PowerXL DX1 Series VFD Effective August 2024

Application manual

Powering Business Worldwide

Disclaimer of warranties and limitation of liability

The information, recommendations, descriptions, and safety notations in this document are based on Eaton's experience and judgment and may not cover all contingencies. If further information is required, an Eaton sales office should be consulted. Sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between Eaton and the purchaser.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OTHER THAN THOSE SPECIFICALLY SET OUT IN ANY EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OF EATON. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF OR MODIFY ANY CONTRACT BETWEEN THE PARTIES.

In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability, or otherwise for any special, indirect, incidental, or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information, recommendations, and descriptions contained herein. The information contained in this manual is subject to change without notice.

Cover Photo: Eaton PowerXL® Series Drives

Support services

Support services

The goal of Eaton is to ensure your greatest possible satisfaction with the operation of our products. We are dedicated to providing fast, friendly, and accurate assistance. That is why we offer you so many ways to get the support you need. Whether it is by phone, fax, or email, you can access Eaton's support information 24 hours a day, seven days a week.

Our wide range of services is listed below.

You should contact your local distributor for product pricing, availability, ordering, expediting, and repairs.

Website

Use the Eaton Website to find product information. You can also find information on local distributors or Eaton's sales offices.

Website address

www.eaton.com/drives

EatonCare customer support center

Call the EatonCare Support Center if you need assistance with placing an order, stock availability or proof of shipment, expediting an existing order, emergency shipments, product price information, returns other than warranty returns, and information on local distributors or sales offices.

Voice: 877-ETN-CARE (386-2273) (8:00 a.m.–6:00 p.m. EST)
After-Hours Emergency: 800-543-7038
(6:00 p.m.–8:00 a.m. EST)

Drives technical resource center

Voice: 877-ETN-CARE (386-2273) option 2, option 6
(8:00 a.m.–5:00 p.m. Central Time U.S. [UTC –6])
email: TRCDrives@Eaton.com

For customers in Europe, contact

For service and support, please contact your local sales organisation.

Contact details: Eaton.com/contacts
Service page: Eaton.com/aftersales

Table of contents

SAFETY XIII
Before commencing the installation xiii
Definitions and symbols xiv
Hazardous high voltage xiv
Warnings and cautions xiv
Important safety information xv

CHAPTER 1—POWERXL DX1 OVERVIEW 1
How to use this manual 1
Receiving and inspection 1
Real time clock battery activation 1
Rating label 2
Catalog number system 3
Power ratings and product selection 4

CHAPTER 2—KEYPAD OVERVIEW 10
Membrane LCD keypad 10
Keypad buttons 11
LED lights 13
LCD display 13
Touchscreen keypad navigation 15
Parameters 22
Monitor 27
Faults and Log 29

CHAPTER 3—MENU OVERVIEW 42
Main menu page 42
Menu navigation 42
Menu structure 43
T—favorite 54

CHAPTER 4—STARTUP 55
Startup wizard page 55
Startup wizard 55

CHAPTER 5—ONBOARD INPUTS/OUTPUTS 63
Introduction 63
I/O Controls 63
Control I/O configuration 65

CHAPTER 6—PARAMETERS LIST 67
Multi pump monitoring 69
Parameters 72
Analog input 74
Digital input 75
Analog output 76
Digital output 78

High freq pulse output . . . 80
Drive control . . . 82
Motor control . . . 86
PID controller 1 . . . 92
PID controller 2 . . . 98
Bypass . . . 105
Brake . . . 106
Protections . . . 107
Supervisions . . . 110
Interval settings . . . 112
HVAC . . . 114
Pump . . . 114
Logic . . . 117
Keypad . . . 118
Communication . . . 120
System . . . 124
Optional boards . . . 128
Slot A: No board . . . 128
Slot A: DXX-EXT-3DI3DO1T (IO1) . . . 128
Slot A: DXX-EXT-1AI2AO (IO2) . . . 130
Slot A: DXX-EXT-3RO (IO3) . . . 132
Slot A: DXX-EXT-THER1 (IO4) . . . 132
Slot A: DXX-EXT-6DI (IO5) . . . 133
Slot A: ABZ . . . 133
Slot A: SABZ . . . 134
Slot B: No board . . . 135
Slot B: DXX-EXT-3DI3DO1T (IO1) . . . 135
Slot B: DXX-EXT-1AI2AO (IO2) . . . 135
Slot B: DXX-EXT-3RO (IO3) . . . 136
Slot B: DXX-EXT-THER1 (IO4) . . . 136
Slot B: DXX-EXT-6DI (IO5) . . . 137
Slot C: No board . . . 137
Slot C: DXX-EXT-3DI3DO1T (IO1) . . . 137
Slot C: DXX-EXT-1AI2AO (IO2) . . . 137
Slot C: DXX-EXT-3RO (IO3) . . . 138
Slot C: DXX-EXT-THER1 (IO4) . . . 138
Slot C: DXX-EXT-6DI (IO5) . . . 139
Slot D: No board . . . 139
Slot D: DXX-EXT-3DI3DO1T (IO1) . . . 139
Slot D: DXX-EXT-1AI2AO (IO2) . . . 139
Slot D: DXX-EXT-3RO (IO3) . . . 140
Slot D: DXX-EXT-THER1 (IO4) . . . 140
Slot D: DXX-EXT-6DI (IO5) . . . 141
Slot D: ProfiNet . . . 141
ProfiNet . . . 141
Slot D: EIP . . . 142

APPENDIX A—DESCRIPTION OF PARAMETERS 143

APPENDIX B—FAULT LOG 245
Fault codes and descriptions. 245

APPENDIX C—POWERXL RECOMMENDED SECURE HARDENING GUIDELINES 256

REFERENCES 267

List of figures

Figure 1. Battery connection. . . . 1
Figure 2. RTC battery rerplacement. . . . 1
Figure 3. Rating labels (samples). . . . 2
Figure 4. Carton labels (samples) 2
Figure 5. Catalog number system 3
Figure 6. Keypad and display. . . . 10
Figure 7. General view of LCD. . . . 13
Figure 8. Welcome page. . . . 13
Figure 9. Upgrade page. . . . 14
Figure 10. Auto backup page. . . . 14
Figure 11. Main menu. . . . 14
Figure 12. Parent node page. . . . 14
Figure 13. Parameter page. . . . 15
Figure 14. Parameter page from favorite menu. . . . 15
Figure 15. Fault page. . . . 15
Figure 16. DXX-KEY-TS Touchscreen keypad. . . . 15
Figure 17. Main menu page. . . . 42
Figure 18. Main menu navigation. . . . 42
Figure 19. M—Monitor. . . . 44
Figure 20. Active faults. . . . 45
Figure 21. Pop-up active faults. . . . 46
Figure 22. Fault history. . . . 47
Figure 23. Parameter menu overview. . . . 48
Figure 24. Parameter sets. . . . 49
Figure 25. Down from keypad. . . . 50
Figure 26. Parameters comparison. . . . 51
Figure 27. Password. . . . 52
Figure 28. Edit parameter value. . . . 53
Figure 29. Parameter locked. . . . 54
Figure 30. Acceleration and deceleration time. . . . 149
Figure 31. Motor parameters from ratings plate. . . . 150
Figure 32. With and without reference scaling. . . . 151
Figure 33. Analog input AI scaling. . . . 152
Figure 34. AI1 signal filtering. . . . 152
Figure 35. AI1 - No signal inversion. . . . 153
Figure 36. AI1 Signal Inversion 153
Figure 37. Example of joystick hysteresis. . . . 153
Figure 38. Example of sleep limit function. . . . 154
Figure 39. AI2 filter time. . . . 155
Figure 40. AI2 - No signal inversion. . . . 156
Figure 41. AI2 signal inversion. . . . 156
Figure 42. Example of joystick hysteresis. . . . 157
Figure 43. Example of sleep limit function. . . . 157
Figure 44. Analog output filtering. . . . 159
Figure 45. Analog output scaling. . . . 160
Figure 46. Analog output invert. . . . 160
Figure 47. Start forward/start reverse. . . . 170

Figure 48. Start, stop, and reverse. . . . 171
Figure 49. Start pulse/stop pulse. . . . 172
Figure 50. Start forward/start reverse. . . . 173
Figure 51. Start, stop, and reverse. . . . 173
Figure 52. Start pulse/stop pulse. . . . 174
Figure 53. Activation of fixed frequencies. . . . 177
Figure 54. Acceleration/deceleration (S-shaped). . . . 180
Figure 55. Acceleration/deceleration (S-shaped). . . . 180
Figure 56. Auto restart fail (try number >2). . . . 181
Figure 57. Example of skip frequency area setting. . . . 184
Figure 58. Linear and squared change of motor voltage. . . . 187
Figure 59. Programmable V/Hz curve. . . . 188
Figure 60. Speed control F1. . . . 190
Figure 61. Setting up PID application. . . . 196
Figure 62. DC-braking time when stop mode = coasting. . . . 209
Figure 63. DC-braking time when stop mode = ramp. . . . 209
Figure 64. Motor thermal current it curve. . . . 215
Figure 65. Stall characteristics settings. . . . 216
Figure 66. Stall time count. . . . 216
Figure 67. Setting of minimum load. . . . 217
Figure 68. Underload time counter function. . . . 218
Figure 69. Supervision function. . . . 221
Figure 70. Supervision function. . . . 222

List of tables

Table 1. Common abbreviations. . . . 1
Table 2. Type 1/IP21. . . . 4
Table 3. Type 12/IP54. . . . 5
Table 4. Type 1/IP21. . . . 6
Table 5. Type 12/IP54. . . . 7
Table 6. Type 1/IP21. . . . 8
Table 7. Type 12/IP54. . . . 9
Table 8. Keypad buttons. . . . 11
Table 9. LED state indicators. . . . 13
Table 10. Soft keys. . . . 14
Table 11. Keypad menus. . . . 43
Table 12. Startup wizard instructions. . . . 56
Table 13. Multi-purpose application default I/O configuration. . . . 65
Table 14. Drive communication ports. . . . 66
Table 15. Monitor—M1. . . . 67
Table 16. Standard—M2. . . . 67
Table 17. Scaled display—M3. . . . 67
Table 18. IO status—M4. . . . 68
Table 19. AI monitor—M5. . . . 68
Table 20. AO monitor—M6. . . . 68
Table 21. PID1 monitoring—M10. . . . 68
Table 22. PID2 monitoring—M11. . . . 68
Table 23. SD card plug in status—M14. . . . 68
Table 24. MPC General—M41.1. . . . 69

Table 25. Operate mode—M41.2. 69
Table 26. Status—M41.3. 69
Table 27. Network status—M41.4. 69
Table 28. Latest fault code—M41.5. 70
Table 29. Output frequency—M41.6. 70
Table 30. Output voltage—M41.7. 70
Table 31. Output current—M41.8. 70
Table 32. Output torque—M41.9. 70
Table 33. Output power—M41.10. 70
Table 34. Output speed—M41.11. 71
Table 35. Accu. run time—M41.12. 71
Table 36. Misc—M42. 71
Table 37. Option cards—M43. 71
Table 38. Fieldbus monitor—M96. 71
Table 39. Energy savings—M97. 71
Table 40. Energy counter—M98. 72
Table 41. Run-time counters—M99. 72
Table 42. Basic parameters—P1. 72
Table 43. Basic setting AI—P2.1. 74
Table 44. AI1 settings—P2.2. 74
Table 45. AI2 settings—P2.3. 75
Table 46. Basic setting—P3.3 75
Table 47. Basic setting—P3.4.1 75
Table 48. Parameters—P3.4.2 75
Table 49. Basic setting—P3.5.1. 76
Table 50. Parameters—P3.5.2. 76
Table 51. AO1—P4.2. 76
Table 52. Relais—P5.1. 78
Table 53. Digital outputs—P5.2. 80
Table 54. Virtual outputs—P5.3. 80
Table 55. Basic setting—P5.4.1. 80
Table 56. Parameters—P5.4.2. 80
Table 57. Basic drive control settings—P7.1. 82
Table 58. Reference functions—P7.2. 84
Table 59. Control place—P7.3. 84
Table 60. Ramp—P7.4. 85
Table 61. Preset speeds—P7.5. 85
Table 62. Auto restart—P7.6. 85
Table 63. Cold weather function—P7.7. 85
Table 64. Basic motor control settings—P8.1. 86
Table 65. Skip frequencies—P8.2. 86
Table 66. Preheat Control—P8.3. 86
Table 67. Motor data—P8.10. 88
Table 68. Motor 2 data—P8.11. 89
Table 69. V/f control—P8.20. 89
Table 70. SVC control—P8.21. 90
Table 71. Torque control—P8.22. 90
Table 72. PM control—P8.23. 92
Table 73. PID1 Control—P10.1. 92

Table 74. PID1 settings—P10.2. 92
Table 75. PID1 standard—P10.3. 93
Table 76. PID1 setpoint1—P10.4. 94
Table 77. PID1 setpoint2—P10.5. 95
Table 78. FB PID1—P10.6. 95
Table 79. PID1 feedback 1—P10.7. 95
Table 80. PID1 feedback 2—P10.8. 96
Table 81. PID1 feedforward—P10.9. 97
Table 82. PID2 control—P11.1. 98
Table 83. PID2 settings—P11.2. 98
Table 84. PID2 standard—P11.3. 98
Table 85. PID2 setpoint1—P11.4. 99
Table 86. PID2 setpoint2—P11.5. 100
Table 87. FB PID2—P11.6. 100
Table 88. PID2 feedback 1—P11.7. 100
Table 89. PID2 feedback 2—P11.8. 101
Table 90. PID2 feedforward—P11.9. 102
Table 91. Master follower—P14. 103
Table 92. Jog function–P15. 104
Table 93. Inch function—P16. 105
Table 94. Bypass control—P22.1. 105
Table 95. Bypass settings—P22.2. 105
Table 96. Brake chopper—P23.1. 106
Table 97. DC-brake—P23.2. 106
Table 98. Ext. brake—P24. 106
Table 99. Fault functions—P25.1. 106
Table 100. External fault text—P25.2. 107
Table 101. Drive protections—P26.1. 107
Table 102. Motor protections—P26.2. 108
Table 103. COM protections—P26.3. 109
Table 104. PID1 protections—P26.10. 109
Table 105. PID2 protections—P26.12. 109
Table 106. Prime pump protections—P26.20. 110
Table 107. Pipe fill loss protection—P26.21. 110
Table 108. AI supervision—P27.1. 110
Table 109. Device supervision—P27.7. 110
Table 110. Motor supervision—P27.8. 111
Table 111. PID1 supervision—P27.10. 111
Table 112. PID2 supervision—P27.11. 112
Table 113. Timer control—P30.1 112
Table 114. Timer settings—P30.2. 112
Table 115. Interval status—P30.3. 112
Table 116. Repeat timer—P30.4. 113
Table 117. Time settings—P30.5. 113
Table 118. HVAC belt control—P40.1. 114
Table 119. Damper-P40.2. 114
Table 120. Basic pump settings—P41.1. 114
Table 121. Derag—P41.2. 114
Table 122. MPC basic settings—P41.3. 115

Table 123. MPC multi drive—P41.4. 115
Table 124. Redundant drive—P41.5. 116
Table 125. Auto change—P41.6. 116
Table 126. Pipe fill—P41.7. 116
Table 127. Jockey pump—P41.8. 116
Table 128. Lube pump—P41.9. 116
Table 129. Broken pipe—P41.10. 117
Table 130. Simple logic—P80.1. 117
Table 131. Logic Engine—P81 118
Table 132. Keypad settings—P95.1. 118
Table 133. Dispaly scaling—P95.2. 119
Table 134. Touch keypad settings—P95.3. 120
Table 135. FB process data input sel—P96.1. 120
Table 136. FB process data output sel—P96.2. 121
Table 137. Standard status word—P96.3. 121
Table 138. RS485 basic settings—P96.4. 121
Table 139. Basic Ethernet settings—P96.5. 122
Table 140. IP security—P96.6. 122
Table 141. Bluetooth—P96.7. 122
Table 142. IOT—P96.8. 122
Table 143. Modbus RTU—P96.9. 123
Table 144. Modbus TCP—P96.13. 123
Table 145. WebUI—P96.16. 123
Table 146. User access level operation—P98. 124
Table 147. Basic system settings—P99.1. 124
Table 148. Parameter handling—P99.2. 124
Table 149. Real time clock—P99.3. 125
Table 150. Version info—P99.4. 126
Table 151. Hardware info—P99.5. 126
Table 152. Energy savings calc—P99.6. 126
Table 153. SD card operation—P99.7. 127
Table 154. Operate mode—O. 127
Table 155. Monitor—B2.1. 128
Table 156. Parameters—B2.2. 128
Table 157. Monitor—B3.1. 130
Table 158. Parameters—B3.2. 130
Table 159. Monitor—B4.1. 132
Table 160. Parameters—B4.2. 132
Table 161. Monitor—B5.1. 132
Table 162. Parameters—B5.2. 133
Table 163. Monitor—B6.1. 133
Table 164. Monitor—B7.1. 133
Table 165. Parameters—B7.2. 134
Table 166. Monitor—B8.1. 134
Table 167. Parameters—B8.2. 135
Table 168. Monitor_B10.1 135
Table 169. Parameters—B10.2. 135
Table 170. Monitor—B11.1. 135
Table 171. Parameters—B11.2. 136

Table 172. Monitor—B12.1. 136
Table 173. Parameters—B12.2. 136
Table 174. Monitor—B13.1. 136
Table 175. Parameters—B13.2. 137
Table 176. Monitor—B14.1. 137
Table 177. Monitor—B16.1. 137
Table 178. Parameters—B16.2. 137
Table 179. Monitor—B17.1. 137
Table 180. Parameters—B17.2. 138
Table 181. Monitor—B18.1. 138
Table 182. Parameters—B18.2. 138
Table 183. Monitor—B19.1. 138
Table 184. Parameters—B19.2. 139
Table 185. Monitor-B20.1. 139
Table 186. Monitor—B22.1. 139
Table 187. Parameters—B22.2. 139
Table 188. Monitor—B23.1. 139
Table 189. Parameters—B23.2. 140
Table 190. Monitor—B24.1. 140
Table 191. Parameters—B24.2. 140
Table 192. Monitor—B25.1. 140
Table 193. Parameters—B25.2. 141
Table 194. Monitor—B26.1. 141
Table 195. Monitor—B27.1.1. 141
Table 196. Parameters—B27.1.2. 142
Table 197. Monitor—B28.1. 142
Table 198. Active faults. 245
Table 199. History faults. 245

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 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2. Power supply shall have a maximum 60 Vdc fault limit according to SELV/PELV.
- 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:

  a. Other independent devices for monitoring safety-related variables (speed, travel, end positions, and so on);

  b. Electrical or non-electrical system-wide measures (electrical or mechanical interlocks);

  c. 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 DX1 is disconnected from mains.

WARNING

Be sure not to plug the Ethernet 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 Series 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 Series 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 Series. 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 DX1 is disconnected from mains.

⚠ WARNING

Before connecting the AC drive to mains, confirm that the front and cable covers of PowerXL DX1 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 Series 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 Series 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 DX1 AC drive must always be grounded with an grounding conductor connected to the grounding terminal marked with. The ground leakage current of PowerXL DX1 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. 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 Series. There is a certain procedure according to which the tests shall be performed. Ignoring this procedure may result in damaged product.

Sécurité

AVERTISSEMENT !
TENSION ÉLECTRIQUE DANGEREUSE !

