1 Feedforward 2 Source** Define where feed forward signal is from.	**2, 3, 4**	RW
P10.44	**1344**	**PID1 Feedforward 2 Min** Define feed forward2 Minimum Unit Value.	**2, 3, 4**	RW
P10.45	**1345**	**PID1 Feedforward 2 Max** Define feed forward2 Maximum Unit Value.	**2, 3, 4**	RW
P10.46	**1352**	**PID1 Set Point 1 Comp Enable** Enables pressure loss compensation for setpoint 1.	**2, 3, 4**	RW
P10.47	**1353**	**PID1 Set Point 1 Comp Max** Value added proportionally to the frequency.	**2, 3, 4**	RW
P10.48	**1354**	**PID1 Set Point 2 Comp Enable** Enables pressure loss compensation for setpoint 2.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P10.49	**1355**	**PID1 Set Point 2 Comp Max** Value added proportionally to the frequency, setpoint compensation = comp max * (output freq–min freq)/(max freq–min freq). **Procedure for setting up PID Application:** Initially set PID Gain (P10.1) to 0.0% and set the PID I Time (P10.2) to 20 sec. Start the frequency converter and verify if the setpoint is reached quickly while maintaining stable operation of the system. If not increase the PID Gain (P10.1) until the drive speed oscillates constantly. After this occurs reduce the PID Gain (P10.1) slightly to reduce the oscillation. From here take the value found for PID Gain (P10.1) to 0.5 times that value and reduce the PID I time (P10.2) until the feedback signal oscillates again. Increase the PID I time (P10.2) until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time (P10.2). If signal noise is seen at high frequency increase the filter time varies to filter the signal. If further tuning is required refer to the table showing what is affected.	**2, 3, 4**	RW

Figure 65. Setting up PID Application

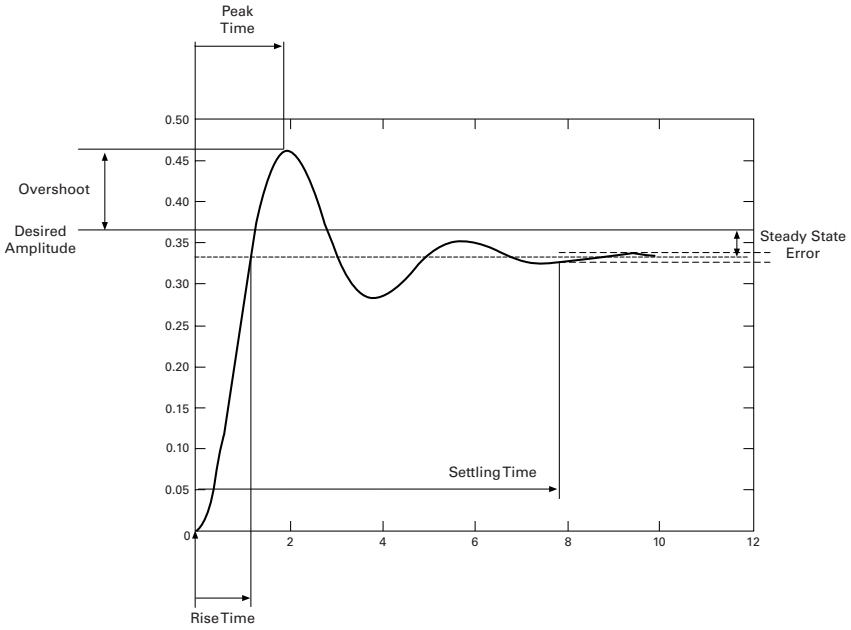
Response	Rise Time	Overshoot	Settling Time	Steady State Error
Increase PID Gain	Decrease Rise	Increases Overshoot	Not Affected	Decreases Error
Increase PID1 Time	Decrease Rise	Increases Overshoot	Increases Setting	Eliminates Error
Increase PID0 Time	Not Affected	Decreases Overshoot	Decreases Setting	Not Affected

Rise Time—the time required for the output to rise 90% of the desired level for the first time.

Overshoot—the difference between the peak level and the steady state level.

Setting Time—time required for the system to converge to its steady state.

Steady State Error—the difference between the steady state level and the desired output level.