Avant de commencer l'installation

- Débrancher l'alimentation de l'appareil
- S'assurer que les dispositifs ne peuvent pas être accidentellement redémarrés
- Vérifier l'isolement de l'alimentation
- Mettre l'appareil à la terre et le protéger contre les courts-circuits
- Couvrir ou enfermer tout composant sous tension adjacent
- Seul le personnel qualifié conformément à la norme EN 50110-1/-2 (VDE 0105 Partie 100) peut travailler sur cet appareil/ce système
- Avant l'installation et avant de toucher l'appareil, s'assurer de ne porter aucune charge électrostatique
- La terre fonctionnelle (FE, PSE) doit être raccordée à la terre de protection (PE) ou la compensation de potentiel. L'installateur du système a la responsabilité d'assurer cette connexion
- Les câbles de connexion et les lignes de signal doivent être installés de façon à ce que les interférences capacitives ou inductives ne compromettent pas les fonctions d'automatisation
- Installer les appareils d'automatisation et les éléments de fonctionnement associés de manière à ce qu'ils soient bien protégés contre tout fonctionnement accidentel
- Des dispositifs de sécurité matériels et logiciels appropriés doivent être utilisés en rapport avec l'interface des E/S afin qu'un circuit ouvert sur le côté signal ne résulte pas en états indéfinis dans les dispositifs d'automatisation
- Assurer une isolation électrique fiable sur le côté tension extra basse de l'alimentation 24 V. Utiliser uniquement des blocs d'alimentation conformes à la norme CEI 60364-4-41 (VDE 0100, partie 410) ou HD384.4.41 S2
- Les écarts entre la tension d'entrée et la tension nominale ne doivent pas dépasser les limites de tolérance indiquées dans les spécifications, au risque de provoquer un mauvais fonctionnement et une utilisation dangereuse du système
- Les dispositifs d'arrêt d'urgence conformes à la norme CEI/EN 60204-1 doivent être efficace dans tous les modes de fonctionnement des dispositifs d'automatisation. Le déverrouillage des dispositifs d'arrêt d'urgence ne doit pas entraîner un redémarrage
- Les dispositifs conçus pour un montage dans des boîtiers ou armoires de commande ne doivent être utilisés et contrôlés qu'après avoir été installés et avec le boîtier fermé. Les unités de bureau ou portatives ne doivent être utilisées et contrôlées que dans leurs boîtiers fermés
- Des mesures doivent être prises pour assurer un bon redémarrage des programmes interrompus après une chute ou une panne de tension. Ceci ne doit pas causer des états de fonctionnement dangereux, même pour un court laps de temps. Si nécessaire, des dispositifs d'arrêt d'urgence doivent être utilisés
- Quand des défaillances du système d'automatisation peuvent entraîner des blessures ou des dommages matériels, des mesures externes doivent être appliquées pour assurer un état de fonctionnement sans danger en cas de panne ou de mauvais fonctionnement (par exemple au moyen de disjoncteurs séparés, de verrouillages mécaniques, etc.)
- En fonction de leur degré de protection, les entraînements à fréquence variable peuvent contenir des pièces métalliques sous tension, des composants rotatifs ou en mouvement et des surfaces brûlantes, pendant le fonctionnement et immédiatement après l'arrêt
- Le retrait des protections requises, une installation incorrecte ou un mauvais fonctionnement du moteur ou de l'entraînement à fréquence variable peuvent causer la défaillance de l'appareil et entraîner des blessures graves et des dommages importants
- La réglementation nationale applicable en matière de sécurité et de prévention des accidents s'applique à tous les travaux effectués sur les entraînements à fréquence variable sous tension
- L'installation électrique doit être effectuée conformément aux réglementations applicables (par exemple, en ce qui concerne les sections transversales des câbles, les fusibles, la mise à la terre de protection)
- Le transport, l'installation, la mise en service et les travaux de maintenance doivent être effectués uniquement par un personnel qualifié (IEC 60364, HD 384 et règles de sécurité du travail)
- Les installations contenant des entraînements à fréquence variable doivent être équipées de dispositifs de surveillance et de protection, conformément aux réglementations applicables en matière de sécurité. Les modifications des entraînements à fréquence variable réalisées à l'aide du logiciel d'exploitation sont autorisées
- Toutes les protections et les portes doivent être maintenues fermées pendant le fonctionnement

- Pour réduire les risques d'accidents et de dommages matériels, l'utilisateur doit inclure dans la conception de la machine des mesures limitant les conséquences de panne ou de mauvais fonctionnement de l'entraînement (augmentation de la vitesse ou arrêt soudain du moteur). Ces mesures comprennent :
  - Autres dispositifs indépendants de surveillance des variables en rapport avec la sécurité (vitesse, voyages, positions d'extrémité, etc.)
  - Mesures électriques ou non électriques appliquées à l'ensemble du système (verrouillages électriques ou mécaniques)
  - Ne jamais toucher les pièces sous tension ni les connexions des câbles de l'entraînement à fréquence variable après leur déconnexion de l'alimentation. En raison de la charge dans les condensateurs, ces pièces peuvent être encore sous tension après la déconnexion. Installer les panneaux d'avertissement appropriés

Lire ce manuel en entier et s'assurer de bien comprendre les procédures avant de tenter d'installer, de configurer, d'utiliser et d'effectuer tout travail d'entretien sur cet entraînement à fréquence variable DX1.

Définitions et symboles

AVERTISSEMENT

Ce symbole indique une haute tension. Il attire l'attention sur les éléments ou les opérations qui pourraient être dangereux pour les personnes utilisant cet équipement. Lire attentivement le message et suivre attentivement les instructions.

Ce symbole est le « symbole d'alerte de sécurité ». Il accompagne les deux termes d'avertissement suivants : MISE EN GARDE ou AVERTISSEMENT, comme décrit ci-dessous.

AVERTISSEMENT

Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures graves ou la mort.

MISE EN GARDE

Indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures légères à modérées et d'importants dégâts matériels. La situation décrite dans la MISE EN GARDE peut, si elle n'est pas évitée, entraîner des conséquences graves. Des mesures de sécurité importantes sont décrites dans les MISES EN GARDE (ainsi que dans les AVERTISSEMENTS).

Haute tension dangereuse

AVERTISSEMENT

L'équipement de contrôle du moteur et les contrôleurs électroniques sont branchés sur des tensions secteur dangereuses. Lors de l'entretien des entraînements et des contrôleurs électroniques, il peut y avoir des composants exposés avec des boîtiers ou des protubérances au niveau du potentiel du réseau ou au-dessus. Toutes les précautions doivent être prises pour se protéger contre les chocs électriques.

- **Se tenir sur un tapis isolant et prendre l'habitude de n'utiliser qu'une seule main pour vérifier les composants**
- **Toujours travailler avec une autre personne lorsqu'une situation d'urgence se produit**
- **Débrancher l'alimentation avant de vérifier les contrôleurs ou d'effectuer des travaux d'entretien**
- **S'assurer que l'équipement est correctement relié à la terre**
- **Porter des lunettes de sécurité lors des travaux sur les contrôleurs électroniques ou les machines rotatives**

AVERTISSEMENT

Les composants de la section d'alimentation de l'entraînement restent sous tension après la coupure de la tension d'alimentation. Après la déconnexion de l'alimentation, attendre au moins cinq minutes avant de retirer le couvercle pour permettre la décharge des condensateurs du circuit intermédiaire.

Prêter attention aux avertissements signalant des dangers !

DANGER
5 MIN

AVERTISSEMENT

Risque de choc électrique – risque de blessures ! Effectuer le câblage uniquement si l'unité n'est plus sous tension.

AVERTISSEMENT

Ne pas effectuer de modifications sur l'entraînement CA lorsqu'il est connecté à l'alimentation secteur.

Avertissements et mises en garde

⚠ AVERTISSEMENT

S'assurer de mettre l'appareil à la terre en suivant les instructions de ce manuel. Les unités non mises à la terre peuvent causer des chocs électriques et des incendies.

⚠ AVERTISSEMENT

Cet équipement ne doit être installé, réglé et entretenu que par un personnel d'entretien électrique qualifié connaissant la construction et le fonctionnement de ce type d'équipement, ainsi que les risques encourus. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

Les composants à l'intérieur de l'entraînement sont sous tension lorsque l'entraînement est branché à l'alimentation. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

⚠ AVERTISSEMENT

Les bornes de phase (L1, L2, L3), les bornes du moteur (U, V, W) et les bornes de résistance de liaison CC/ frein (DC-, DC+/R+, R-) sont sous tension lorsque l'entraînement est branché à l'alimentation, même si le moteur ne tourne pas. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

⚠ AVERTISSEMENT

Même si les bornes E/S de commande sont isolées de la tension secteur, les sorties de relais et les autres bornes E/S peuvent présenter une tension dangereuse même lorsque l'entraînement est débranché. Le contact avec cette tension est extrêmement dangereux et peut causer la mort ou des blessures graves.

⚠ AVERTISSEMENT

Cet équipement a un grand courant de fuite capacitif pendant le fonctionnement, ce qui peut mettre les pièces du boîtier à un niveau supérieur au potentiel de terre. Une mise à la terre appropriée, telle que décrite dans ce manuel, est nécessaire. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

Avant de mettre l'entraînement sous tension, s'assurer que les protections avant et des câbles sont fermées et attachées pour empêcher l'exposition à d'éventuelles défaillances électriques. Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

Un dispositif de protection/déconnexion en amont doit être fourni, tel que requis par le code électrique national (NEC®). Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

Cet entraînement peut causer un courant CC dans le conducteur de mise à la terre de protection. Lorsqu'un dispositif de protection ou de surveillance à courant résiduel est utilisé pour la protection en cas de contact direct ou indirect, seul un dispositif de type B est autorisé sur le côté alimentation de ce produit.

⚠ AVERTISSEMENT

Ne travailler sur le câblage qu'après que l'entraînement a été correctement monté et attaché.

⚠ AVERTISSEMENT

Avant d'ouvrir les couvercles de l'entraînement :

- **Débrancher toute l'alimentation allant à l'entraînement, y compris l'alimentation de commande externe pouvant être présente**
- **Attendre un minimum de cinq minutes après l'extinction de tous les voyants du clavier. Cela permet aux condensateurs de bus CC de se décharger**
- **Une tension dangereuse peut rester dans les condensateurs de bus CC même si l'alimentation a été coupée. Confirmer que les condensateurs sont entièrement déchargés en mesurant la tension à l'aide d'un multimètre réglé pour mesurer la tension CC**

Le non-respect de cette précaution peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

L'ouverture du dispositif de protection du circuit de dérivation peut indiquer que le courant de défaut a été interrompu. Pour réduire le risque d'incendie ou de choc électrique, les pièces porteuses de courant et les autres composants du contrôleur doivent être examinés et remplacés s'ils sont endommagés. Si l'élément de courant d'un relais de surcharge a grillé, le relais de surcharge doit être intégralement remplacé.

⚠ AVERTISSEMENT

Le fonctionnement de cet équipement nécessite le respect des instructions d'installation et de fonctionnement détaillées fournies dans le manuel d'installation/de fonctionnement destiné à être utilisé avec ce produit. Ces informations sont fournies sur le CD-ROM, la disquette ou tout autre périphérique de stockage inclus dans l'emballage contenant ce dispositif. Ce support doit être conservé avec cet appareil à tout moment. Une copie papier de ces informations peut être commandée auprès du service de documentation Eaton.

⚠ AVERTISSEMENT

Avant de procéder à l'entretien de l'entraînement :

- **Débrancher toute l'alimentation allant à l'entraînement, y compris l'alimentation de commande externe pouvant être présente**
- **Placer une étiquette « NE PAS UTILISER » sur le dispositif de déconnexion**
- **Verrouiller le dispositif de déconnexion en position ouverte**

Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.

⚠ AVERTISSEMENT

Les sorties de l'entraînement (U, V, W) ne doivent pas être connectées à la tension d'entrée ni à l'alimentation secteur, car ceci pourrait gravement endommager l'appareil et causer un incendie.

⚠ AVERTISSEMENT

Le dissipateur de chaleur et/ou le boîtier externe peuvent atteindre une température élevée.

Prêter attention aux avertissements signalant des dangers !

Surface brûlante – Risque de brûlure. NE PAS TOUCHER !

⚠ MISE EN GARDE

Toute modification électrique ou mécanique de cet entraînement sans consentement écrit préalable d'Eaton annule toutes les garanties, peut entraîner un danger pour la sécurité et annuler l'homologation UL®.

⚠ MISE EN GARDE

Installer cet entraînement sur une matière résistante aux flammes, telle qu'une plaque d'acier, pour réduire les risques d'incendie.

⚠ MISE EN GARDE

Installer cet entraînement sur une surface perpendiculaire capable de supporter le poids de l'entraînement et non soumise à des vibrations afin de diminuer les risques de chute et de dommage de l'entraînement, ainsi que les risques de blessures.

⚠ MISE EN GARDE

Empêcher la pénétration de corps étrangers, tels que morceaux de fils et copeaux métalliques, dans le boîtier de l'entraînement, car ceci pourrait provoquer la formation d'un arc électrique et un incendie.

⚠ MISE EN GARDE

Installer cet entraînement dans une pièce bien aérée non soumise à des températures extrêmes, à une forte humidité ou à la condensation. Éviter les endroits directement exposés au soleil ou présentant de fortes concentrations de poussières, des gaz corrosifs, des gaz explosifs, des gaz inflammables, ou des vapeurs de liquide de meulage, etc. Une installation inadéquate peut entraîner un risque d'incendie.

⚠ MISE EN GARDE

Lors de la sélection de la section transversale des câbles, prendre en compte la chute de tension dans des conditions de charge. La prise en compte d'autres paramètres relève de la responsabilité de l'utilisateur.

Il relève de la responsabilité de l'utilisateur de respecter toutes les normes électriques nationales et internationales en vigueur concernant la mise à la terre de protection de l'ensemble de l'équipement.

⚠ MISE EN GARDE

Les spécifications minimum relatives aux sections transversales des conducteurs de terre de protection indiquées dans ce manuel doivent être respectées.

Le courant de fuite de cet équipement dépasse 3,5 mA (CA). La taille minimum du conducteur de la mise à la terre de protection doit être conforme aux exigences de la norme EN 61800-5-1 et/ou aux réglementations de sécurité locales.

⚠ MISE EN GARDE

Les courants de fuite de ce convertisseur de fréquence sont supérieures à 3,5 mA (CA). Conformément à la norme CEI/EN 61800-5-1, un conducteur de mise à la terre de l'équipement supplémentaire possédant la même superficie de coupe transversale que le conducteur de mise à la terre de protection d'origine doit être branché, ou la section transversale du conducteur de mise à la terre de l'équipement doit être d'au moins 10 mm^2 Cu. Seul un conducteur en cuivre doit être utilisé avec cet entraînement.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Des disjoncteurs de courant résiduel (RCD) ne peuvent être installés qu'entre le réseau de courant alternatif et l'entraînement.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Si plusieurs moteurs sont connectés à un entraînement, des contacteurs doivent être conçus pour les moteurs individuels conformément à la catégorie d'utilisation AC-3.

Sélectionner du contacteur du moteur en fonction du courant de fonctionnement nominal du moteur à connecter.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Une commutation entre l'entraînement et l'alimentation d'entrée doit avoir lieu dans un état sans tension.

⚠ MISE EN GARDE

Les entrées anti-rebond ne sont pas permises dans le schéma du circuit de sécurité. Risque d'incendie !

Utiliser uniquement des câbles, des interrupteurs de protection et des contacteurs indiquant le courant nominal permis.

⚠ MISE EN GARDE

Avant de connecter l'entraînement à l'alimentation secteur CA, s'assurer que les réglages de la classe de protection CEM sont correctement effectués selon les instructions de ce manuel.

- Si l'entraînement doit être utilisé dans un réseau de distribution flottant, retirer les vis au niveau des VOM et CEM. Voir « Installation dans un réseau à une phase connectée à la terre (corner-grounded) » et « Installation dans un réseau IT»
- Débrancher le filtre CEM interne lors de l'installation de l'entraînement sur un réseau IT (système d'alimentation non mis à la terre ou système d'alimentation électrique mis à la terre haute résistance [plus de 30 ohms]) pour ne pas que le système soit connecté au potentiel de terre via les condensateurs du filtre CEM. Ceci peut être une cause de dangers ou endommager l'entraînement
- Débrancher le filtre CEM interne lors de l'installation de l'entraînement sur un système TN à une phase connectée à la terre pour ne pas endommager l'entraînement

Note: Lorsque le filtre CEM interne est débranché, l'entraînement peut ne pas être conforme aux normes de compatibilité électromagnétique.

- Ne pas tenter d'installer ou de retirer les vis des VOM et CEM lorsque l'alimentation est appliquée aux bornes d'entrée de l'entraînement

Sécurité du moteur et de l'équipement

⚠ MISE EN GARDE

n'effectuer aucun test de résistance de tension ou au mégohmmètre sur toute partie de l'entraînement ou de ses composants. Un test inadéquat peut entraîner des dommages.

⚠ MISE EN GARDE

Avant tout test ou mesure du moteur ou du câble du moteur, débrancher le câble du moteur au niveau des bornes de sortie de l'entraînement (U, V, W) pour éviter d'endommager ce dernier lors des tests.

⚠ MISE EN GARDE

Ne toucher aucun composant sur les cartes de circuit. Les décharges d'électricité statique peuvent endommager les composants.

⚠ MISE EN GARDE

Avant de mettre le moteur en marche, vérifier qu'il est correctement monté et aligné avec l'équipement entraîné. S'assurer que le démarrage du moteur ne risque pas de provoquer des blessures ou d'endommager l'équipement connecté au moteur.

⚠ MISE EN GARDE

Régler la vitesse maximale du moteur (fréquence) dans l'entraînement conformément aux exigences du moteur et de l'équipement qui lui est connecté. Des réglages de fréquence maximum incorrects peuvent endommager le moteur ou l'équipement et causer des blessures.

⚠ MISE EN GARDE

Avant d'inverser le sens de rotation du moteur, veiller à ce que cela ne risque pas de provoquer des blessures ou des dommages matériels.

⚠ MISE EN GARDE

S'assurer qu'aucun condensateur de correction de puissance n'est connecté à la sortie de l'entraînement ou aux bornes du moteur pour éviter un mauvais fonctionnement de l'entraînement et des dommages potentiels.

⚠ MISE EN GARDE

S'assurer que les bornes de sortie de l'entraînement (U, V, W) ne sont pas connectées à l'alimentation secteur, ce qui pourrait causer de graves dommages à l'entraînement.

⚠ MISE EN GARDE

Lorsque les bornes de commande de deux ou plusieurs unités d'entraînement sont raccordées en parallèle, la tension auxiliaire de ces connexions de commande doit être fournie par une source unique, qui peut être soit l'une des unités, soit une alimentation externe.

⚠ MISE EN GARDE

L'entraînement démarre automatiquement après une interruption de la tension d'entrée si la commande de démarrage externe est active.

⚠ MISE EN GARDE

Ne pas commander le moteur avec le dispositif de déconnexion ; à la place, utiliser les touches de marche et d'arrêt du tableau de contrôle ou les commandes du tableau des E/S de l'entraînement. Le nombre de cycles de charge maximum permis des condensateurs CC (c'est-à-dire les mises sous tension par application de puissance) est de cinq en dix minutes.

⚠ MISE EN GARDE

Fonctionnement incorrect de l'entraînement :

- Si l'entraînement n'est pas mis en marche pendant une longue période, la performance de ses condensateurs électrolytiques sera réduite
- S'il est arrêté pour une période prolongée, le mettre en marche au moins tous les six mois pendant au moins 5 heures pour restaurer la performance des condensateurs, puis vérifier son fonctionnement. Il est recommandé de ne pas brancher l'entraînement directement sur la tension secteur. La tension doit être augmentée progressivement en utilisant une source CA réglable

Le non-respect de ces instructions peut entraîner des blessures ou des dégâts matériels.

Pour plus d'informations techniques, contacter l'usine ou le représentant commercial Eaton local.

Chapter 1—PowerXL DX1 overview

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

How to use this manual

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

Receiving and inspection

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

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

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

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

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

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

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

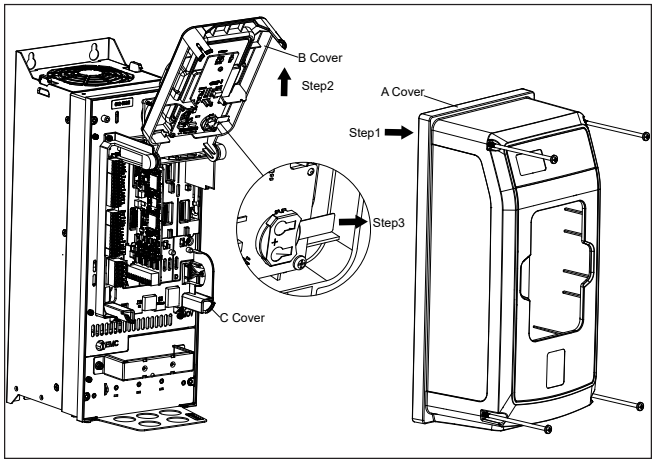
Note: Do not destroy the packing. The template printed on the protective cardboard can be used for marking the mounting points of the PowerXL DX1 VFD on the wall or in a cabinet.

Real time clock battery activation

To activate the real time clock (RTC) functionality in the PowerXL Series VFD:

1. Remove the “A” cover.
2. Open the “B” cover.
3. Remove the insulation.

Figure 1. Battery connection.



To replace the RTC battery:

1. Remove the “A” cover.
2. Open the “B” cover.
3. Remove the old RTC battery
4. Install the new RTC battery.

Figure 2. RTC battery rerplacement.

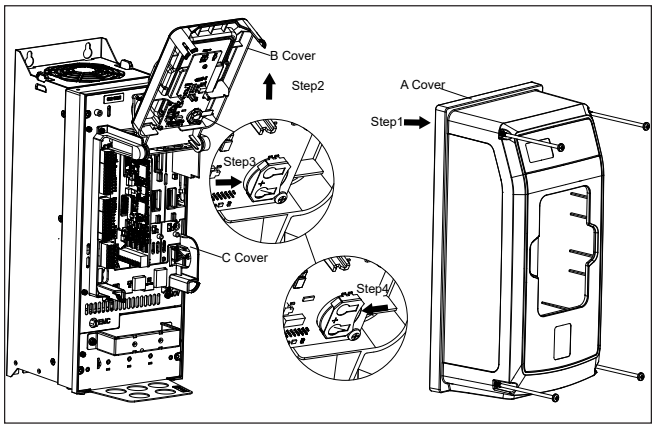


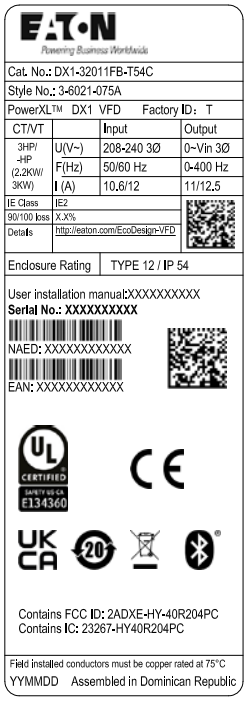
Table 1. Common abbreviations.

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

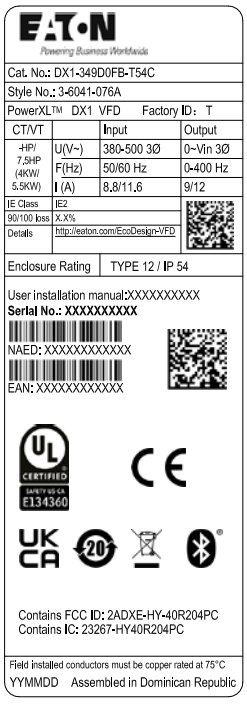
Rating label

Figure 3. Rating labels (samples).

DX1 230V rating label



DX1 480V rating label



DX1 575V rating label

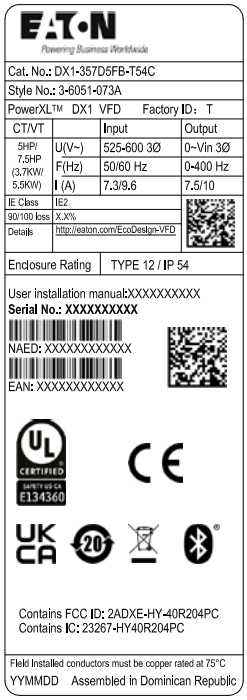


Figure 4. Carton labels (samples)

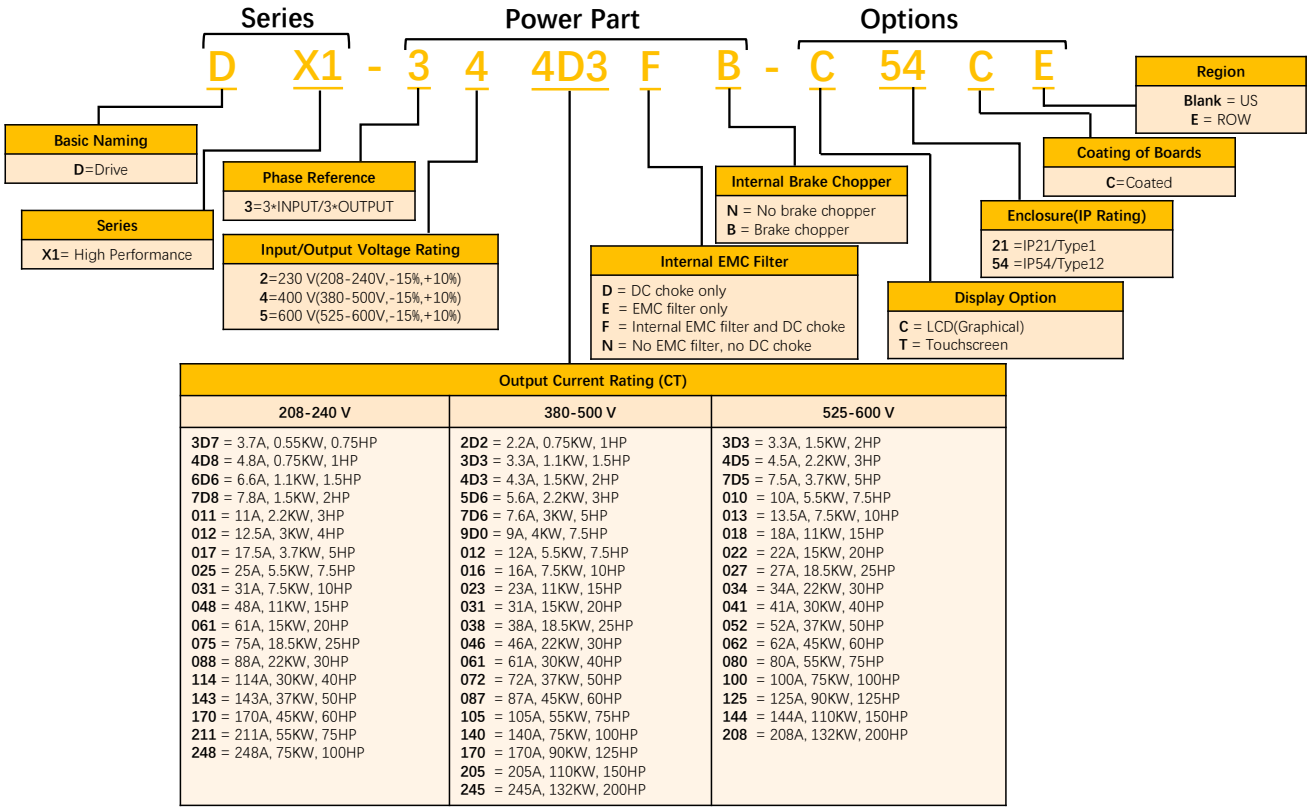
DX1 carton 230V rating label

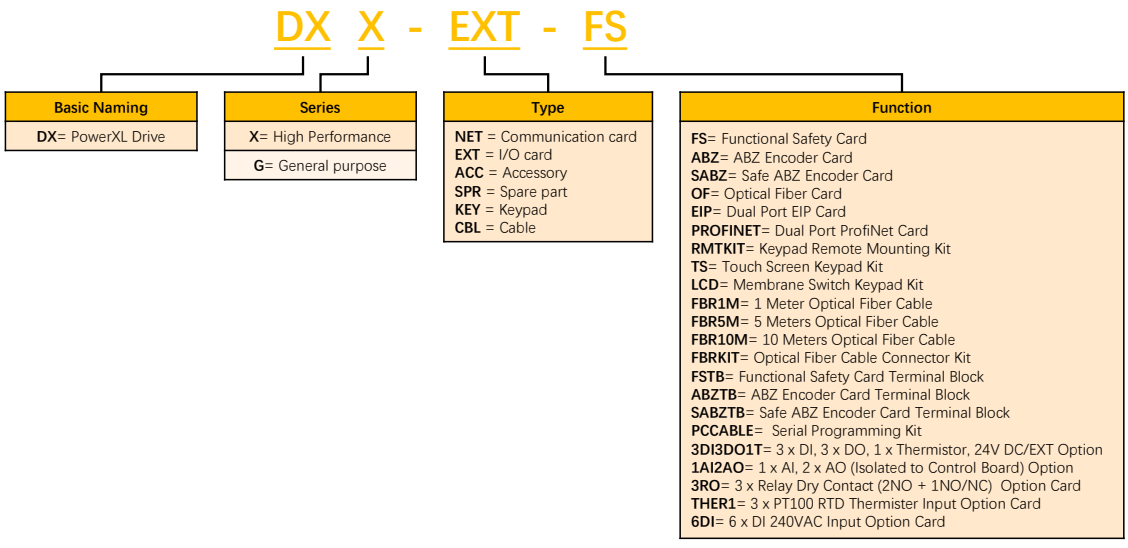
DX1 carton 480V rating label

DX1 carton 575V rating label

Catalog number system

Figure 5. Catalog number system





Power ratings and product selection

PowerXL Series drives—208-230 Volt

Table 2. Type 1/IP21.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	0.55	0.75	3.7	0.75	1	4.8	**DX1-323D7FB-C21C**	**DX1-323D7FB-T21C**
	0.75	1	4.8	1.1	1.5	6.6	**DX1-324D8FB-C21C**	**DX1-324D8FB-T21C**
	1.1	1.5	6.6	1.5	2	7.8	**DX1-326D6FB-C21C**	**DX1-326D6FB-T21C**
	1.5	2	7.8	2.2	3	11	**DX1-327D8FB-C21C**	**DX1-327D8FB-T21C**
	2.2	3	11	2.2	3	12.5	**DX1-32011FB-C21C**	**DX1-32011FB-T21C**
FR2	3	3	12.5	3.7	5	17.5	**DX1-32012FB-C21C**	**DX1-32012FB-T21C**
	3	5	17.5	5.5	7.5	25	**DX1-32017FB-C21C**	**DX1-32017FB-T21C**
	5.5	7.5	25	7.5	10	31	**DX1-32025FB-C21C**	**DX1-32025FB-T21C**
FR3	7.5	10	31	11	15	48	**DX1-32031FB-C21C**	**DX1-32031FB-T21C**
	11	15	48	15	20	61	**DX1-32048FB-C21C**	**DX1-32048FB-T21C**
FR4	15	20	61	18.5	25	75	**DX1-32061FN-C21C**	**DX1-32061FN-T21C**
	15	20	61	18.5	25	75	**DX1-32061FB-C21C**	**DX1-32061FB-T21C**
	18.5	25	75	22	30	88	**DX1-32075FN-C21C**	**DX1-32075FN-T21C**
	18.5	25	75	22	30	88	**DX1-32075FB-C21C**	**DX1-32075FB-T21C**
	22	30	88	30	40	114	**DX1-32088FN-C21C**	**DX1-32088FN-T21C**
	22	30	88	30	40	114	**DX1-32088FB-C21C**	**DX1-32088FB-T21C**
FR5	30	40	114	37	50	143	**DX1-32114FN-C21C**	**DX1-32114FN-T21C**
	30	40	114	37	50	143	**DX1-32114FB-C21C**	**DX1-32114FB-T21C**
	37	50	143	45	60	170	**DX1-32143FN-C21C**	**DX1-32143FN-T21C**
	37	50	143	45	60	170	**DX1-32143FB-C21C**	**DX1-32143FB-T21C**
	45	60	170	55	75	211	**DX1-32170FN-C21C**	**DX1-32170FN-T21C**
	45	60	170	55	75	211	**DX1-32170FB-C21C**	**DX1-32170FB-T21C**
FR6	55	75	211	75	100	261	**DX1-32211FN-C21C**	**DX1-32211FN-T21C**
	55	75	211	75	100	261	**DX1-32211FB-C21C**	**DX1-32211FB-T21C**
FR6	75	100	248	90	125	312	**DX1-32248FN-C21C**	**DX1-32248FN-T21C**
	75	100	248	90	125	312	**DX1-32248FB-C21C**	**DX1-32248FB-T21C**

Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).

Table 3. Type 12/IP54.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**230 V, 50 Hz kW rating**	**230 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	0.55	0.75	3.7	0.75	1	4.8	**DX1-323D7FB-C54C**	**DX1-323D7FB-T54C**
	0.75	1	4.8	1.1	1.5	6.6	**DX1-324D8FB-C54C**	**DX1-324D8FB-T54C**
	1.1	1.5	6.6	1.5	2	7.8	**DX1-326D6FB-C54C**	**DX1-326D6FB-T54C**
	1.5	2	7.8	2.2	3	11	**DX1-327D8FB-C54C**	**DX1-327D8FB-T54C**
	2.2	3	11	2.2	3	12.5	**DX1-32011FB-C54C**	**DX1-32011FB-T54C**
FR2	3	3	12.5	3.7	5	17.5	**DX1-32012FB-C54C**	**DX1-32012FB-T54C**
	3	5	17.5	5.5	7.5	25	**DX1-32017FB-C54C**	**DX1-32017FB-T54C**
	5.5	7.5	25	7.5	10	31	**DX1-32025FB-C54C**	**DX1-32025FB-T54C**
FR3	7.5	10	31	11	15	48	**DX1-32031FB-C54C**	**DX1-32031FB-T54C**
	11	15	48	15	20	61	**DX1-32048FB-C54C**	**DX1-32048FB-T54C**
FR4	15	20	61	18.5	25	75	**DX1-32061FN-C54C**	**DX1-32061FN-T54C**
	15	20	61	18.5	25	75	**DX1-32061FB-C54C**	**DX1-32061FB-T54C**
	18.5	25	75	22	30	88	**DX1-32075FN-C54C**	**DX1-32075FN-T54C**
	18.5	25	75	22	30	88	**DX1-32075FB-C54C**	**DX1-32075FB-T54C**
	22	30	88	30	40	114	**DX1-32088FN-C54C**	**DX1-32088FN-T54C**
	22	30	88	30	40	114	**DX1-32088FB-C54C**	**DX1-32088FB-T54C**
FR5	30	40	114	37	50	143	**DX1-32114FN-C54C**	**DX1-32114FN-T54C**
	30	40	114	37	50	143	**DX1-32114FB-C54C**	**DX1-32114FB-T54C**
	37	50	143	45	60	170	**DX1-32143FN-C54C**	**DX1-32143FN-T54C**
	37	50	143	45	60	170	**DX1-32143FB-C54C**	**DX1-32143FB-T54C**
	45	60	170	55	75	211	**DX1-32170FN-C54C**	**DX1-32170FN-T54C**
FR5	45	60	170	55	75	211	**DX1-32170FB-C54C**	**DX1-32170FB-T54C**
FR6	55	75	211	75	100	261	**DX1-32211FN-C54C**	**DX1-32211FN-T54C**
	55	75	211	75	100	261	**DX1-32211FB-C54C**	**DX1-32211FB-T54C**
	75	100	248	90	125	312	**DX1-32248FN-C54C**	**DX1-32248FN-T54C**
	75	100	248	90	125	312	**DX1-32248FB-C54C**	**DX1-32248FB-T54C**

Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).
PowerXL Series drives—380-500 Volt

Table 4. Type 1/IP21.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**400 V, 50 Hz kW rating**	**460 V, 60 Hz hp**	**Current A**	**400 V, 50 Hz kW rating**	**460 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	0.75	1	2.2	1.1	1.5	3.3	**DX1-342D2FB-C21C**	**DX1-342D2FB-T21C**
	1.1	1.5	3.3	1.5	2	4.3	**DX1-343D3FB-C21C**	**DX1-343D3FB-T21C**
	1.5	2	4.3	2.2	3	5.6	**DX1-344D3FB-C21C**	**DX1-344D3FB-T21C**
	2.2	3	5.6	3.7	5	7.6	**DX1-345D6FB-C21C**	**DX1-345D6FB-T21C**
	3	5	7.6	3.7	5	9	**DX1-347D6FB-C21C**	**DX1-347D6FB-T21C**
	3	5	7.6	5.5	7.5	12	**DX1-349D0FB-C21C**	**DX1-349D0FB-T21C**
FR2	5.5	7.5	12	7.5	10	16	**DX1-34012FB-C21C**	**DX1-34012FB-T21C**
	7.5	10	16	11	15	23	**DX1-34016FB-C21C**	**DX1-34016FB-T21C**
	11	15	23	15	20	31	**DX1-34023FB-C21C**	**DX1-34023FB-T21C**
FR3	15	20	31	18.5	25	38	**DX1-34031FB-C21C**	**DX1-34031FB-T21C**
	18.5	25	38	22	30	46	**DX1-34038FB-C21C**	**DX1-34038FB-T21C**
	22	30	46	30	40	61	**DX1-34046FB-C21C**	**DX1-34046FB-T21C**
FR4	30	40	61	37	50	72	**DX1-34061FN-C21C**	**DX1-34061FN-T21C**
	30	40	61	37	50	72	**DX1-34061FB-C21C**	**DX1-34061FB-T21C**
	37	50	72	45	60	87	**DX1-34072FN-C21C**	**DX1-34072FN-T21C**
	37	50	72	45	60	87	**DX1-34072FB-C21C**	**DX1-34072FB-T21C**
	45	60	87	55	75	105	**DX1-34087FN-C21C**	**DX1-34087FN-T21C**
	45	60	87	55	75	105	**DX1-34087FB-C21C**	**DX1-34087FB-T21C**
FR5	55	75	105	75	100	140	**DX1-34105FN-C21C**	**DX1-34105FN-T21C**
	55	75	105	75	100	140	**DX1-34105FB-C21C**	**DX1-34105FB-T21C**
	75	100	140	90	125	170	**DX1-34140FN-C21C**	**DX1-34140FN-T21C**
	75	100	140	90	125	170	**DX1-34140FB-C21C**	**DX1-34140FB-T21C**
	90	125	170	110	150	205	**DX1-34170FN-C21C**	**DX1-34170FN-T21C**
	90	125	170	110	150	205	**DX1-34170FB-C21C**	**DX1-34170FB-T21C**
FR6	110	150	205	132	200	261	**DX1-34205FN-C21C**	**DX1-34205FN-T21C**
	110	150	205	132	200	261	**DX1-34205FB-C21C**	**DX1-34205FB-T21C**
	132	200	245	160	250	310	**DX1-34245FN-C21C**	**DX1-34245FN-T21C**
	132	200	245	160	250	310	**DX1-34245FB-C21C**	**DX1-34245FB-T21C**

Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).

Table 5. Type 12/IP54.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**400 V, 50 Hz kW rating**	**460 V, 60 Hz hp**	**Current A**	**400 V, 50 Hz kW rating**	**460 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	0.75	1	2.2	1.1	1.5	3.3	**DX1-342D2FB-C54C**	**DX1-342D2FB-T54C**
	1.1	1.5	3.3	1.5	2	4.3	**DX1-343D3FB-C54C**	**DX1-343D3FB-T54C**
	1.5	2	4.3	2.2	3	5.6	**DX1-344D3FB-C54C**	**DX1-344D3FB-T54C**
	2.2	3	5.6	3.7	5	7.6	**DX1-345D6FB-C54C**	**DX1-345D6FB-T54C**
	3	5	7.6	3.7	5	9	**DX1-347D6FB-C54C**	**DX1-347D6FB-T54C**
	3	5	7.6	5.5	7.5	12	**DX1-349D0FB-C54C**	**DX1-349D0FB-T54C**
FR2	5.5	7.5	12	7.5	10	16	**DX1-34012FB-C54C**	**DX1-34012FB-T54C**
	7.5	10	16	11	15	23	**DX1-34016FB-C54C**	**DX1-34016FB-T54C**
	11	15	23	15	20	31	**DX1-34023FB-C54C**	**DX1-34023FB-T54C**
FR3	15	20	31	18.5	25	38	**DX1-34031FB-C54C**	**DX1-34031FB-T54C**
	18.5	25	38	22	30	46	**DX1-34038FB-C54C**	**DX1-34038FB-T54C**
	22	30	46	30	40	61	**DX1-34046FB-C54C**	**DX1-34046FB-T54C**
FR4	30	40	61	37	50	72	**DX1-34061FN-C54C**	**DX1-34061FN-T54C**
	30	40	61	37	50	72	**DX1-34061FB-C54C**	**DX1-34061FB-T54C**
	37	50	72	45	60	87	**DX1-34072FN-C54C**	**DX1-34072FN-T54C**
	37	50	72	45	60	87	**DX1-34072FB-C54C**	**DX1-34072FB-T54C**
	45	60	87	55	75	105	**DX1-34087FN-C54C**	**DX1-34087FN-T54C**
	45	60	87	55	75	105	**DX1-34087FB-C54C**	**DX1-34087FB-T54C**
FR5	55	75	105	75	100	140	**DX1-34105FN-C54C**	**DX1-34105FN-T54C**
	55	75	105	75	100	140	**DX1-34105FB-C54C**	**DX1-34105FB-T54C**
	75	100	140	90	125	170	**DX1-34140FN-C54C**	**DX1-34140FN-T54C**
	75	100	140	90	125	170	**DX1-34140FB-C54C**	**DX1-34140FB-T54C**
	90	125	170	110	150	205	**DX1-34170FN-C54C**	**DX1-34170FN-T54C**
	90	125	170	110	150	205	**DX1-34170FB-C54C**	**DX1-34170FB-T54C**
FR6	110	150	205	132	200	261	**DX1-34205FN-C54C**	**DX1-34205FN-T54C**
	110	150	205	132	200	261	**DX1-34205FB-C54C**	**DX1-34205FB-T54C**
	132	200	245	160	250	310	**DX1-34245FN-C54C**	**DX1-34245FN-T54C**
	132	200	245	160	250	310	**DX1-34245FB-C54C**	**DX1-34245FB-T54C**

Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).