P11.1	**1356**	**PID2 Control Gain** See P10.1.	**3, 4**	RW
P11.2	**1357**	**PID2 Control ITime** See P10.2.	**3, 4**	RW
P11.3	**1358**	**PID2 Control DTime** See P10.3.	**3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.4	**1359**	**PID2 Process Unit** See P10.4.	**3, 4**	RW
P11.5	**1360**	**PID2 Process Unit Min** See P10.5.	**3, 4**	RW
P11.6	**1362**	**PID2 Process Unit Max** See P10.6.	**3, 4**	RW
P11.7	**1364**	**PID2 Process Unit Decimal** See P10.7.	**3, 4**	RW
P11.8	**1365**	**PID2 Error Inversion** See P10.8.	**3, 4**	RW
P11.9	**1366**	**PID2 Dead Band** See P10.9.	**3, 4**	RW
P11.10	**1368**	**PID2 Dead Band Delay** See P10.10.	**3, 4**	RW
P11.11	**1369**	**PID2 Keypad Set Point 1** See P10.11.	**3, 4**	RW
P11.12	**1371**	**PID2 Keypad Set Point 2** See P10.12.	**3, 4**	RW
P11.13	**1373**	**PID2 Ramp Time** See P10.13.	**3, 4**	RW
P11.14	**1374**	**PID2 Set Point 1 Source** See P10.14.	**3, 4**	RW
P11.15	**1375**	**PID2 Set Point 1 Min** See P10.15.	**3, 4**	RW
P11.16	**1376**	**PID2 Set Point 1 Max** See P10.16.	**3, 4**	RW
P11.17	**1377**	**PID2 Set Point 1 Sleep Enable** See P10.17.	**3, 4**	RW
P11.18	**1378**	**PID2 Set Point 1 Sleep Freq** See P10.18.	**3, 4**	RW
P11.19	**1379**	**PID2 Set Point 1 Sleep Delay** See P10.19.	**3, 4**	RW
P11.20	**1380**	**PID2 Set Point 1 Wake-Up Level** See P10.20.	**3, 4**	RW
P11.21	**1382**	**PID2 Set Point 1 Boost** See P10.21.	**3, 4**	RW
P11.22	**1383**	**PID2 Set Point 2 Source** See P10.22.	**3, 4**	RW
P11.23	**1384**	**PID2 Set Point 2 Min** See P10.23.	**3, 4**	RW
P11.24	**1385**	**PID2 Set Point 2 Max** See P10.24.	**3, 4**	RW
P11.25	**1386**	**PID2 Set Point 2 Sleep Enable** See P10.25.	**3, 4**	RW
P11.26	**1387**	**PID2 Set Point 2 Sleep Freq** See P10.26.	**3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P11.27	**1388**	**PID2 Set Point 2 Sleep Delay** See P10.27.	**3, 4**	RW
P11.28	**1389**	**PID2 Set Point 2 Wake-Up Level** See P10.28.	**3, 4**	RW
P11.29	**1391**	**PID2 Set Point 2 Boost** See P10.29.	**3, 4**	RW
P11.30	**1392**	**PID2 Feedback Func** See P10.30.	**3, 4**	RW
P11.31	**1393**	**PID2 Feedback Gain** See P10.31.	**3, 4**	RW
P11.32	**1394**	**PID2 Feedback 1 Source** See P10.32.	**3, 4**	RW
P11.33	**1395**	**PID2 Feedback 1 Min** See P10.33.	**3, 4**	RW
P11.34	**1396**	**PID2 Feedback 1 Max** See P10.34.	**3, 4**	RW
P11.35	**1397**	**PID2 Feedback 2 Source** See P10.35.	**3, 4**	RW
P11.36	**1398**	**PID2 Feedback 2 Min** See P10.36.	**3, 4**	RW
P11.37	**1399**	**PID2 Feedback 2 Max** See P10.37.	**3, 4**	RW
P11.38	**1400**	**PID2 Feedforward Func** See P10.38.	**3, 4**	RW
P11.39	**1401**	**PID2 Feedforward Gain** See P10.39.	**3, 4**	RW
P11.40	**1402**	**PID2 Feedforward 1 Source** See P10.40.	**3, 4**	RW
P11.41	**1403**	**PID2 Feedforward 1 Min** See P10.41.	**3, 4**	RW
P11.42	**1404**	**PID2 Feedforward 1 Max** See P10.42.	**3, 4**	RW
P11.43	**1405**	**PID2 Feedforward 2 Source** See P10.43.	**3, 4**	RW
P11.44	**1406**	**PID2 Feedforward 2 Min** See P10.44.	**3, 4**	RW
P11.45	**1407**	**PID2 Feedforward 2 Max** See P10.45.	**3, 4**	RW
P11.46	**1414**	**PID2 Set Point 1 Comp Enable** See P10.46.	**3, 4**	RW
P11.47	**1415**	**PID2 Set Point 1 Comp Max** See P10.47.	**3, 4**	RW
P11.48	**1416**	**PID2 Set Point 2 Comp Enable** See P10.48.	**3, 4**	RW
P11.49	**1417**	**PID2 Set Point 2 Comp Max** See P10.49.	**3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P12.1	**105**	**Preset Speed 1**	**1, 2, 3, 4**	RW
P12.2	**106**	**Preset Speed 2** Parameter values are automatically limited between the minimum and maximum frequencies (P1.1, P1.2). Sets the desired frequency when input is applied.	**1, 2, 3, 4**	RW
P12.3	**118**	**Preset Speed 3**	**1, 2, 3, 4**	RW
P12.4	**119**	**Preset Speed 4**	**1, 2, 3, 4**	RW
P12.5	**120**	**Preset Speed 5**	**1, 2, 3, 4**	RW
P12.6	**121**	**Preset Speed 6**	**1, 2, 3, 4**	RW
P12.7	**122**	**Preset Speed 7** These parameter values define the Multi-step speeds selected. These parameter values are automatically limited between minimum and maximum frequency (P1.1 and P1.2).	**1, 2, 3, 4**	RW
P13.1	**295**	**Torque Limit** With this parameter you can set the torque limit control between 0.0–400.0%.	**4**	RW
P13.2	**296**	**TorqLimCtrl P** This parameter defines the gain of the torque limit controller.	**4**	RW
P13.3	**297**	**TorqLimCtrl I** This parameter determines the I-gain of the torque limit controller.	**4**	RW
P13.4	**303**	**Torque Ref Sel** Defines the source for torque reference. **0** Not used **1** AI1 **2** AI2 **3** SlotA:AI1 **4** SlotB:AI1 **5** AI1 joystick **6** AI2 joystick **7** Keypad Torque Ref **8** Fieldbus Ref	**4**	RW
P13.5	**782**	**Keypad Torque Ref** Keypad torque reference setpoint.	**4**	RW
P13.6	**304**	**Torque Ref Max**	**4**	RW
P13.7	**305**	**Torque Ref Min** Scale the custom minimum and maximum levels for analog inputs within –300.0 to 300.0%.	**4**	RW
P13.8	**300**	**Torque Ctrl Freq Min** Defines the frequency limit below which the frequency converter operates in the frequency control mode. Because of the nominal slip of the motor, the internal torque calculation is inaccurate at low speeds where it is recommended to use the frequency control mode.	**4**	RW
P13.9	**301**	**OL Torque Control P** Defines the P gain of the torque controller.	**4**	RW
P13.10	**302**	**OL Torque Control I** Defines the I gain of the torque controller.	**4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P13.11	**1666**	**Torque Control Freq Max** With this parameter, the maximum frequency for the torque control can be selected. **0** Maximum frequency, P1.2 **1** Selected frequency reference **2** Preset speed 7, P12.7	**4**	RW
P13.12	**1636**	**Window Pos Width** Positive torque control width.	**4**	RW
P13.13	**1637**	**Window Neg Width** Negative torque control width.	**4**	RW
P13.14	**1638**	**Window Pos Off Limit** Positive torque off limit.	**4**	RW
P13.15	**1639**	**Window Neg Off Limit** Negative torque off limit.	**4**	RW
P13.16	**1640**	**Torque Reference Filter TC** Torque reference filter time.	**4**	RW
P13.17	**1606**	**Pull Out Torque** Startup torque level in percentage.	**4**	RW
P13.18	**1667**	**Startup Torque Time** Startup torque time limit for starting torque level in open loop torque control mode.	**4**	RW
P13.19	**1684**	**Stop State Magnetization Time** Motor stop magnetization time upon stopping in open loop torque control mode.	**4**	RW
P14.1	**254**	**DC-Brake Current** Defines the current injected into the motor during DC-braking.	**1, 2, 3, 4**	RW
P14.2	**263**	**Start DC-Brake Time** DC-brake is activated when the start command is given. This parameter defines the time before the brake is released. After the brake is released, the output frequency increases according to the set start function by P7.9.	**1, 2, 3, 4**	RW
P14.3	**262**	**Stop DC-Brake Frequency** The output frequency at which the DC-braking is applied on stopping. See **Figure 66**.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P14.4	**255**	**Stop DC-Brake Time**	**1, 2, 3, 4**	RW

Determines if braking is ON or OFF and the braking time of the DC-brake when the motor is stopping. The function of the DC-brake depends on the stop function, P7.10.

0.0 DC-brake is not used

>0.0 DC-brake is in use and its function depends on the Stop function, (P7.10). The DC-braking time is determined with this parameter

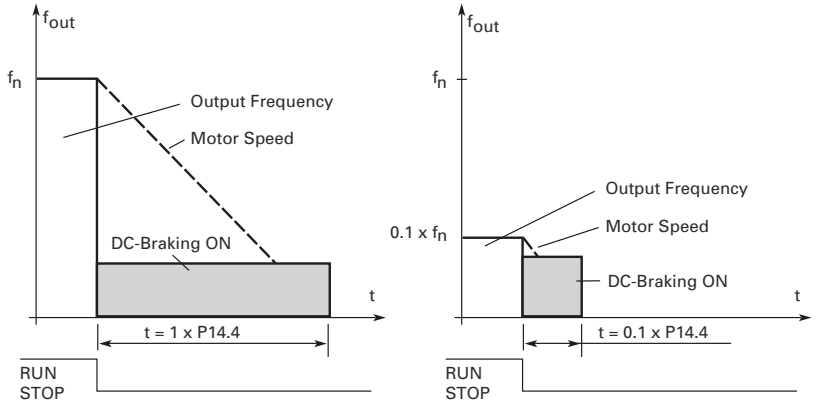
Par. P7.10 = 0; Stop function = Coasting:

After the stop command, the motor coasts to a stop without control of the frequency converter.

With DC-injection, the motor can be electrically stopped in the shortest possible time, without using an optional external braking resistor.

The braking time is scaled according to the frequency when the DC-braking starts. If the frequency is ≥ the nominal frequency of the motor, the set value of parameter P14.4 determines the braking time. When the frequency is ≤10% of the nominal, the braking time is 10% of the set value of P14.4.

Figure 66. DC-Braking Time when Stop Mode = Coasting

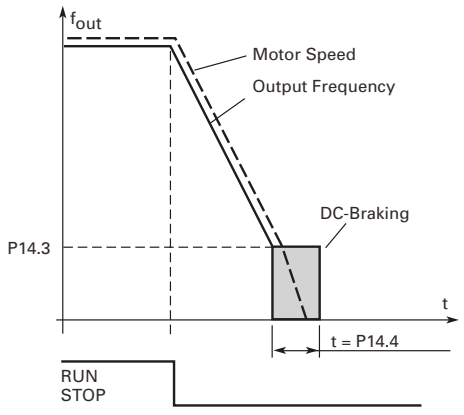


Par. P7.10 = 1; Stop function = Ramp:

After the Stop command, the speed of the motor is reduced according to the set deceleration parameters, as fast as possible, to the speed defined with P14.3, where the DC-braking starts.

The braking time is defined with P14.4. If high inertia exists, it is recommended to use an external braking resistor for faster deceleration. See **Figure 67**.