PowerXL Series Drives—600 volt

Table 6. Type 1/IP21.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**600 V, 50 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**600 V, 50 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	1.5	2	3.3	2.2	3	4.5	**DX1-353D3FB-C21C**	**DX1-353D3FB-T21C**
	2.2	3	4.5	3.7	5	7.5	**DX1-354D5FB-C21C**	**DX1-354D5FB-T21C**
	3.7	5	7.5	5.5	7.5	10	**DX1-357D5FB-C21C**	**DX1-357D5FB-T21C**
FR2	5.5	7.5	10	7.5	10	13.5	**DX1-35010FB-C21C**	**DX1-35010FB-T21C**
	7.5	10	13.5	11	15	18	**DX1-35013FB-C21C**	**DX1-35013FB-T21C**
	11	15	18	15	20	22	**DX1-35018FB-C21C**	**DX1-35018FB-T21C**
FR3	15	20	22	18.5	25	27	**DX1-35022FB-C21C**	**DX1-35022FB-T21C**
	18.5	25	27	22	30	34	**DX1-35027FB-C21C**	**DX1-35027FB-T21C**
	22	30	34	30	40	41	**DX1-35034FB-C21C**	**DX1-35034FB-T21C**
FR4	30	40	41	37	50	52	**DX1-35041FN-C21C**	**DX1-35041FN-T21C**
	30	40	41	37	50	52	**DX1-35041FB-C21C**	**DX1-35041FB-T21C**
	37	50	52	45	60	62	**DX1-35052FN-C21C**	**DX1-35052FN-T21C**
	37	50	52	45	60	62	**DX1-35052FB-C21C**	**DX1-35052FB-T21C**
	45	60	62	55	75	80	**DX1-35062FN-C21C**	**DX1-35062FN-T21C**
	45	60	62	55	75	80	**DX1-35062FB-C21C**	**DX1-35062FB-T21C**
FR5	55	75	80	75	100	100	**DX1-35080FN-C21C**	**DX1-35080FN-T21C**
	55	75	80	75	100	100	**DX1-35080FB-C21C**	**DX1-35080FB-T21C**
	75	100	100	90	125	125	**DX1-35100FN-C21C**	**DX1-35100FN-T21C**
	75	100	100	90	125	125	**DX1-35100FB-C21C**	**DX1-35100FB-T21C**
	90	125	125	110	150	144	**DX1-35125FN-C21C**	**DX1-35125FN-T21C**
	90	125	125	110	150	144	**DX1-35125FB-C21C**	**DX1-35125FB-T21C**
FR6	110	150	144	132	200	208	**DX1-35144FN-C21C**	**DX1-35144FN-T21C**
	110	150	144	132	200	208	**DX1-35144FB-C21C**	**DX1-35144FB-T21C**
	132	200	208	160	250	250	**DX1-35208FN-C21C**	**DX1-35208FN-T21C**
	132	200	208	160	250	250	**DX1-35208FB-C21C**	**DX1-35208FB-T21C**

Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).

Table 7. Type 12/IP54.

	Constant torque (CT)/high overload (I_H)			Variable torque (VT)/low overload (I_L)				
Frame size	**600 V, 50 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**600 V, 50 Hz kW rating**	**600 V, 60 Hz hp**	**Current A**	**Catalog number with LCD Keypad**	**Catalog number with touch screen**
FR1	1.5	2	3.3	2.2	3	4.5	**DX1-353D3FB-C54C**	**DX1-353D3FB-T54C**
	2.2	3	4.5	3.7	5	7.5	**DX1-354D5FB-C54C**	**DX1-354D5FB-T54C**
	3.7	5	7.5	5.5	7.5	10	**DX1-357D5FB-C54C**	**DX1-357D5FB-T54C**
FR2	5.5	7.5	10	7.5	10	13.5	**DX1-35010FB-C54C**	**DX1-35010FB-T54C**
	7.5	10	13.5	11	15	18	**DX1-35013FB-C54C**	**DX1-35013FB-T54C**
	11	15	18	15	20	22	**DX1-35018FB-C54C**	**DX1-35018FB-T54C**
FR3	15	20	22	18.5	25	27	**DX1-35022FB-C54C**	**DX1-35022FB-T54C**
	18.5	25	27	22	30	34	**DX1-35027FB-C54C**	**DX1-35027FB-T54C**
	22	30	34	30	40	41	**DX1-35034FB-C54C**	**DX1-35034FB-T54C**
FR4	30	40	41	37	50	52	**DX1-35041FN-C54C**	**DX1-35041FN-T54C**
	30	40	41	37	50	52	**DX1-35041FB-C54C**	**DX1-35041FB-T54C**
	37	50	52	45	60	62	**DX1-35052FN-C54C**	**DX1-35052FN-T54C**
	37	50	52	45	60	62	**DX1-35052FB-C54C**	**DX1-35052FB-T54C**
	45	60	62	55	75	80	**DX1-35062FN-C54C**	**DX1-35062FN-T54C**
	45	60	62	55	75	80	**DX1-35062FB-C54C**	**DX1-35062FB-T54C**
FR5	55	75	80	75	100	100	**DX1-35080FN-C54C**	**DX1-35080FN-T54C**
	55	75	80	75	100	100	**DX1-35080FB-C54C**	**DX1-35080FB-T54C**
	75	100	100	90	125	125	**DX1-35100FN-C54C**	**DX1-35100FN-T54C**
	75	100	100	90	125	125	**DX1-35100FB-C54C**	**DX1-35100FB-T54C**
	90	125	125	110	150	144	**DX1-35125FN-C54C**	**DX1-35125FN-T54C**
	90	125	125	110	150	144	**DX1-35125FB-C54C**	**DX1-35125FB-T54C**
FR6	110	150	144	132	200	208	**DX1-35144FN-C54C**	**DX1-35144FN-T54C**
	110	150	144	132	200	208	**DX1-35144FB-C54C**	**DX1-35144FB-T54C**
	132	200	208	160	250	250	**DX1-35208FN-C54C**	**DX1-35208FN-T54C**
	132	200	208	160	250	250	**DX1-35208FB-C54C**	**DX1-35208FB-T54C**

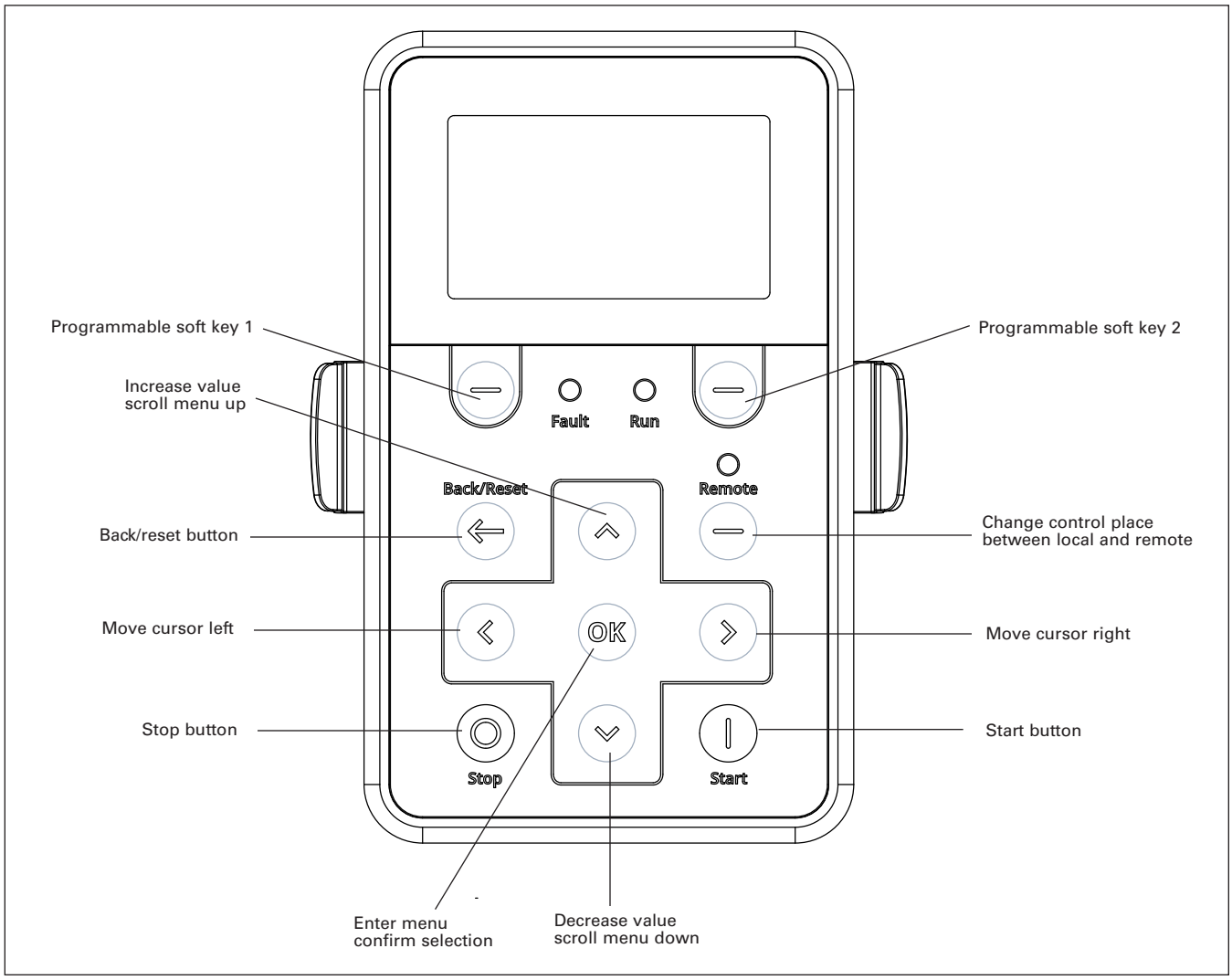
Note: The same data is applicable for the EMEA and rest of the world models (catalog numbers with an "E" at the end).

Chapter 2—Keypad overview

Membrane LCD keypad

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 6**).

Figure 6. Keypad and display.



Keypad buttons

Buttons description

Table 8. Keypad buttons.

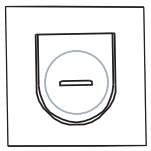
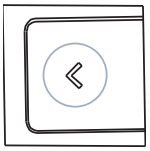
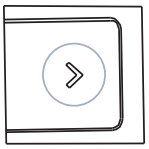
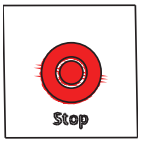
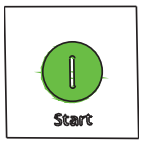
Icon	Button	Description
	Soft key 1, Soft key 2	**Soft key 1, soft key 2:** The functions of these two buttons shall be the following: • Forward/Reverse, this shall change motor's run direction. • Menu, this shall return to main menu. • Details, this shall display the details of the fault. • Bypass, this shall make drive go into bypass. • Jog, this shall activate jog. Jog can enabled via press OK Key and Soft2 Key (When the Soft2Key is Jog) and disabled via release any one of the two keys. • 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 2 seconds in any page). • Hold Stop and Back Reset for 5 seconds to return drive to factory default. • At Main Menu page by hitting Back/Reset takes to Default Page.
	Local/Remote	**Local/Remote:** Switches between LOCAL and REMOTE control for start and speed reference. The control locations corresponding to local and remote shall be selected within an application.
	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter comparison mode, scroll through the parameters of which current value is different from comparison parameter value. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.

Table 8. 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. • At Main Menu page by hitting Back/Reset takes to Default Page.
	Right	**Right arrow:** • Enter parameter group mode. • Enter parameter mode from group mode. • Enter parameter whole edit mode when this parameter can be written. • Enter parameter bit by bit edit mode from whole edit mode. • Navigation button, movement to right when editing a parameter bit by bit.
	OK	**OK:** • Will clear all the fault history if pressed for more than 5 seconds (including 5 seconds) 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 the motor stop button for normal operation. The default is for this button to always be active. It can be changed in parameter P7.5 to only when "Keypad" is selected as the control source. • Motor stop from the keypad.
	Start	**Start:** This button operates as motor start button for normal operation when the "Keypad" is selected as the active control source. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen.

LED lights

Table 9. 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).
Remote	**Local/Remote:** Local: If the local control place is selected, the light will be off. Remote: If the remote control place is selected, the light will be on.

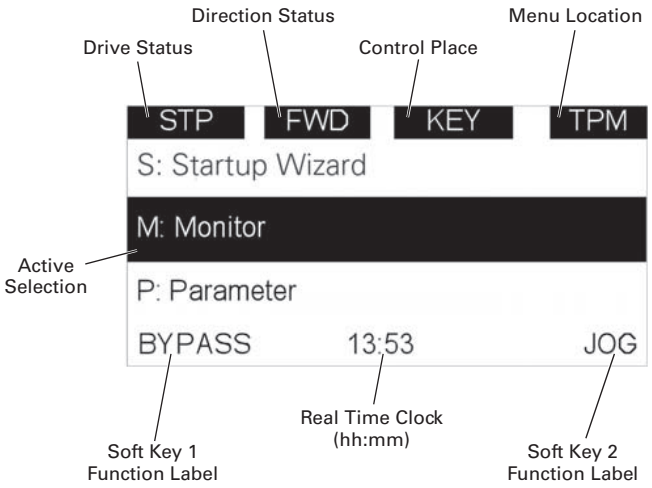
LCD display

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 7**.

Figure 7. General view of LCD.



The lines definition is as follows:

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/JOG/INCH**—If the motor running direction is clockwise, display "FWD", otherwise display "REV" "Jog" if the drive is in Jog mode the status indication will occur.
- **KEY/I/O/BPS/RBP/BUS/OFF**—If it is in bypass currently, display "BPS"; when run command is given it will got to "RBP", otherwise, if the current control source is I/O terminal, display "I/O". If it is keypad, then display "KEY"; otherwise display "BUS." if HOA enabled and switch to OFF, it shall show OFF.
- **PAR/MON/FLT/OPE/QSW/FAV/TPM/MS1/SL1/SL2/SL3/SL4/BUx.**—If the current page is parameter menu, display "PAR"; If monitor menu, then display "MON"; If fault menu, then display "FLT"; If operation menu, then display "OPE"; If quick start wizard, then display "QSW"; If optional card menu, then display "BOA"; If favorite menu, then display "FAV"; If main menu, then display "TPM" when doing the Multi-drive Pump and Fan mode, the drive mode will be defined with MS- Master and SL being a slave drive. The 1 through 4 will indicate the number in the series it is. "BUx" indicates the drive being a backup drive when in the redundant drive system. When in the MPFC mode, the last item of first line shows the information of master or slave, such as MS1, SL2, OFL. "OFL" normally means that the slave drive and master drive are not talking for various reasons, or the slave drive is not configure correctly.

The second line is the Code line and 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

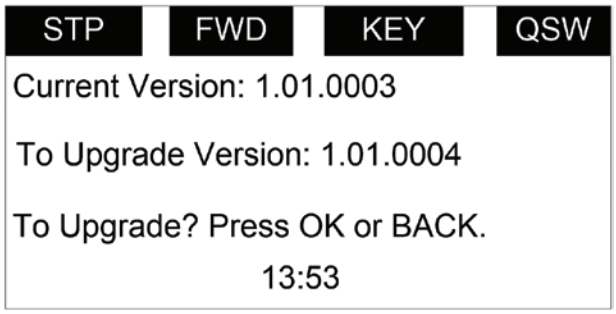
LCD shall show the welcome page when power on. See **Figure 8**.

Figure 8. 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.

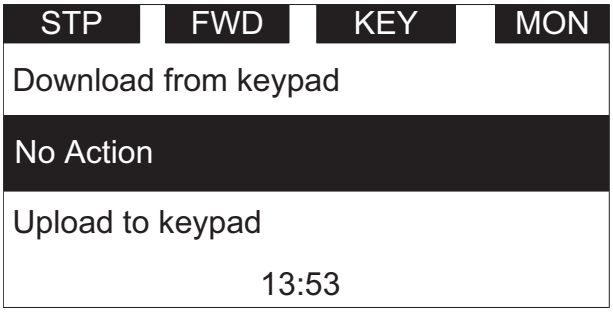
Figure 9. Upgrade page.



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 10. Auto backup page.



Soft key description

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

Table 10. 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	Menu
Favorite page	Delete	Menu
Fault page	Detail	Menu

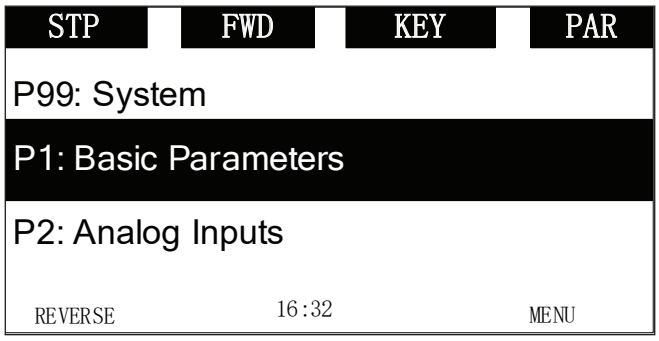
***Note:** If "Jog Softkey Hidden" (ID2412) or "Reverse Softkey Hidden" (ID2413) is set to hidden it will hide this value.

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 11**

Figure 11. Main menu.

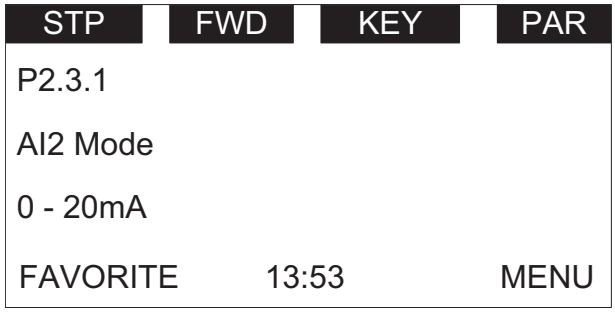
2. For the parameter group, the two soft keys "REVERSE/ FORWARD" and "MENU" shall be shown. See **Figure 12**

Figure 12. Parent node page.



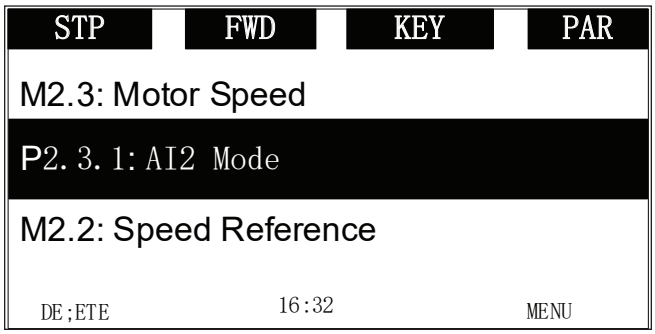
3. For the parameter menu, if this parameter hasn't been added into the favorite list, two soft keys "FAVORITE" and "MENU" shall be shown. If it has been added into the favorite list, only one soft key "MENU" is shown in the right.

Figure 13. Parameter page.



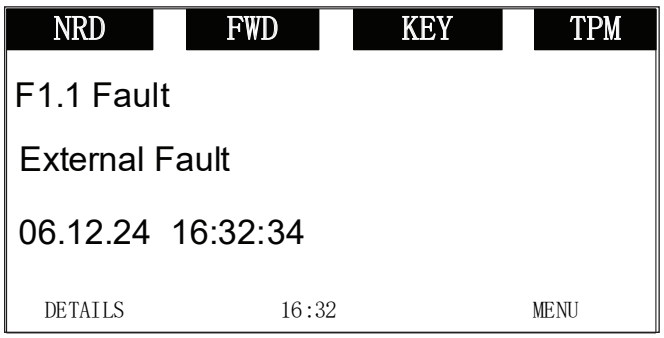
4. If one parameter has been added to the favorite list, it shall appear in the favorite menu. Then when you enter into the favorite menu, two soft keys "DELETE" and "MENU" shall be shown, and "DELETE" means you can delete the selected parameter from favorite list. See **Figure 14**

Figure 14. Parameter page from favorite menu.