Figure 67. DC-Braking Time when Stop Mode = Ramp

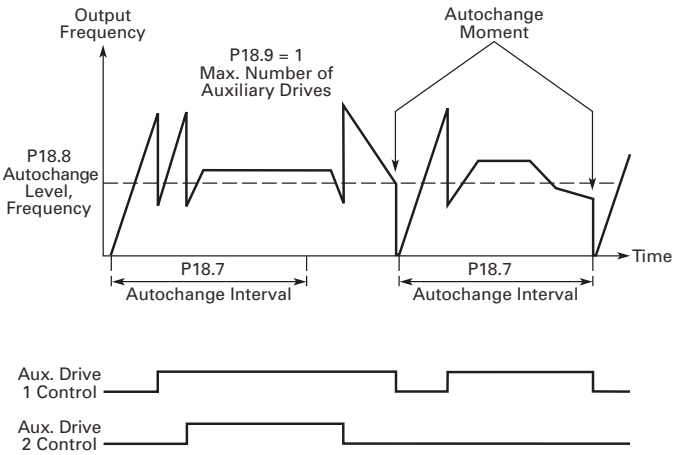


Code	Modbus ID	Parameter	Application	RO/RW
P14.5	**251**	**Brake Chopper** When the frequency converter is decelerating the motor, the inertia of the motor and the load is fed into an external brake resistor. This enables the frequency converter to decelerate the load with a torque equal to that of acceleration (provided that the correct brake resistor has been selected). **0** No brake chopper used **1** Brake chopper in use and tested when running. Can be tested also in READY state **2** External brake chopper (no testing) **3** Used and tested in READY state and when running **4** Used when running (no testing)	**1, 2, 3, 4**	RW
P14.6	**266**	**Flux Brake** Instead of DC braking, flux braking is a useful form of braking for motors <15 kW. When braking is needed, the frequency is reduced and the flux in the motor is increased, which in turn increases the motor's capability to brake. Unlike DC braking, the motor speed remains controlled during braking. The flux braking can be set ON or OFF. **0** Flux braking OFF **1** Flux braking ON **Note**: Flux braking converts the energy into heat in the motor, and should be used intermittently to avoid motor damage.	**1, 2, 3, 4**	RW
P14.7	**519**	**Flux Brake Current** Defines the flux braking current value. This value can be set P1.5 and P1.16.	**1, 2, 3, 4**	RW
P15.1	**535**	**Fire Mode Function** This parameter determines whether the fire mode function is determined by a contact closure or contact opening on digital input. **0** Closing contact initiates fire mode function **1** Opening contact initiates fire mode function	**2, 3, 4**	RW
P15.2	**536**	**FMRefSel Function** Setting this parameter to 1 enables the Fire Mode Frequency Reference 1 or Fire Mode Frequency Reference 2 to be used as a reference in "Fire Mode" without using a digital input. **0** Disabled **1** Enabled	**2, 3, 4**	RW
P15.3	**537**	**Fire Mode Min Frequency** This parameter sets the minimum output frequency for fire mode.	**2, 3, 4**	RW
P15.4	**565**	**Fire Mode Freq Ref 1** This parameter sets the drive operating frequency for fire mode reference 1.	**2, 3, 4**	RW
P15.5	**564**	**Fire Mode Freq Ref 2** This parameter sets the drive operating frequency for fire mode reference 2.	**2, 3, 4**	RW
P15.6	**554**	**Smoke Purge Frequency** Frequency setting for Smoke Purge.	**2, 3, 4**	RW
P16.1	**557**	**Motor Nom Current 2** The second motor set I_n. Selected based off of a digital input.	**2, 3, 4**	RW
P16.2	**578**	**Motor Nom Speed 2** The second motor set n_n. Selected based off of a digital input.	**2, 3, 4**	RW
P16.3	**579**	**Motor PF 2** The second motor set F_n. Selected based off of a digital input.	**2, 3, 4**	RW
P16.4	**580**	**Motor Nom Voltage 2** The second motor set p_n. Selected based off of a digital input.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P16.5	**581**	**Motor Nom Freq 2** The second motor set v_n. Selected based off of a digital input.	**2, 3, 4**	RW
P16.6	**1419**	**Stator Resistor 2** The second set of motor stator resistor real value.	**4**	RW
P16.7	**1420**	**Rotor Resistor 2** The second set of motor rotor resistor real value.	**4**	RW
P16.8	**1421**	**Leak Inductance 2** The second set of motor leakage inductance real value.	**4**	RW
P16.9	**1422**	**Mutual Inductance 2** The second set of motor mutual inductance real value.	**4**	RW
P16.10	**1423**	**Excitation Current 2** The second set of motor no-load current real value.	**4**	RW
P17.1	**1418**	**Bypass Enable** This parameter identifies whether or not to enter into bypass mode. The "Bypass" soft key on keypad will show to start bypass.	**2, 3, 4**	RW
P17.2	**544**	**Bypass Start Delay** This parameter specifies the time delay between when the Start Signal is applied in I/O or Fieldbus, to when the motor starts.	**2, 3, 4**	RW
P17.3	**542**	**Auto Bypass** This parameter specifies whether an automatic switch to bypass will occur based on Overvoltage Fault Auto Bypass P10.5 through Undervoltage Fault Auto Bypass P10.9 parameters below. **0** Auto Bypass disabled **1** Auto Bypass enabled	**2, 3, 4**	RW
P17.4	**543**	**Auto Bypass Delay** This parameter specifies the time delay before an automatic switch to bypass, as determined by Overvoltage Fault Auto Bypass P10.5 through Undervoltage Fault Auto Bypass P10.9 parameters, will occur.	**2, 3, 4**	RW
P17.5	**547**	**Overcurrent Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the overcurrent fault auto-restart tries have been exceeded. **0** Auto bypass on overcurrent fault tries exceeded disabled, bypass once fault happens **1** Auto bypass on overcurrent fault tries exceeded enabled, bypass after tries exceed	**2, 3, 4**	RW
P17.6	**546**	**IGBT FLT Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the IGBT fault auto-restart tries have been exceeded. **0** Auto bypass on IGBT fault tries exceeded disabled **1** Auto bypass on IGBT fault tries exceeded enabled	**2, 3, 4**	RW
P17.7	**548**	**4 mA FLT Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the loss of reference fault and auto-restart tries have been exceeded. **0** Auto bypass on loss of reference fault tries exceeded disabled **1** Auto bypass on loss of reference fault tries exceeded enabled **Note**: P1.7.1 (4 mA (Reference) Fault Auto Bypass) must be set to 4 or 5 (Fault).	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P17.8	**545**	**Undervoltage Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the undervoltage fault auto-restart tries have been exceeded. **0** Auto bypass on undervoltage fault tries exceeded disabled **1** Auto bypass on undervoltage fault tries exceeded enabled	**2, 3, 4**	RW
P17.9	**549**	**Overvoltage Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the overvoltage fault auto-restart tries have been exceeded. **0** Auto bypass on overvoltage fault tries exceeded disabled **1** Auto bypass on overvoltage fault tries exceeded enabled	**2, 3, 4**	RW
P18.1	**342**	**Number of Motors** Total auxiliary number of motors/pumps used with the Multi-Pump System.	**2, 3, 4**	RW
P18.2	**343**	**Bandwidth** Percentage of the setpoint defining when motor connection or removal will not take place.	**2, 3, 4**	RW
P18.3	**344**	**Bandwidth Delay** With feedback outside the bandwidth, this time must pass before pumps are added or removed.	**2, 3, 4**	RW
P18.4	**350**	**Interlock Enable** Input tells the frequency converter if a motor/pump is connected or not.	**2, 3, 4**	RW
P18.5	**346**	**Include Freq Converter** Input tells the drive if the motor/pump contacted with frequency converter is included in the auto change and interlock system.	**2, 3, 4**	RW
P18.6	**345**	**Auto Change Enable** Autochange will rotate the starting order/priority of the motors in the system to get equal run time on all the motors.	**2, 3, 4**	RW
P18.7	**347**	**AutoChange Interval** Defines how often to rotate starting order of motors/pumps.	**2, 3, 4**	RW
P18.8	**349**	**AutoChange Freq Limit** An autochange is done when the autochange interval has elapsed and the drive is running below autochange frequency limit.	**2, 3, 4**	RW
P18.9	**348**	**AutoChange Motor Limit** An auto change is done when the auto change interval has elapsed and the number of running aux motors is less than auto change motor limit.	**2, 3, 4**	RW