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

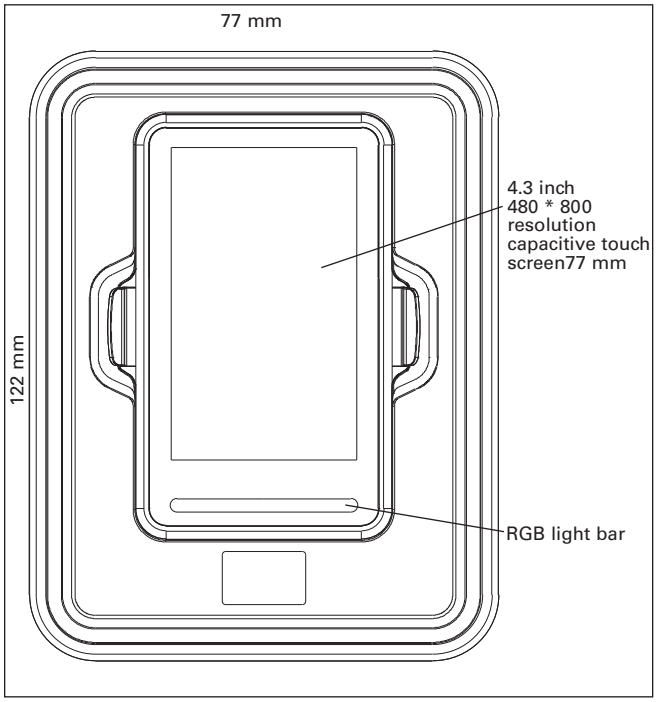
Figure 15. Fault page.



Touchscreen keypad navigation

DX1 Touchscreen Keypad catalog number DXX-KEY-TS offers an intuitive ease-of-use experience to setup, monitor and troubleshoot the drive. This keypad is removable and shall be remote mounted using a 'DXX-KEY-RMTKIT' and connected through a Cat5/Cat6 cable.

Figure 16. DXX-KEY-TS Touchscreen keypad



The color of the lightbar at the bottom of the touchscreen keypad shows the status of the drive.

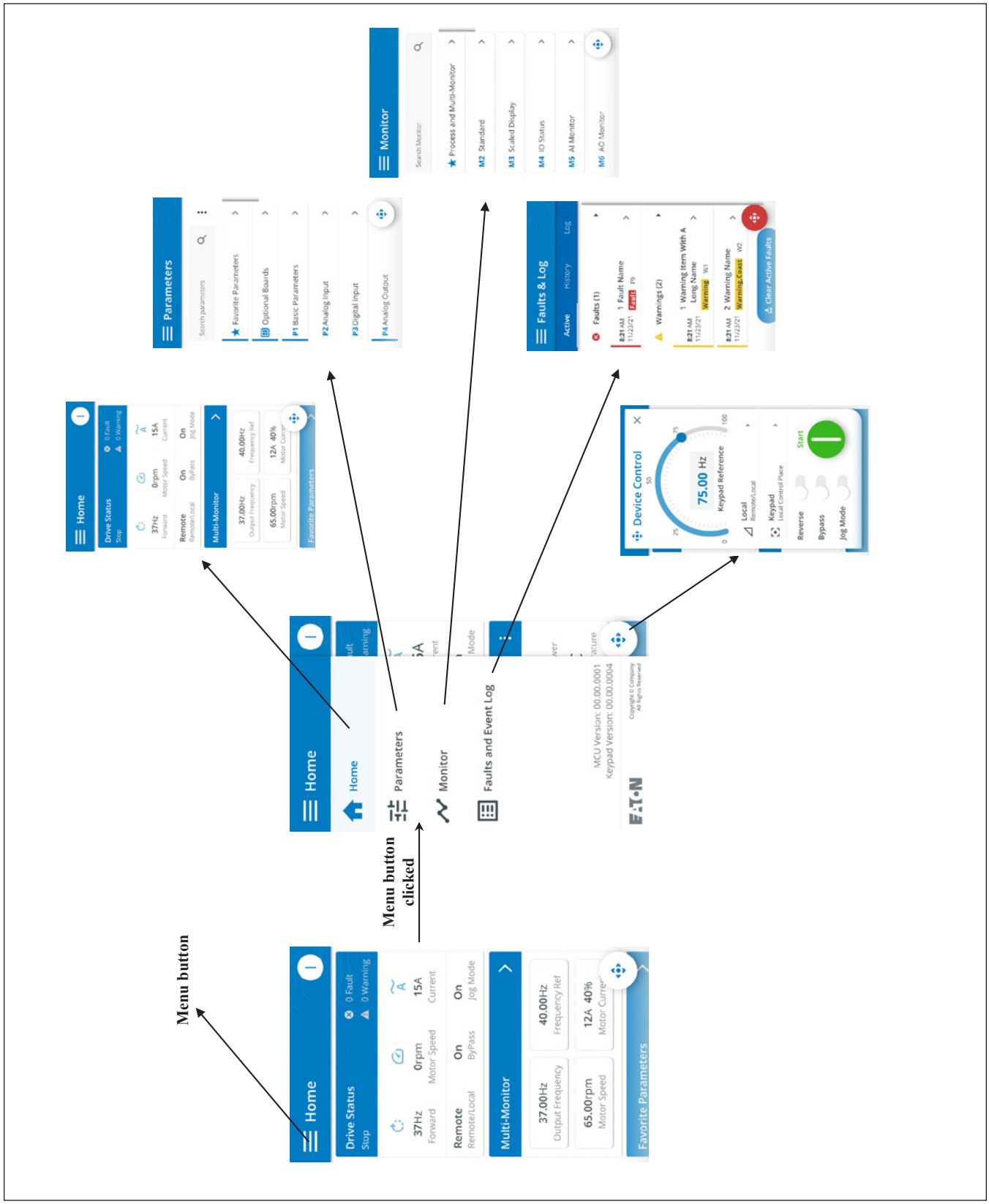
- Green: The drive is in running status.
- Blue: The drive is in stop status and ready to run.
- Red: There is active fault.
- No bar light: Drive is not ready.

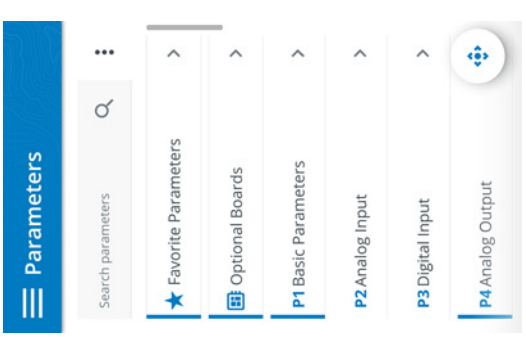
The following sections offer instructions about screen navigation the touchscreen keypad.

Main Screens

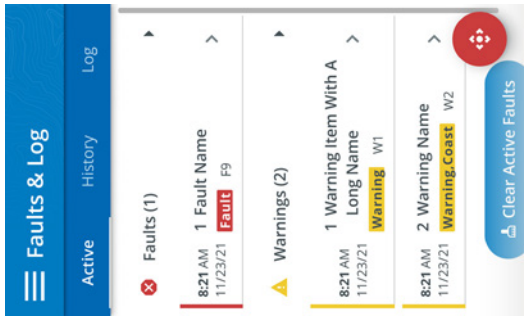
The touchscreen keypad offers the following access levels:

- Home page
- Parameters
- Monitor
- Fault and Event Log


Menu button
Menu button clicked
Home
Drive Status
Stop
0 Fault
0 Warning
37Hz
Forward
0rpm
Motor Speed
15A
Current
Remote
Remote/Local
On
ByPass
On
Jog Mode
Multi-Monitor
37.00Hz
Output Frequency
40.00Hz
Frequency Ref
65.00rpm
Motor Speed
12A 40%
Motor Current
Favorite Parameters
Parameters
Monitor
Faults and Event Log
Faults & Log
Active
History
Log
Faults (1)
1 Fault Name
Warnings (2)
1 Warning Item With A Long Name
2 Warning Name
Clear Active Faults
Device Control
75.00 Hz
Keypad Reference
Local
Remote/Local
Keypad
Local Control Place
Start
Reverse
Bypass
Jog Mode
MCU Version: 00.00.0001
Keypad Version: 00.00.0004
Copyright © Company
All Rights Reserved

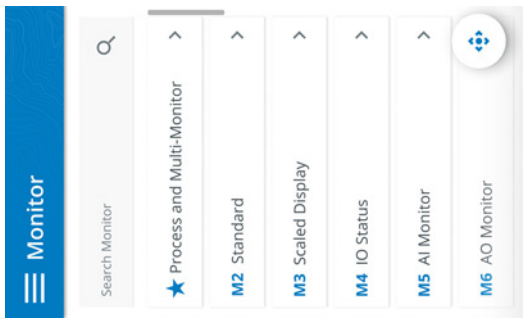


Parameters



Fault and Log

Home page

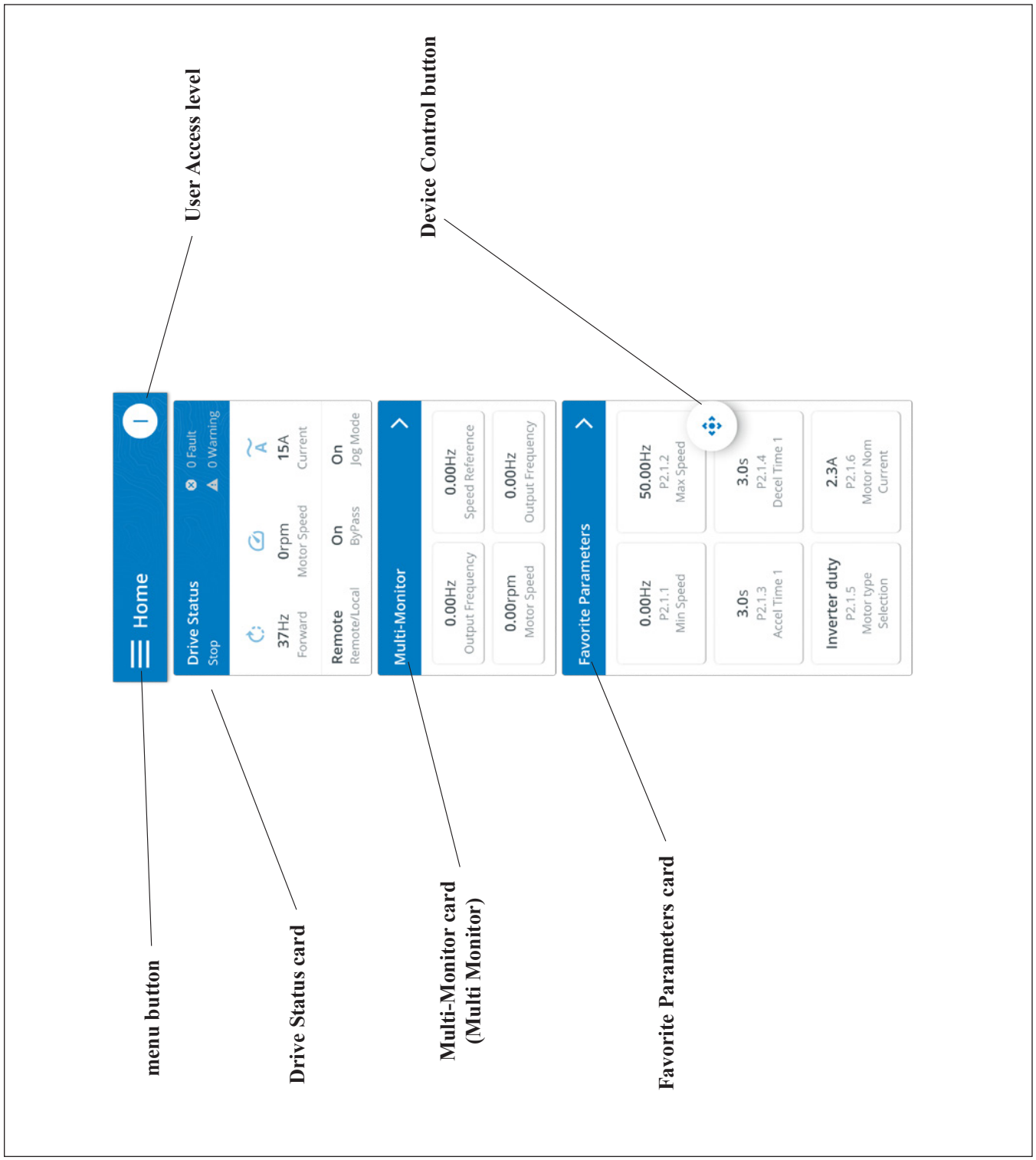


Monitor

Home Page

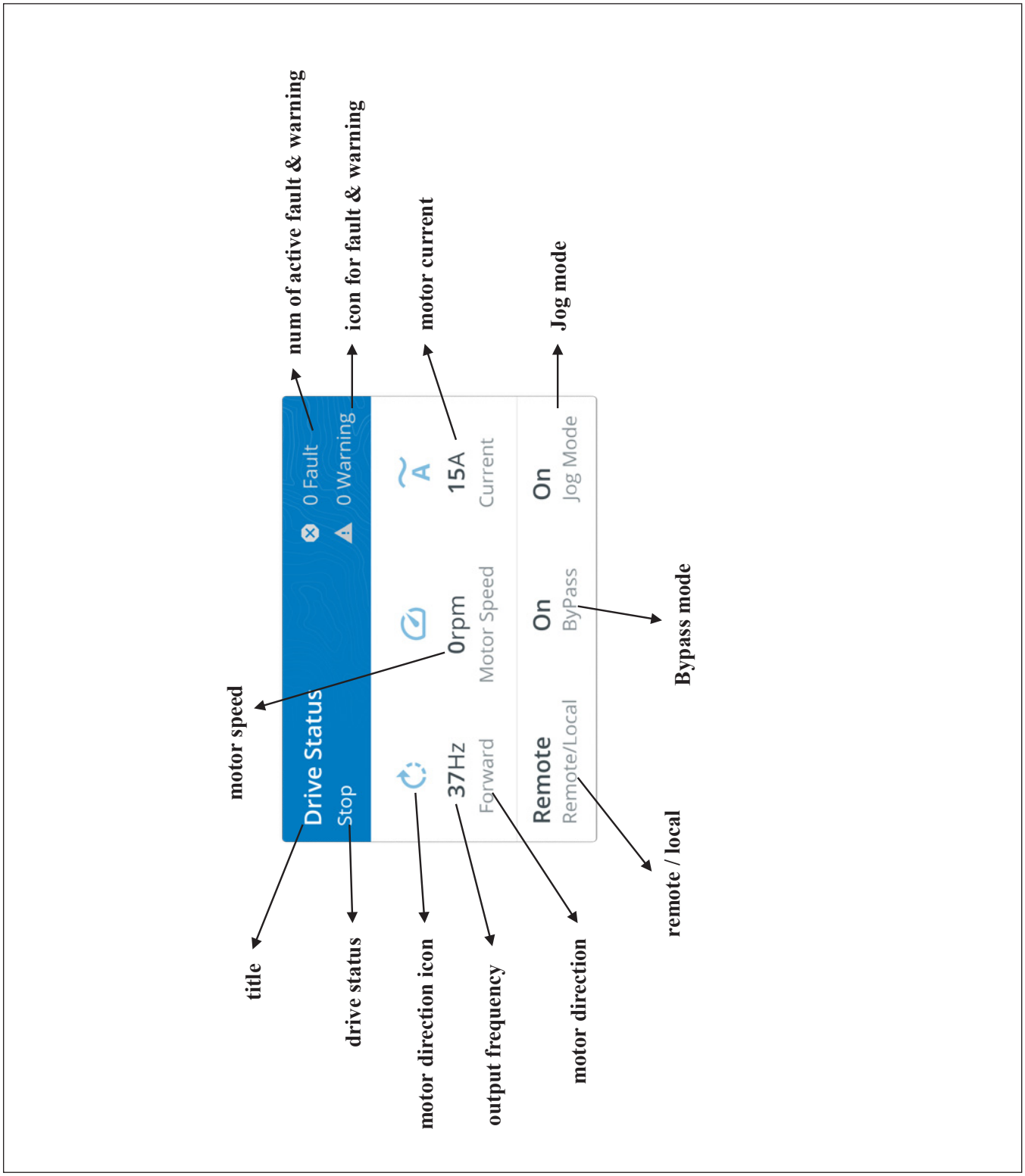
The Home page is the default screen when keypad powers on.

In the Home page, multiple entrances to the other screens / pages are provided.



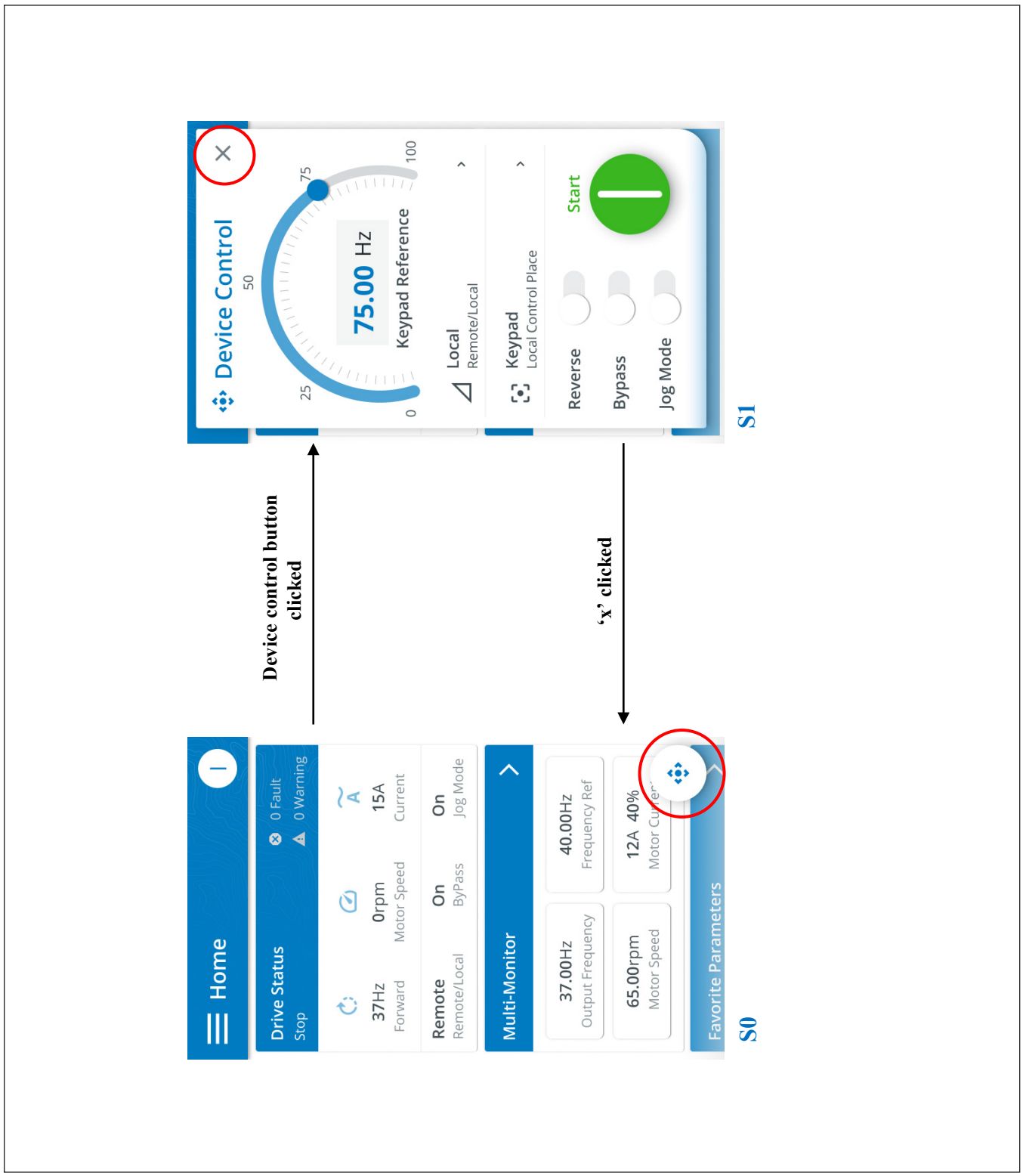
Drive Status Screen

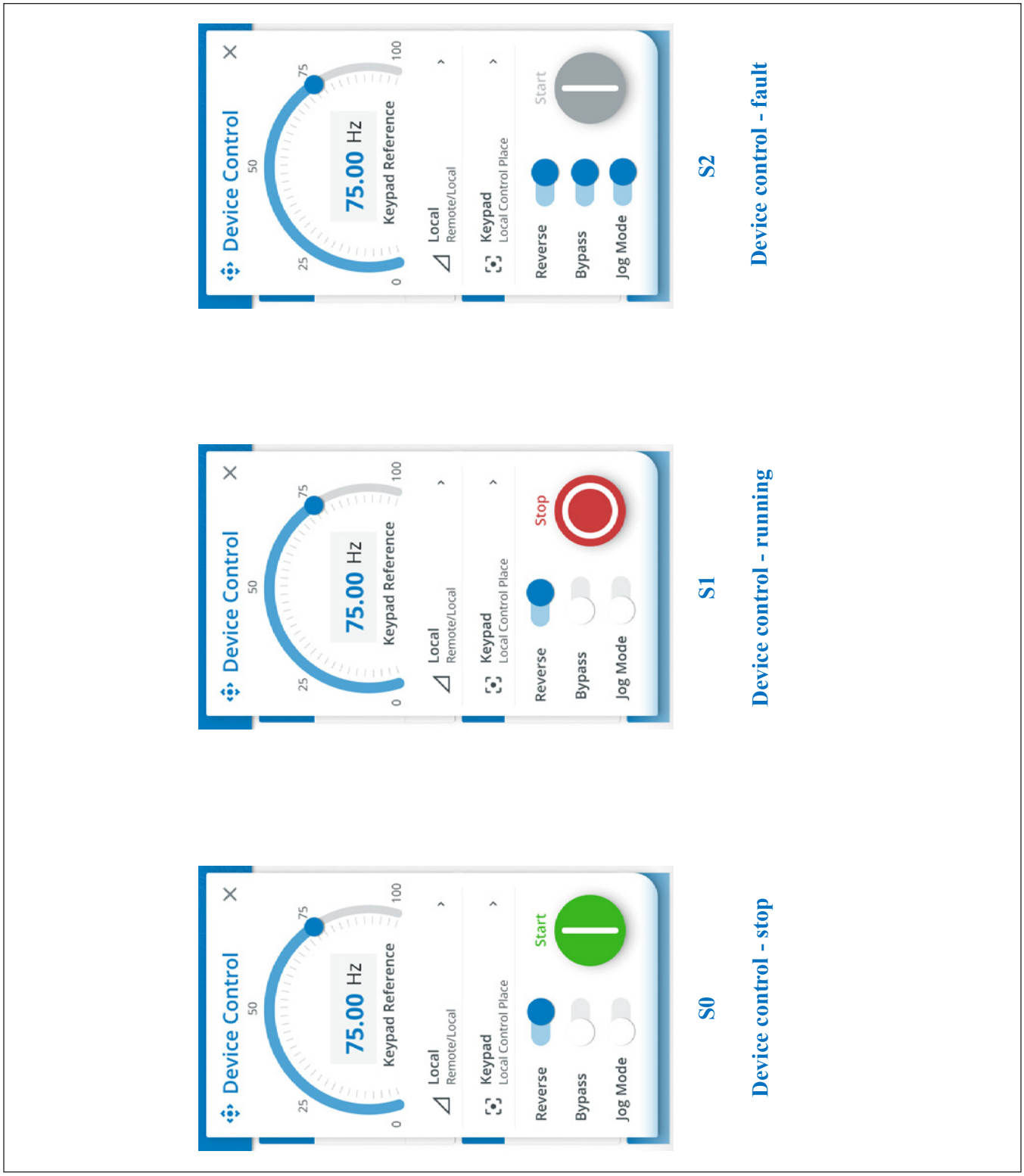
The Drive Status screen shows the current status of the drive.