Figure 68. AutoChange Interval and Limits



Code	Modbus ID	Parameter	Application	RO/RW
P18.10	**483**	**Damper Start** This parameter determines the function of damper. **0** Start standard start **1** Interlocked Start—To use this, a relay output, RO1–RO3, needs to be programmed for selections 35 "Damper Control," and a digital input DIN must be programmed for selection "RunEn/INTLK." The relay output is used to energize an element of the driven system, such as a damper, seal water solenoid, or a pre-lube pump. Upon a return acknowledgement contact closure to the programmed digital input, the frequency converter will start **2** Interlock Time Start—This functions the same as the Interlocked Start, except that if the return acknowledgement contact is not received within the Interlock Timeout, a "prevent-up start" fault is displayed in keypad and the start sequence will need to be restarted **3** Delay Start This start is similar to the Interlocked Start, except that a return contact is not used. After the "Delay Time" following the relay output closure, the frequency converter starts	**2, 3, 4**	RW
P18.11	**484**	**Damper Time Out** The timeout time used for an Interlocked Time Start, after which the start sequence must be restarted if no acknowledgement contact is received.	**2, 3, 4**	RW
P18.12	**485**	**Damper Delay** The delay time following a Delay Start, after which the frequency converter will be started.	**2, 3, 4**	RW
P19.1	**491**	**Interval 1 On Time** On time for Interval function. It uses 24-hour format.	**2, 3, 4**	RW
P19.2	**493**	**Interval 1 Off Time** Off time for Interval function. It uses 24-hour format.	**2, 3, 4**	RW
P19.3	**517**	**Interval 1 From Day** On day of week for Interval function. **0** Sunday **1** Monday **2** Tuesday **3** Wednesday **4** Thursday **5** Friday **6** Saturday	**2, 3, 4**	RW
P19.4	**518**	**Interval 1 To Day** On day of week for Interval function. **0** Sunday **1** Monday **2** Tuesday **3** Wednesday **4** Thursday **5** Friday **6** Saturday	**2, 3, 4**	RW
P19.5	**519**	**Interval 1 Channel** Select affected time channel. **0** Not used **1** Time channel 1 **2** Time channel 2 **3** Time channel 3	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P19.6	**495**	**Interval 2 On Time** See P19.1.	**2, 3, 4**	RW
P19.7	**497**	**Interval 2 Off Time** See P19.2.	**2, 3, 4**	RW
P19.8	**520**	**Interval 2 From Day** See P19.3.	**2, 3, 4**	RW
P19.9	**521**	**Interval 2 To Day** See P19.4.	**2, 3, 4**	RW
P19.10	**522**	**Interval 2 Channel** See P19.5.	**2, 3, 4**	RW
P19.11	**499**	**Interval 3 On Time** See P19.1.	**2, 3, 4**	RW
P19.12	**501**	**Interval 3 Off Time** See P19.2.	**2, 3, 4**	RW
P19.13	**523**	**Interval 3 From Day** See P19.3.	**2, 3, 4**	RW
P19.14	**524**	**Interval 3 To Day** See P19.4.	**2, 3, 4**	RW
P19.15	**525**	**Interval 3 Channel** See P19.5.	**2, 3, 4**	RW
P19.16	**503**	**Interval 4 On Time** See P19.1.	**2, 3, 4**	RW
P19.17	**505**	**Interval 4 Off Time** See P19.2.	**2, 3, 4**	RW
P19.18	**526**	**Interval 4 From Day** See P19.3.	**2, 3, 4**	RW
P19.19	**527**	**Interval 4 To Day** See P19.4.	**2, 3, 4**	RW
P19.20	**528**	**Interval 4 Channel** See P19.5.	**2, 3, 4**	RW
P19.21	**507**	**Interval 5 On Time** See P19.1.	**2, 3, 4**	RW
P19.22	**509**	**Interval 5 Off Time** See P19.2.	**2, 3, 4**	RW
P19.23	**529**	**Interval 5 From Day** See P19.3.	**2, 3, 4**	RW
P19.24	**530**	**Interval 5 To Day** See P19.4.	**2, 3, 4**	RW
P19.25	**531**	**Interval 5 Channel** See P19.5.	**2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P19.26	**511**	**Timer 1 Duration** The timer will run when activated by DI).	**2, 3, 4**	RW
P19.27	**532**	**Timer 1 Channel** Select affected time channel. **0** Not used **1** Time channel 1 **2** Time channel 2 **3** Time channel 3	**2, 3, 4**	RW
P19.28	**513**	**Timer 2 Duration** See P19.26.	**2, 3, 4**	RW
P19.29	**533**	**Timer 2 Channel** SeeP19.27.	**2, 3, 4**	RW
P19.30	**515**	**Timer 3 Duration** See P19.26.	**2, 3, 4**	RW
P19.31	**534**	**Timer 3 Channel** See P19.27.	**2, 3, 4**	RW
P20.1.1	**1556**	**FB Data Output 1 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.2	**1557**	**FB Data Output 2 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.3	**1558**	**FB Data Output 3 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.4	**1559**	**FB Data Output 4 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.5	**1560**	**FB Data Output 5 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.6	**1561**	**FB Data Output 6 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.7	**1562**	**FB Data Output 7 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.1.8	**1563**	**FB Data Output 8 Sel** Selects fieldbus process data word to pass over fieldbus.	**1,2, 3, 4**	RW
P20.2.1	**586**	**RS-485 Comm Set** This parameter defines the communication protocol for RS-485. **0** Modbus RTU **1** BACnet MS/TP	**1, 2, 3, 4**	RW
P20.2.2	**587**	**Slave Address** This parameter defines the slave address for RS-485 communication.	**1,2, 3, 4**	RW
P20.2.3	**584**	**Baud Rate** This parameter defines communication speed for RS-485 communication.	**1,2, 3, 4**	RW
P20.2.4	**585**	**Parity Type** This parameter defines parity type for RS-485 communication.	**1,2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P20.2.5	**588**	**Protocol Status** This parameter shows the protocol status for RS-485 communication. **0** Initial **1** Stopped **2** Operational **3** Faulted	**1, 2, 3, 4**	RO
P20.2.6	**589**	**Slave Busy** Shows the status of the Slave device on the network.	**1, 2, 3, 4**	RO
P20.2.7	**590**	**Parity Error** Counts the amount of Parity Errors seen on the RS-485 network.	**1, 2, 3, 4**	RO
P20.2.8	**591**	**Slave Fault** Error response given when slave receives message without communication error, but can't handle it.	**1, 2, 3, 4**	RO
P20.2.9	**592**	**Last Fault Response** Stores the last active fault for viewing over communications.	**1, 2, 3, 4**	RO
P20.2.10	**593**	**Comm Timeout Modbus RTU** Selects the time it waits before a communication fault occurs over Modbus RTU if a message isn't received.	**1, 2, 3, 4**	RW
P20.2.11	**594**	**BACnet Baud Rate** Communication speed of BACnet.	**1, 2, 3, 4**	RW
P20.2.12	**595**	**MAC Address** Selects the BACnet Address that the drive will be located at on Instance node.	**1, 2, 3, 4**	RW
P20.2.13	**596**	**Instance Number** Selects the BACnet Instance value.	**1, 2, 3, 4**	RW
P20.2.14	**598**	**Comm Timeout BACnet** Selects the time it waits before a communication fault occurs over BACnet.	**1, 2, 3, 4**	RW
P20.2.15	**599**	**BACnet Protocol Status** Shows the status of the BACnet protocol.	**1, 2, 3, 4**	RW
P20.2.16	**600**	**BACnet Fault Code** BACnet protocol faults. **0** None **1** Sole Master	**1, 2, 3, 4**	RW
P20.3.1	**1500**	**IP Address Mode** This parameter defined the IP address configuration mode for EIP/Modbus TCP. **0** DHCP with AutoIP **1** Static IP	**1, 2, 3, 4**	RW
P20.3.2	**1507**	**Active IP Address** The current used IP address.	**1, 2, 3, 4**	RO
P20.3.3	**1509**	**Active Subnet Mask** The current used subnet mask.	**1, 2, 3, 4**	RO
P20.3.4	**1511**	**Active Default Gateway** The current used default gateway.	**1, 2, 3, 4**	RO
P20.3.5	**1513**	**MAC Address** 48 bit hardware address.	**1, 2, 3, 4**	RO