Device Control

The Device Control page provides the commonly used interface for users to set up the drive.

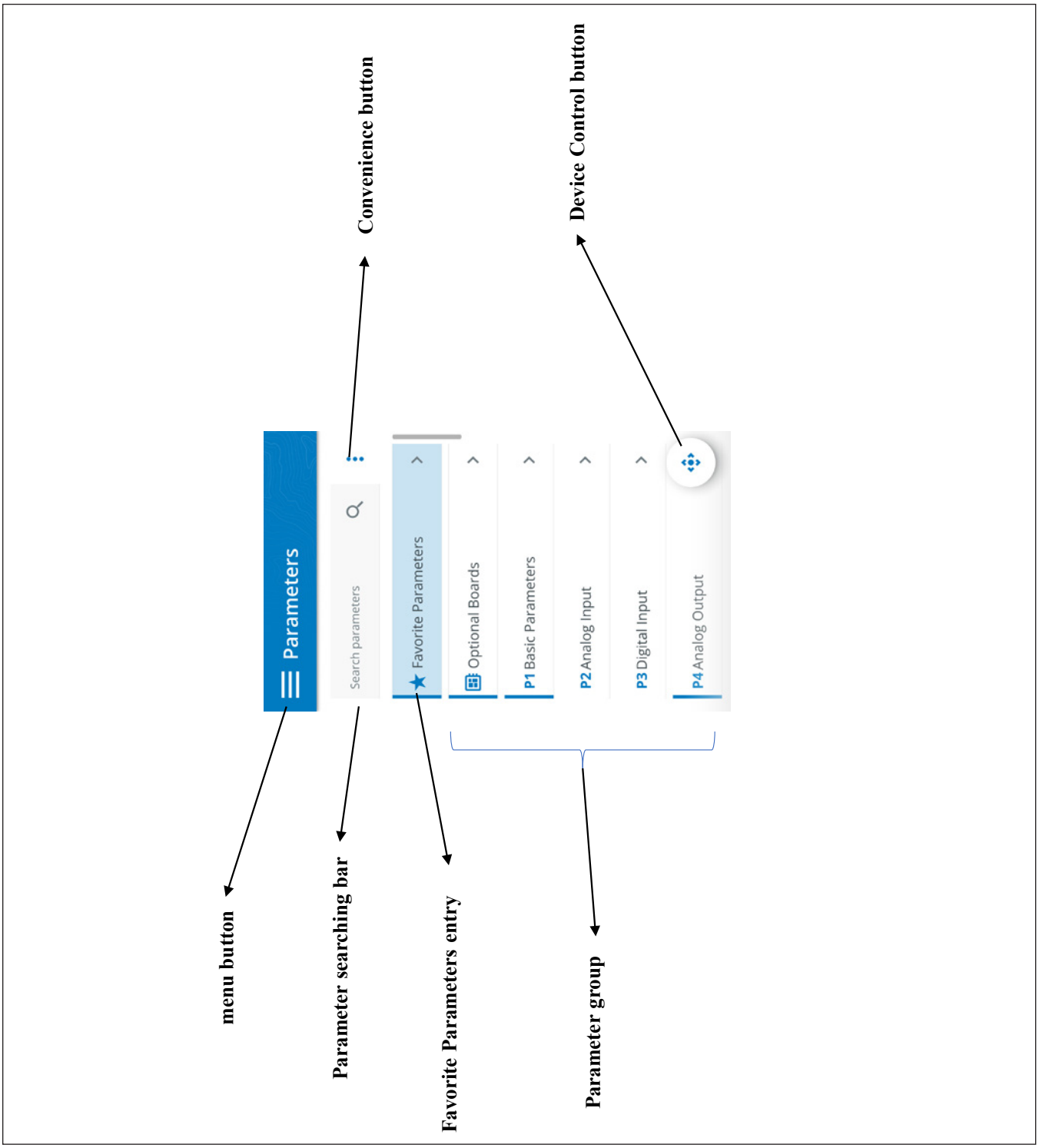



Device Control
75.00 Hz
Keypad Reference
Local
Remote/Local
Keypad
Local Control Place
Reverse
Bypass
Jog Mode
Start
Stop
S0
Device control - stop
S1
Device control - running
S2
Device control - fault

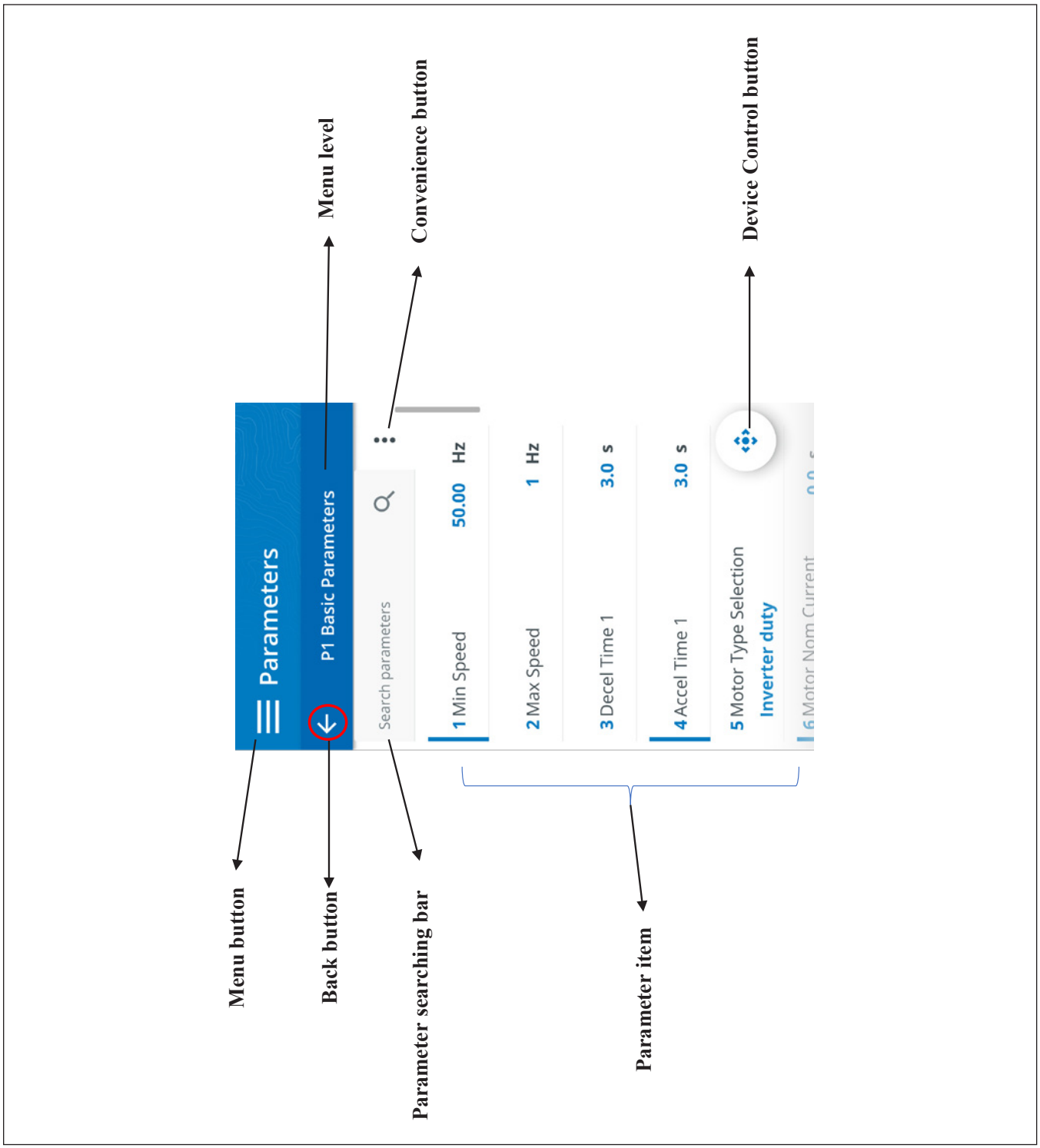
Parameters

The Parameters page lists the parameter groups / parameter items and provides components to allow users to interact efficiently.

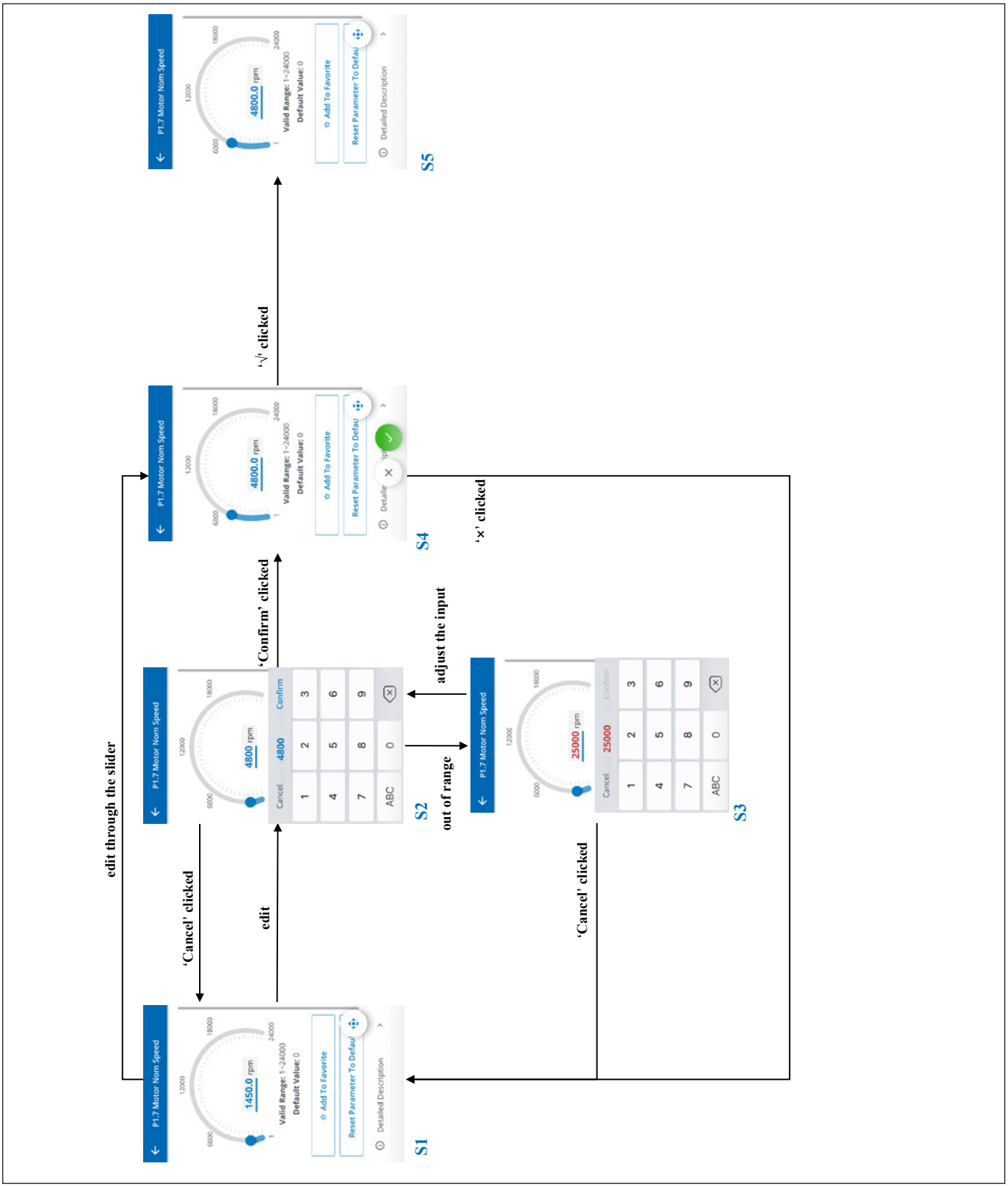
Parameter screen level 1 (menu level)



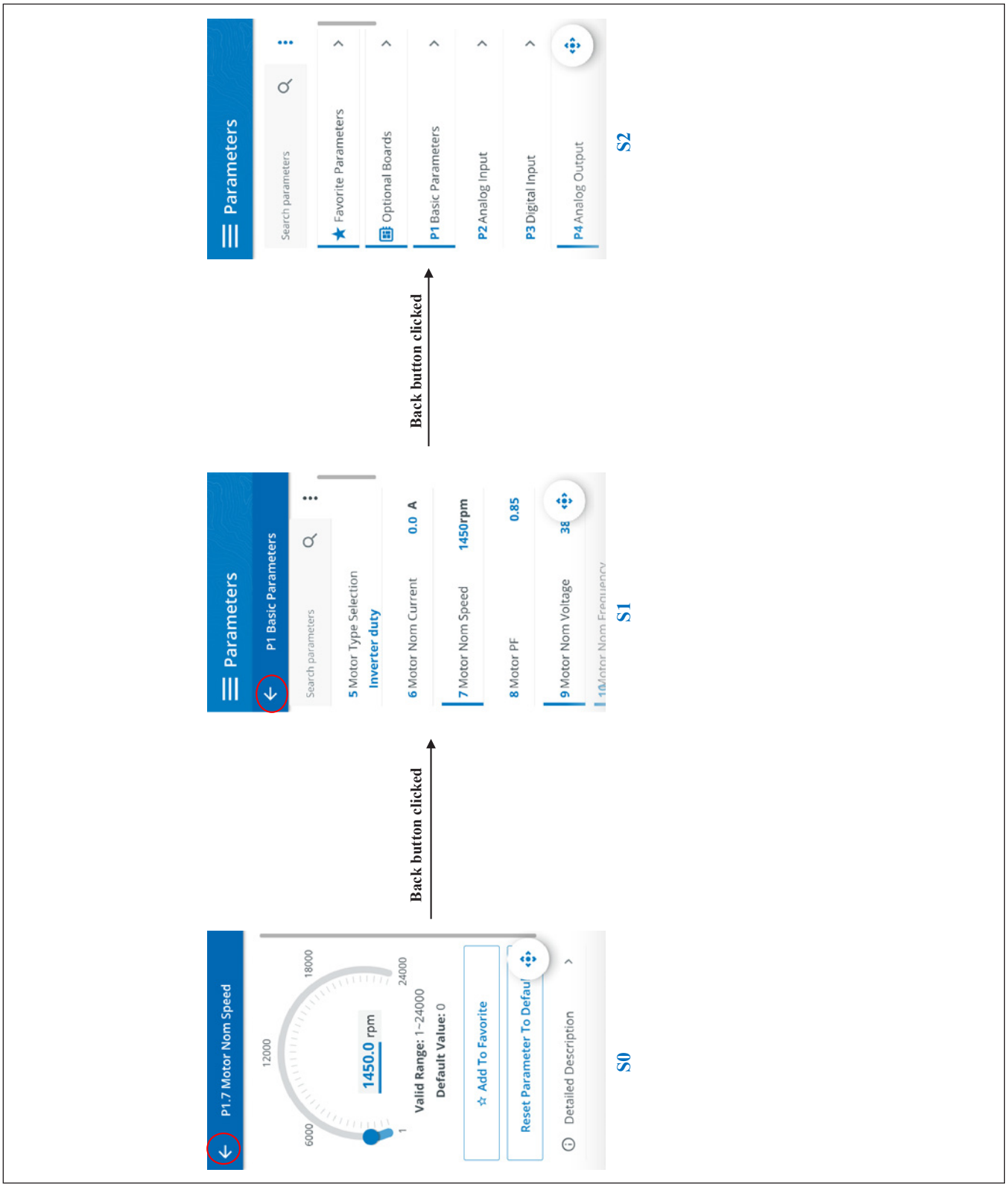
Parameter screen level 1 (parameter level)