P20.3.6	**1501**	**Static IP Address** The static IP address. This parameter is used for user to configure the IP address, when P20.3.1 is set to be 1.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P20.3.7	**1503**	**Static Subnet Mask** The static IP address. This parameter is used for user to configure the subnet mask, when P20.3.1 is set to be 1.	**1, 2, 3, 4**	RW
P20.3.8	**1505**	**Static Default Gateway** The static IP address. This parameter is used for user to configure the default gateway, when P20.3.1 is set to be 1.	**1, 2, 3, 4**	RW
P20.3.9	**608**	**EtherNet/IP Protocol Status** Indicates if Ethernet Protocol is active or not. **0** Stopped **1** Operational **2** Faulted	**1, 2, 3, 4**	RO
P20.3.10	**609**	**Connection Limit** Maximum number of connections allowed to the frequency converter.	**1, 2, 3, 4**	RW
P20.3.11	**610**	**Modbus TCP Unit ID** Unit identifier unit value for Modbus TCP.	**1, 2, 3, 4**	RW
P20.3.12	**611**	**Comm Timeout** Selects the time it waits before a communication fault occurs over Ethernet.	**1, 2, 3, 4**	RW
P20.3.13	**612**	**Protocol Status** **0** Stopped **1** Operational **2** Faulted	**1, 2, 3, 4**	RO
P20.3.14	**613**	**Slave Busy** Value indicates frequency converter is communicating.	**1, 2, 3, 4**	RO
P20.3.15	**614**	**Parity Error** This parameter checks the input characters' parity error.	**1, 2, 3, 4**	RO
P20.3.16	**615**	**Slave Failure** Indicates the frequency converter is unable to process message.	**1, 2, 3, 4**	RO
P20.3.17	**616**	**Last Fault Resp** Shows the last active fault that occurred.	**1, 2, 3, 4**	RO
P21.1.1	**340**	**Language** This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available languages are: English, Chinese, German, Spanish, French and Portuguese.	**1, 2, 3, 4**	RW
P21.1.2	**142**	**Application** This parameter sets the active application if multiple applications have been loaded.	**1, 2, 3, 4**	RW
P21.1.3	**619**	**Parameter Sets** This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets. **0** No **1** Load Factory Default parameters **2** Store parameter set #1 **3** Load parameter set #1 **4** Store parameter set #2 **5** Load parameter set #2	**1, 2, 3, 4**	RW
P21.1.4	**620**	**Up to Keypad** This function uploads all existing parameter groups to the keypad. **0** No **1** Yes (All parameters)	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P21.1.5	**621**	**Down From Keypad** This function downloads one or all parameter groups from the keypad to the drive. **0** No **1** Yes (All parameters)	**1, 2, 3, 4**	RW
P21.1.6	**623**	**Param Comparison** With the Parameter Comparison function, you can compare the actual parameter values to the values of your customized parameter sets and those loaded to the control keypad. The actual parameter values are first compared to those of the customized parameter Set1. If no differences are detected, a "0" is displayed on the lowermost line of the keypad. If any of the parameter values differ from those of the Set1 parameters, the number of the deviations is displayed together. By pressing the right arrow button once again you will see both the actual value and the value it was compared to. In this display, the value on the Description line (in the middle) is the default value, and the one on the value line (lowermost line) is the edited value. You can also edit the actual value by pushing the Right Arrow button. Actual values can also be compared to Set2, Factory Settings and Keypad Set values.	**1, 2, 3, 4**	RW
P21.1.7	**624**	**Password** The application selection can be protected against unauthorized changes with the Password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0.	**1, 2, 3, 4**	RW
P21.1.8	**625**	**Parameter Lock** This function allows the user to prohibit changes to the parameters. If the parameter lock is activated the text *locked* will appear on the display if you try to edit a parameter value. **Note**: This function does not prevent unauthorized editing of parameter values.	**1, 2, 3, 4**	RW
P21.1.9	**627**	**Multimonitor Set** The keypad display where can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.	**1, 2, 3, 4**	RW
P21.1.10	**628**	**Default Page** This parameter sets the view to which the display automatically moves as the Timeout Time expires or when the keypad power is switched on. If the Default Page value is 0, the function is not activated, i.e., the last displayed page remains on the keypad display.	**1, 2, 3, 4**	RW
P21.1.11	**629**	**Timeout Time** The Timeout Time setting defines the time after which the keypad display returns to the Default Page. **Note**: If the Default Page value is 0 the Timeout Time setting has no effect.	**1, 2, 3, 4**	**[?]**
P21.1.12	**630**	**Contrast Adjust** If the display is not clear, you can adjust the keypad contrast with this parameter.	**1, 2, 3, 4**	RW
P21.1.13	**631**	**Backlight Time** This parameter determines how long the backlight stays on before going out.	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P21.1.14	**632**	**Fan Control** This function allows you to control the PowerXL DG1's cooling fan. You can set the fan to run: **1** Continuous fan runs continuously **2** Temperature—based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C. The fan receives a stop command when the heat sink temperature falls to 55°C. The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from "Continuous" to "Temperature" **3** First Start after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment **4** Calc Temp starting of cooling fan is based on calculated IGBT temperature. When IGBT temp = 40°C, fan starts and when temp falls down to 30°C, fan stops **Note**: The fan runs continuously, regardless of this setting, when the frequency converter is in RUN state.	**1, 2, 3, 4**	RW
P21.1.15	**633**	**HMI ACK Timeout** This function allows the user to change the timeout of the HMI acknowledgement time. *Example:* l Transfer delay between the frequency converter and the PC = 600 ms l The value of HMI Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay) l The corresponding setting shall be entered in the [Misc]-part of the file NCDrive.ini: Retries = 5 AckTimeOut = 1200 TimeOut = 6000 It must also be considered that intervals shorter than the HMI Acknowledge Timeout time cannot be used in frequency converter drive monitoring.	**1, 2, 3, 4**	RW
P21.1.16	**634**	**HMI Retry Num** With this parameter you can set the number of times the drive will try to receive acknowledgement when it has not been received within the acknowledgement time (HMI Acknowledge Timeout) or if the received acknowledgement is faulty.	**1, 2, 3, 4**	RW
P21.2.1	**640**	**Keypad Software Version**	**1, 2, 3, 4**	RO
P21.2.2	**642**	**Motor Control Software Version**	**1, 2, 3, 4**	RO
P21.2.3	**644**	**Application Software Version**	**1, 2, 3, 4**	RO
P21.3.1	**646**	**Brake Chopper Stat**	**1, 2, 3, 4**	RO
P21.3.2	**647**	**Brake Resistor**	**1, 2, 3, 4**	RO
P21.3.3	**648**	**Serial Number** The Hardware information.	**1, 2, 3, 4**	RO
P21.4.1	**566**	**Real Time Clock** This parameter shows the real time clock, user can also edit it to adjust time.	**1, 2, 3, 4**	RW
P21.4.2	**582**	**Daylight Saving** Daylight saving rule. **0** Off **1** EU **2** US **3** Russia	**1, 2, 3, 4**	RW

Code	Modbus ID	Parameter	Application	RO/RW
P21.4.3	**601**	**Total MWh Count** Megawatt hours total operation time counter.	**1, 2, 3, 4**	RO
P21.4.4	**603**	**Total Power Day Count** Number of days the GMAX has been supplied with power.	**1, 2, 3, 4**	RO
P21.4.5	**606**	**Total Power Hr Count** Number of hours the GMAX has been supplied with power.	**1, 2, 3, 4**	RO
P21.4.6	**604**	**Trip MWh Count** Megawatts hours since last reset.	**1, 2, 3, 4**	RW
P21.4.7	**635**	**Clear Trip MWh Count** Resets megawatts hours counter and clears Energy Meter in the Menu (P21.4.7).	**1, 2, 3, 4**	RW
P21.4.8	**636**	**Trip Power Day Count** Number of days since the last reset.	**1, 2, 3, 4**	RW
P21.4.9	**637**	**Trip Power Hr Count** Number of hours the HVX9000 has been running a motor since the last reset.	**1, 2, 3, 4**	RW
P21.4.10	**639**	**Clear Trip Power Count** Resets the day and hour motor or drive running counter and resets the Motor Run Time in the Menu (P21.4.9 and P21.4.10).	**1, 2, 3, 4**	RW
M1	**1**	**Output Frequency** Drive output frequency going to the motor. This value should match reference frequency when in frequency control mode.	**1, 2, 3, 4**	RO
M2	**24**	**Frequency Reference** Drive frequency reference value. Motor output frequency should match this value in frequency control mode.	**1, 2, 3, 4**	RO
M3	**2**	**Motor Speed** Motor speed is calculated based on the V/Hz curve that was set up when motor parameters were entered.	**1, 2, 3, 4**	RO
M4	**3**	**Motor Current** Measured output motor current.	**1, 2, 3, 4**	RO
M5	**4**	**Motor Torque** Percent calculated motor torque based on the current draw of the motor and its nameplate values.	**1, 2, 3, 4**	RO
M6	**5**	**Motor Power** Percent calculated motor power based on the current and voltage draw of the motor and its nameplate values.	**1, 2, 3, 4**	RO
M7	**6**	**Motor Voltage** Measured output AC motor voltage.	**1, 2, 3, 4**	RO
M8	**7**	**DC Link Voltage** Measured DC bus voltage.	**1, 2, 3, 4**	RO
M9	**8**	**Unit Temperature** Measured drive heat sink temperature in °C.	**1, 2, 3, 4**	RO
M10	**9**	**Motor Temperature** Calculated motor temperature value in percentage. Value is based on motor nameplate data and the motor status information noted on power up.	**1, 2, 3, 4**	RO
M11	**15**	**Torque Reference** Torque reference percentage used when in torque control mode.	**4**	RO
M12	**10**	**Analog Input 1** Analog input 1 measured value. Can be a current or voltage input signal.	**1, 2, 3, 4**	RO
M13	**11**	**Analog Input 2** Analog input 2 measured value. Can be a current or voltage input signal.	**1, 2, 3, 4**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M14	**25**	**Analog Output 1** Analog output 1 measured value supplied from the drive. Can be a current or voltage output signal.	**1, 2, 3, 4**	RO
M15	**575**	**Analog Output 2** Analog output 2 measured value supplied from the drive. Can be a current or voltage output signal.	**1, 2, 3, 4**	RO
M16	**12**	**DI1, DI2, DI3** Digital input status.	**1, 2, 3, 4**	RO
M17	**13**	**DI4, DI5, DI6** Digital input status.	**1, 2, 3, 4**	RO
M18	**576**	**DI7, DI8** Digital input status.	**1, 2, 3, 4**	RO
M19	**14**	**DO1** Digital output status.	**1, 2, 3, 4**	RO
M20	**557**	**RO1, RO2, RO3** Relay output status.	**1, 2, 3, 4**	RO
M21	**558**	**TC1, TC2, TC3** Timer channel status.	**2, 3, 4**	RO
M22	**559**	**Interval** Time interval 1 status.	**1, 2, 3, 4**	RO
M23	**560**	**Interval 2** Time interval 2 status.	**2, 3, 4**	RO
M24	**561**	**Interval 3** Time interval 3 status.	**2, 3, 4**	RO
M25	**562**	**Interval 4** Time interval 4 status.	**2, 3, 4**	RO
M26	**563**	**Interval 5** Time interval 5 status.	**2, 3, 4**	RO
M27	**569**	**Timer 1** Timer 1 value in seconds.	**2, 3, 4**	RO
M28	**571**	**Timer 2** Timer 2 value in seconds.	**2, 3, 4**	RO
M29	**573**	**Timer 3** Timer 3 value in seconds.	**2, 3, 4**	RO
M30	**16**	**PID1 Set Point** PID1 reference value level.	**2, 3, 4**	RO
M31	**18**	**PID1 Feedback** PID1 actual value feedback level.	**2, 3, 4**	RO
M32	**20**	**PID1 Error Value** PID1 difference between set point and feedback value levels.	**2, 3, 4**	RO
M33	**22**	**PID1 Output** PID1 output percentage to the motor.	**2, 3, 4**	RO
M34	**23**	**PID1 Status** PID1 status indication. Indicates if drive is stopped, running in PID mode, or in PID sleep mode.	**2, 3, 4**	RO
M35	**32**	**PID2 Set Point** PID2 reference value level.	**3, 4**	RO