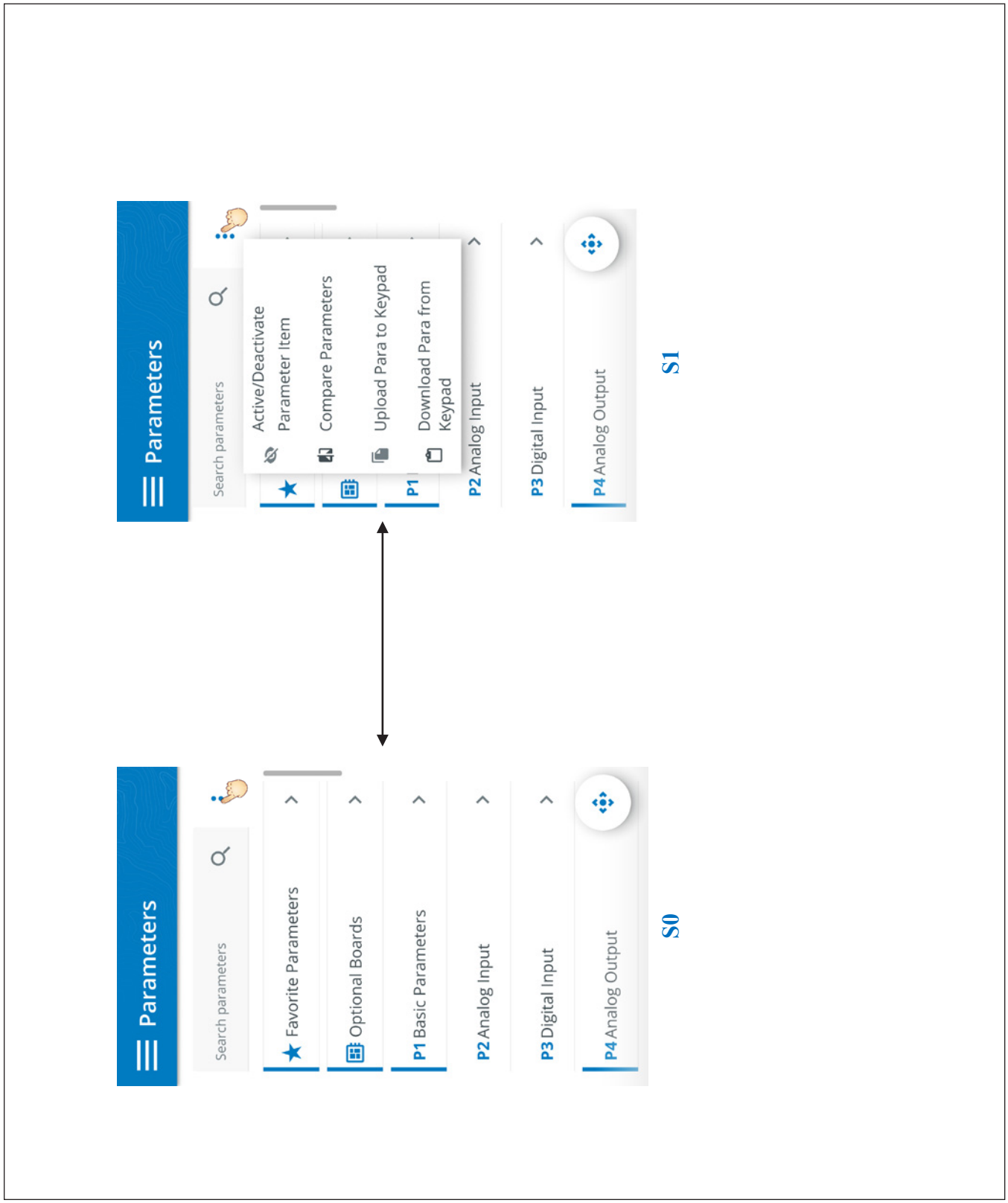
Parameter Edit



Back Button Navigation



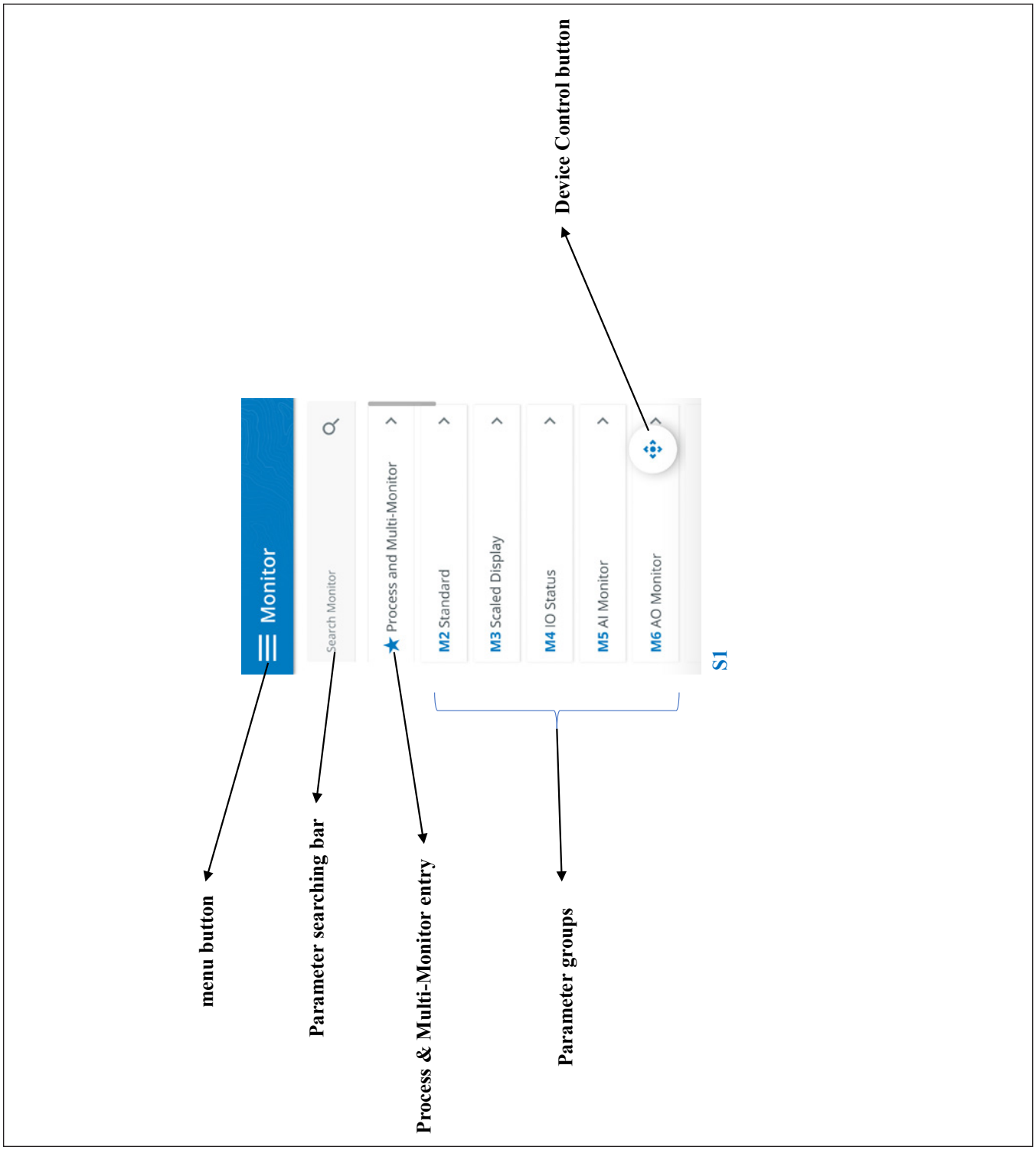
Convenience Button



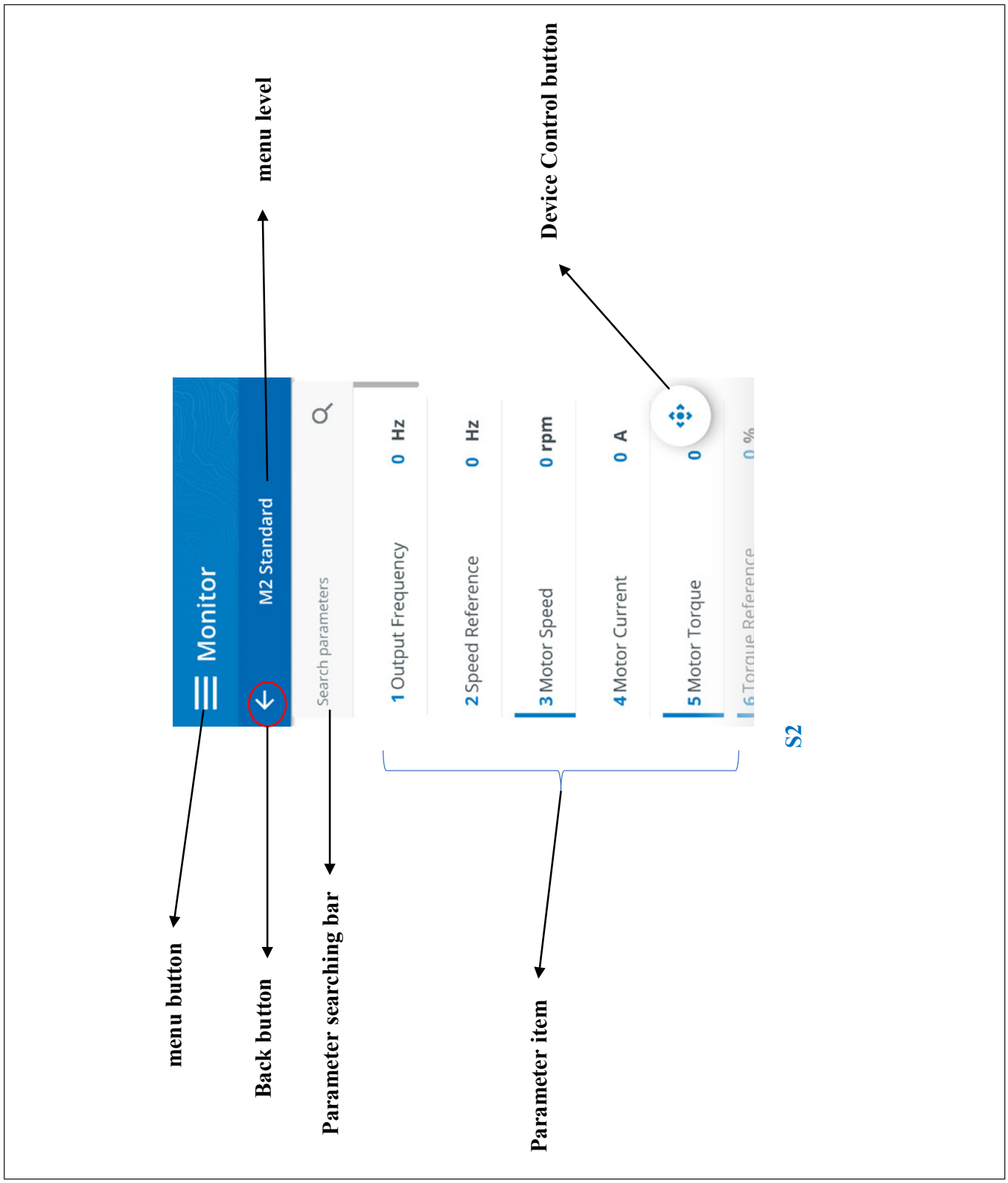
Monitor

The Monitor page lists the parameter groups / parameter items and provides interfaces to go to the other pages like multi-monitor, parameter monitor detail page, etc.

Menu level

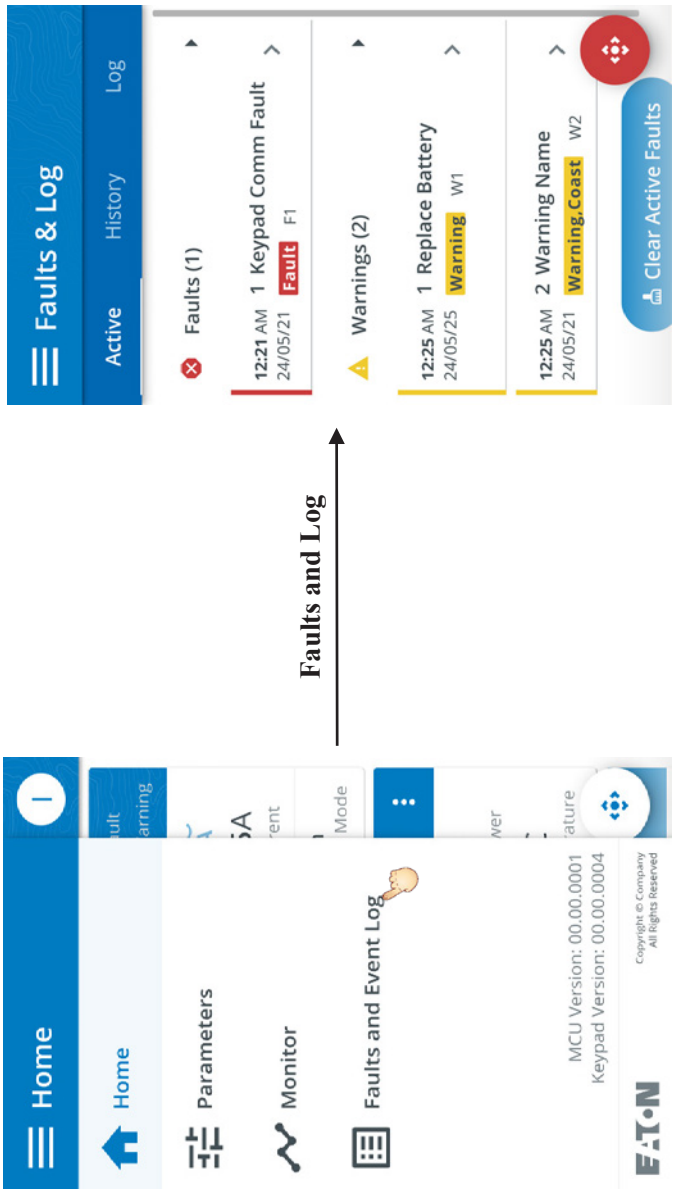


Parameter Level Monitor

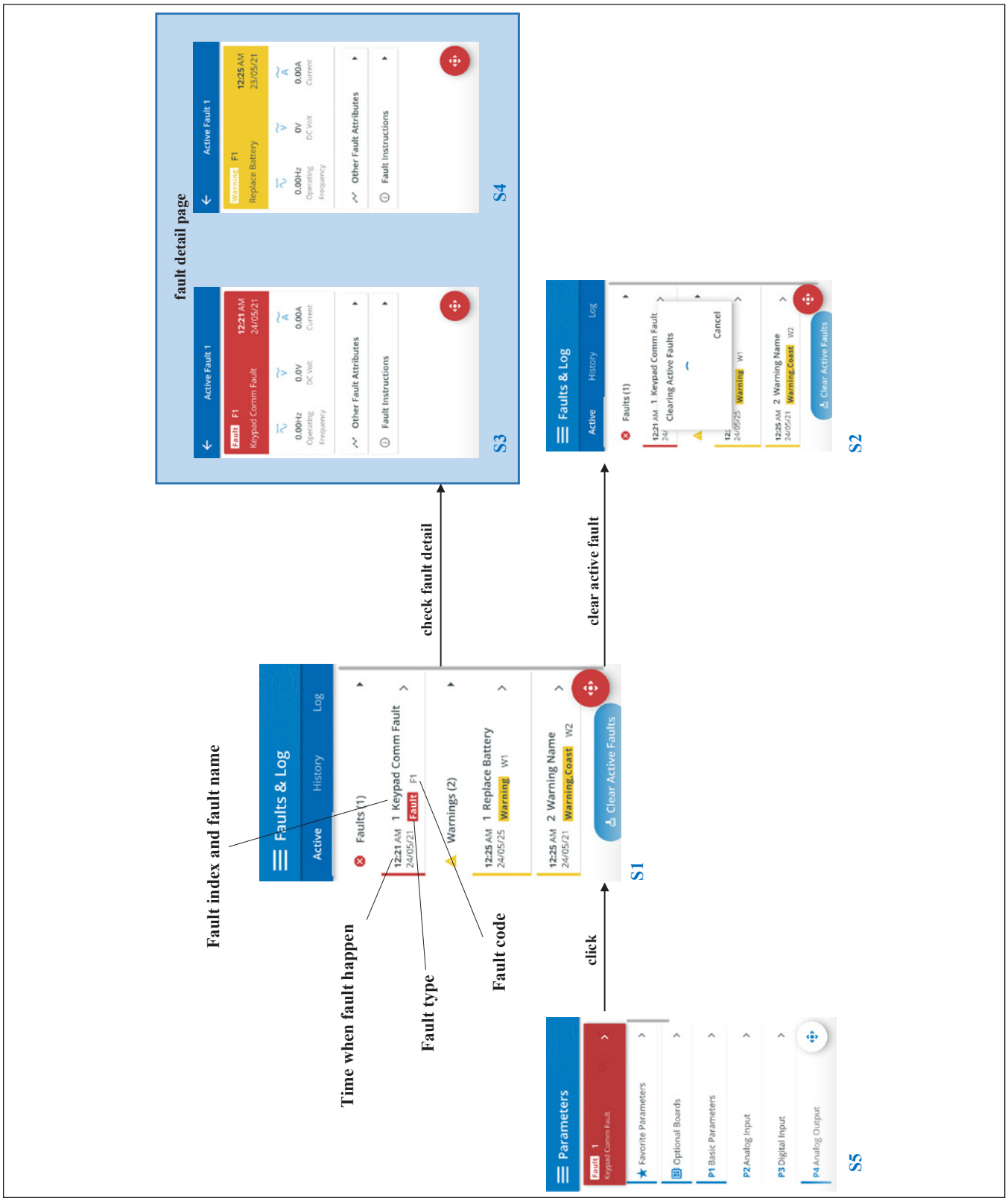


Faults and Log

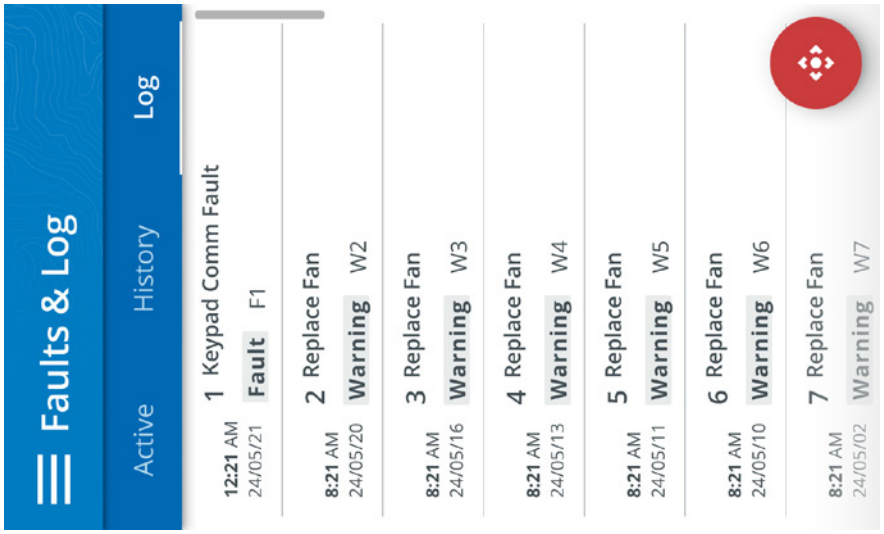
The keypad shall go to the Faults and Log page (S1) if clicking the Faults and Log menu.



Active Fault



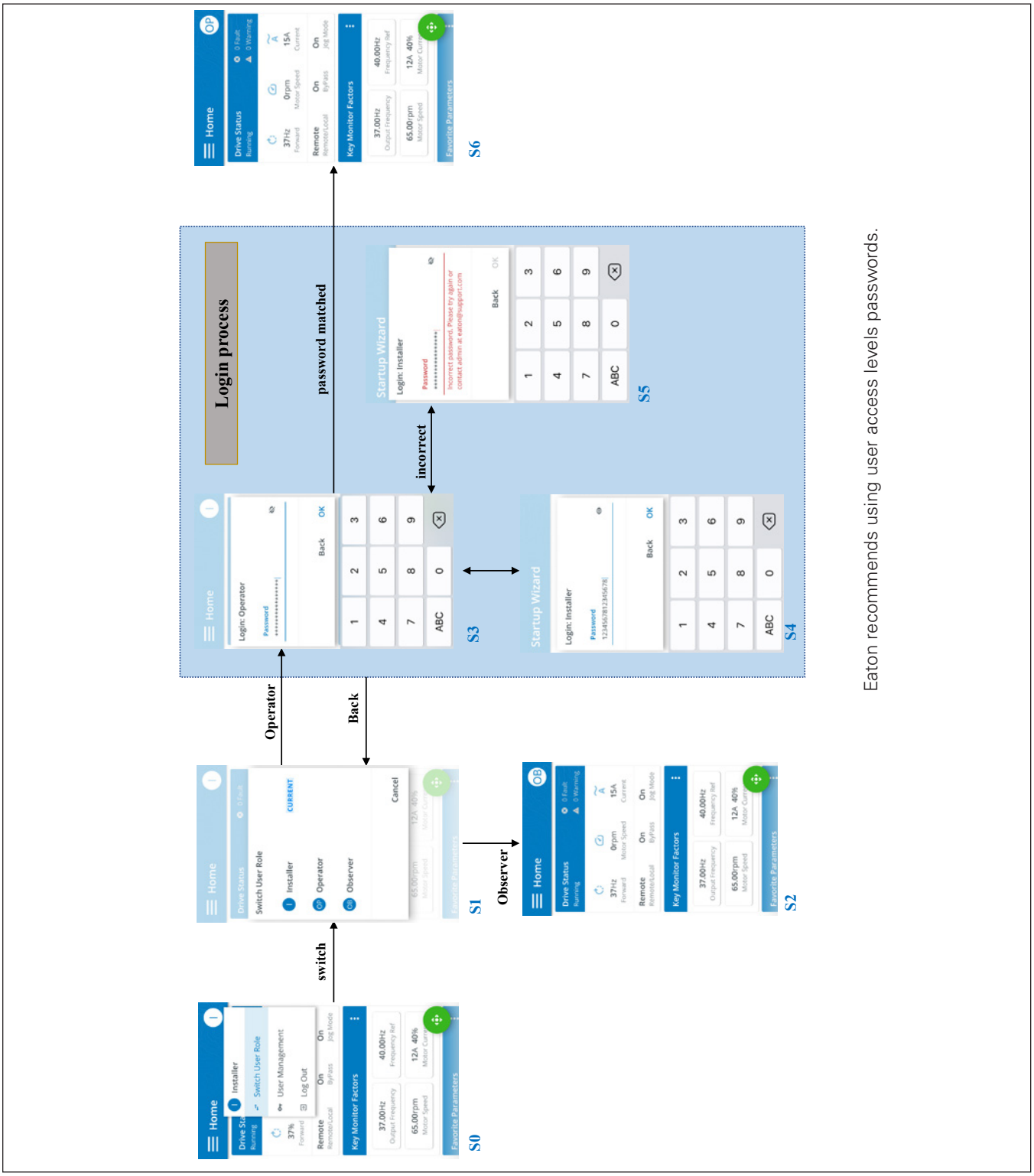
Fault Log


Faults & Log
Active
History
Log
1 Keypad Comm Fault
12:21 AM 24/05/21 Fault F1
2 Replace Fan
8:21 AM 24/05/20 Warning W2
3 Replace Fan
8:21 AM 24/05/16 Warning W3
4 Replace Fan
8:21 AM 24/05/13 Warning W4
5 Replace Fan
8:21 AM 24/05/11 Warning W5
6 Replace Fan
8:21 AM 24/05/10 Warning W6
7 Replace Fan
8:21 AM 24/05/02 Warning W7
S10