Code	Modbus ID	Parameter	Application	RO/RW
M36	**34**	**PID2 Feedback** PID2 actual value feedback level.	**3, 4**	RO
M37	**36**	**PID2 Error Value** PID2 difference between set point and feedback value levels.	**3, 4**	RO
M38	**38**	**PID2 Output** PID2 output percentage to the motor.	**3, 4**	RO
M39	**39**	**PID2 Status** PID2 status indication. Indicates if drive is stopped, running in PID mode, or in PID sleep mode.	**3, 4**	RO
M40	**26**	**Running Motors** Number of auxiliary motors currently running.	**2, 3, 4**	RO
M41	**27**	**PT100 Temperature** PT100 thermistor temperature value in °C.	**1, 2, 3, 4**	RO
M42	**28**	**Last Active Fault** Last active fault value. See fault codes for the value shown here.	**1, 2, 3, 4**	RO
M43	**583**	**RTC Battery Status** Real-time clock battery status.	**1, 2, 3, 4**	RO
M44	**1686**	**Instance Motor Power** Measured Instantaneous motor power draw in kW.	**1, 2, 3, 4**	RO
M45	**2119**	**Energy Savings** Displayed energy value based off of format chosen.	**1, 2, 3, 4**	RO
M46	**30**	**Multi-Monitoring** Multi-monitor screen. Allows for showing three monitoring values.	**1, 2, 3, 4**	RO

Appendix B—Faults and Warning Codes

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

Table 120. 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 121. 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

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