Other functions

User access level

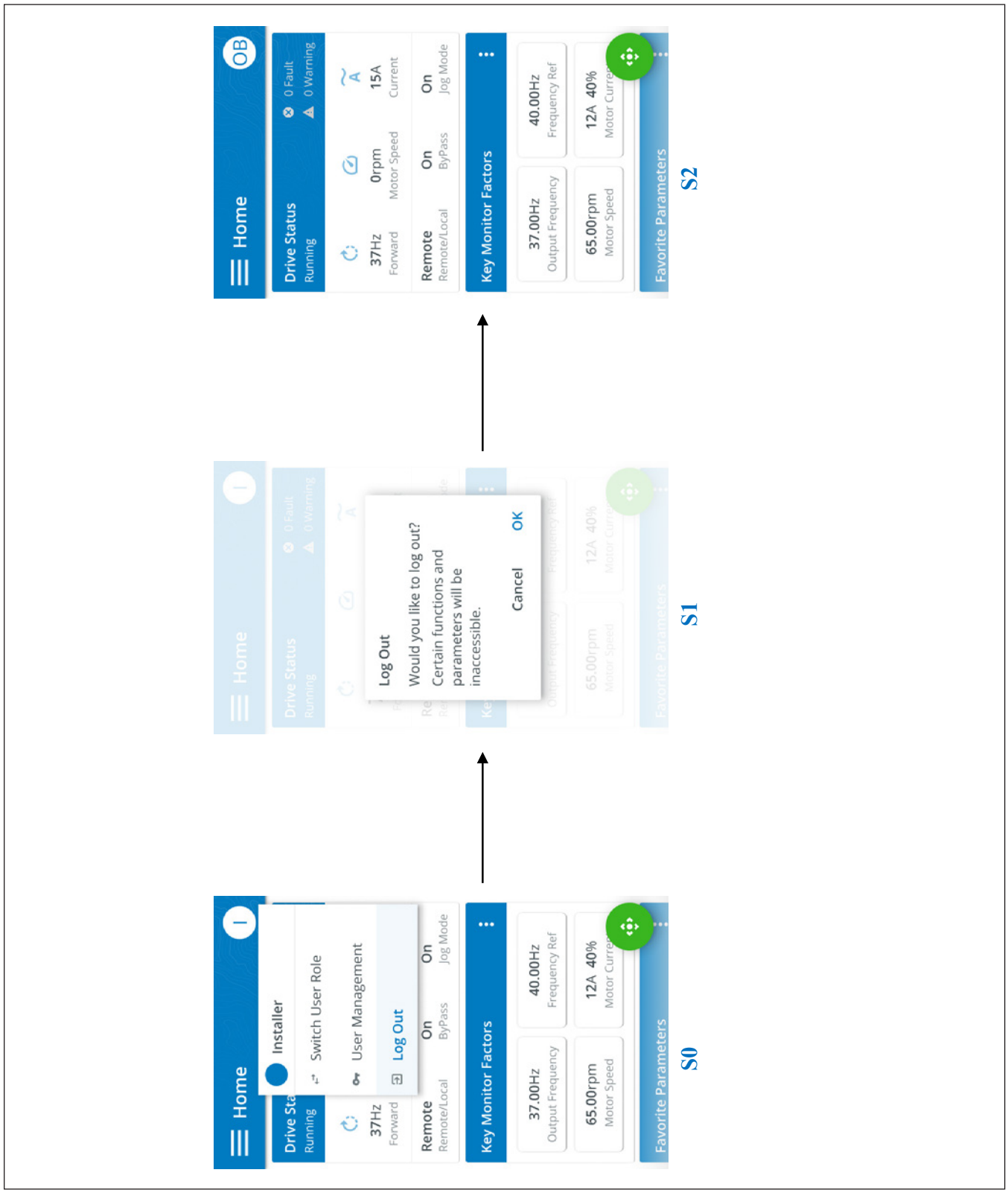
(Installer, operator, observer)



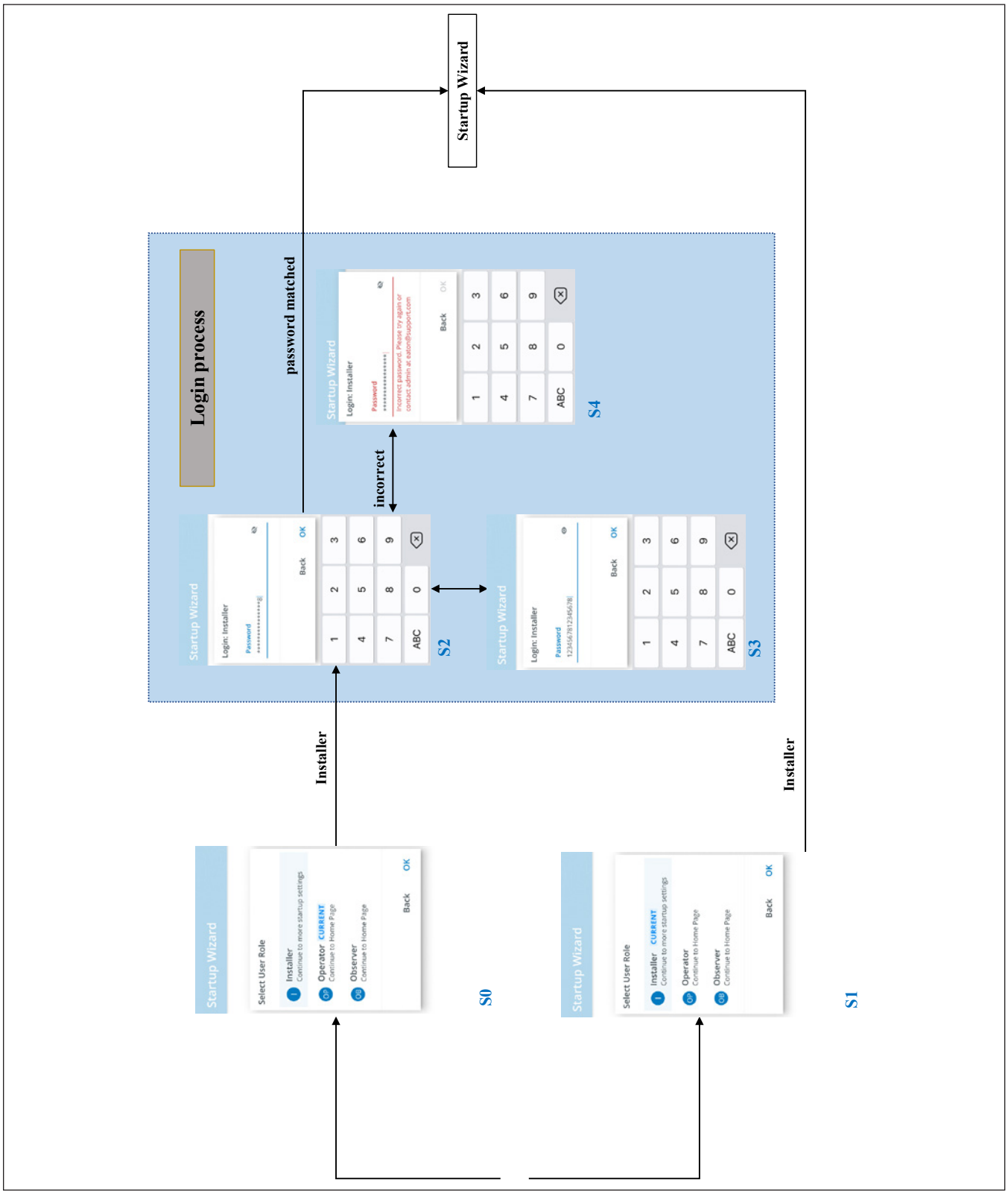
User Management

Change User Level. Requires password management.

Log out

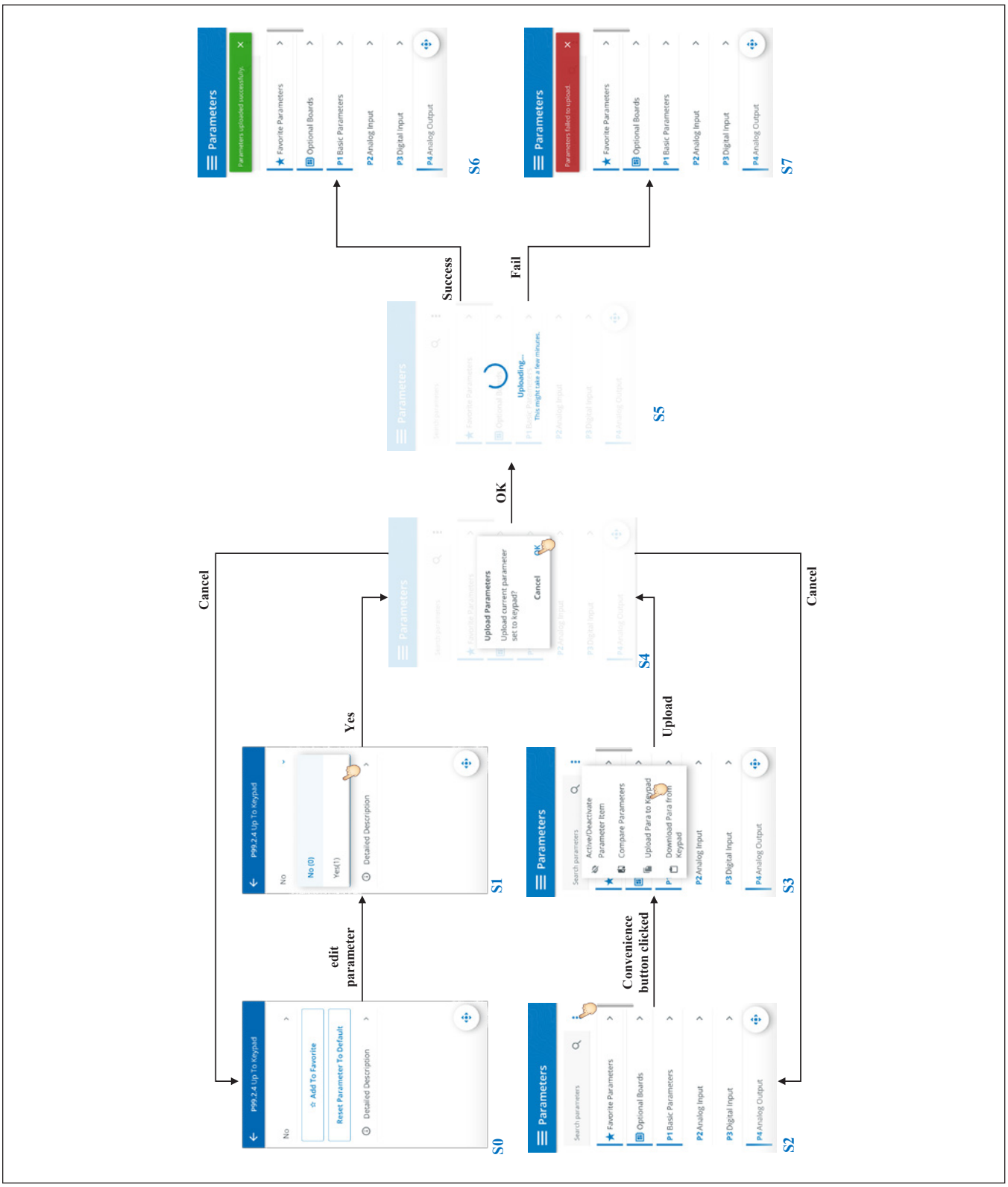

Home
Drive Status
Running
0 Fault
0 Warning
37Hz
Forward
0rpm
Motor Speed
15A
Current
Remote
Remote/Local
On
ByPass
On
Jog Mode
Key Monitor Factors
37.00Hz
Output Frequency
40.00Hz
Frequency Ref
65.00rpm
Motor Speed
12A 40%
Favorite Parameters
Installer
Switch User Role
User Management
Log Out
Log Out
Would you like to log out?
Certain functions and parameters will be inaccessible.
Cancel
OK
S0
S1
S2

User access level in startup wizard

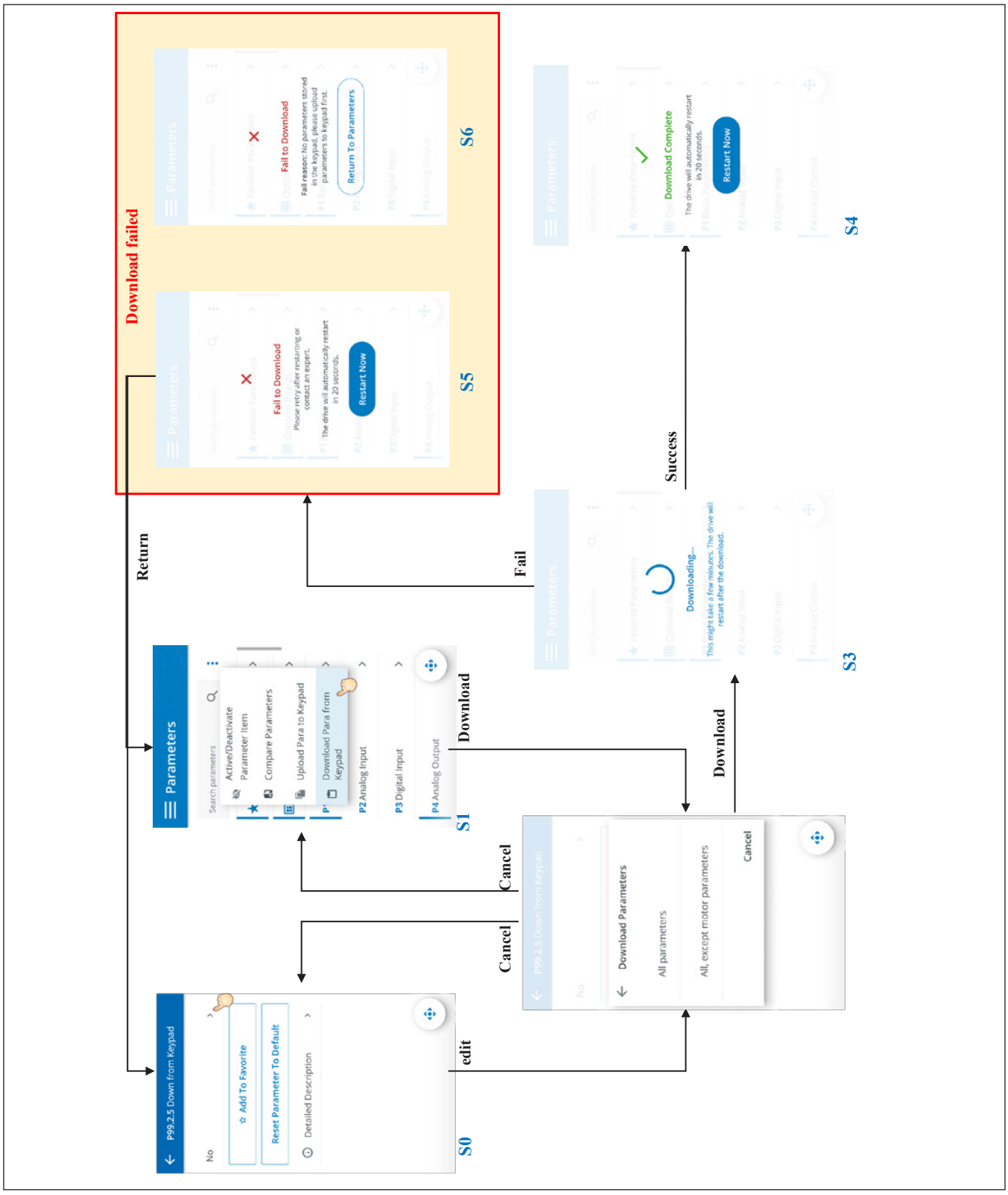


Parameter copy / download

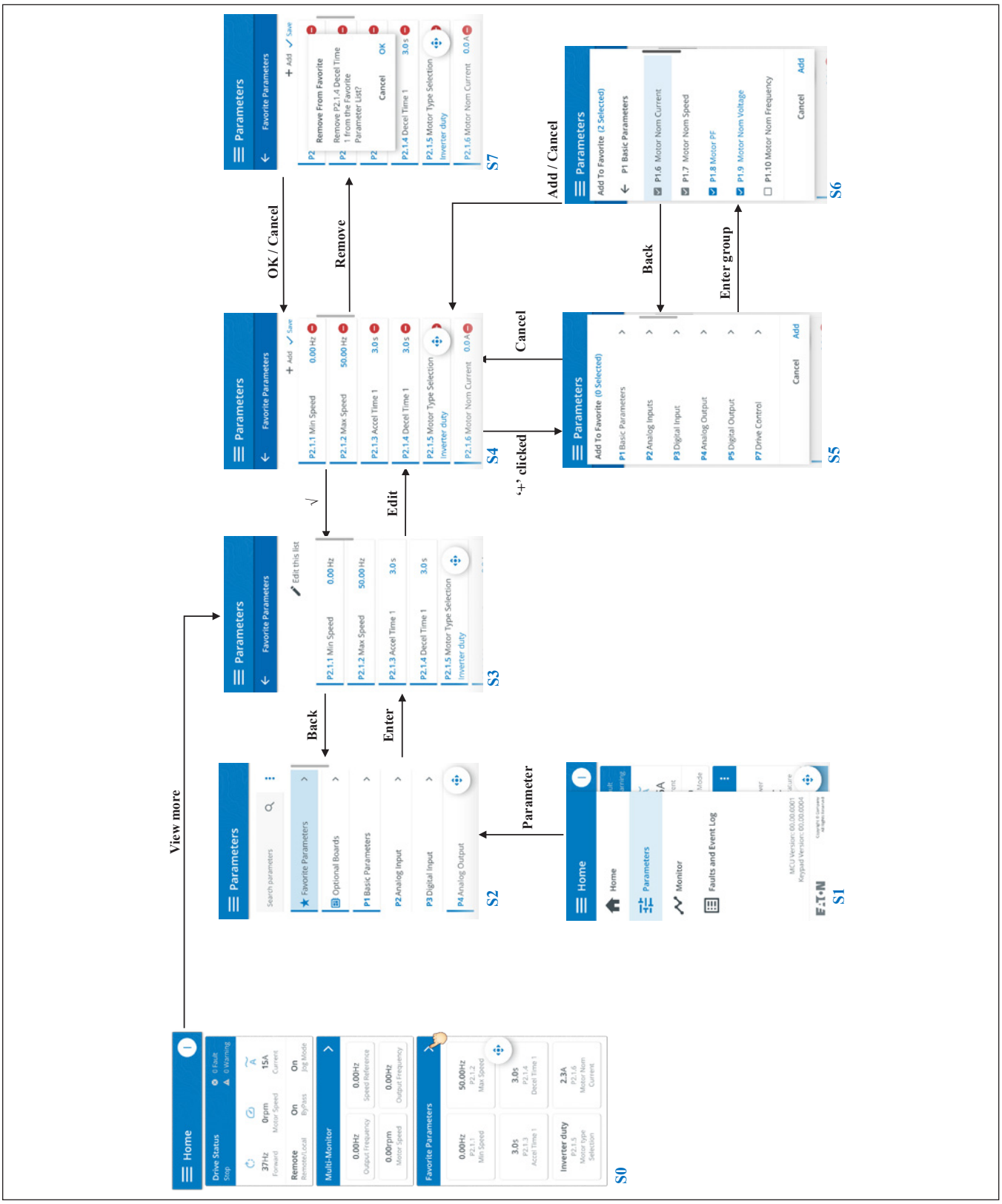
Parameter copy to keypad

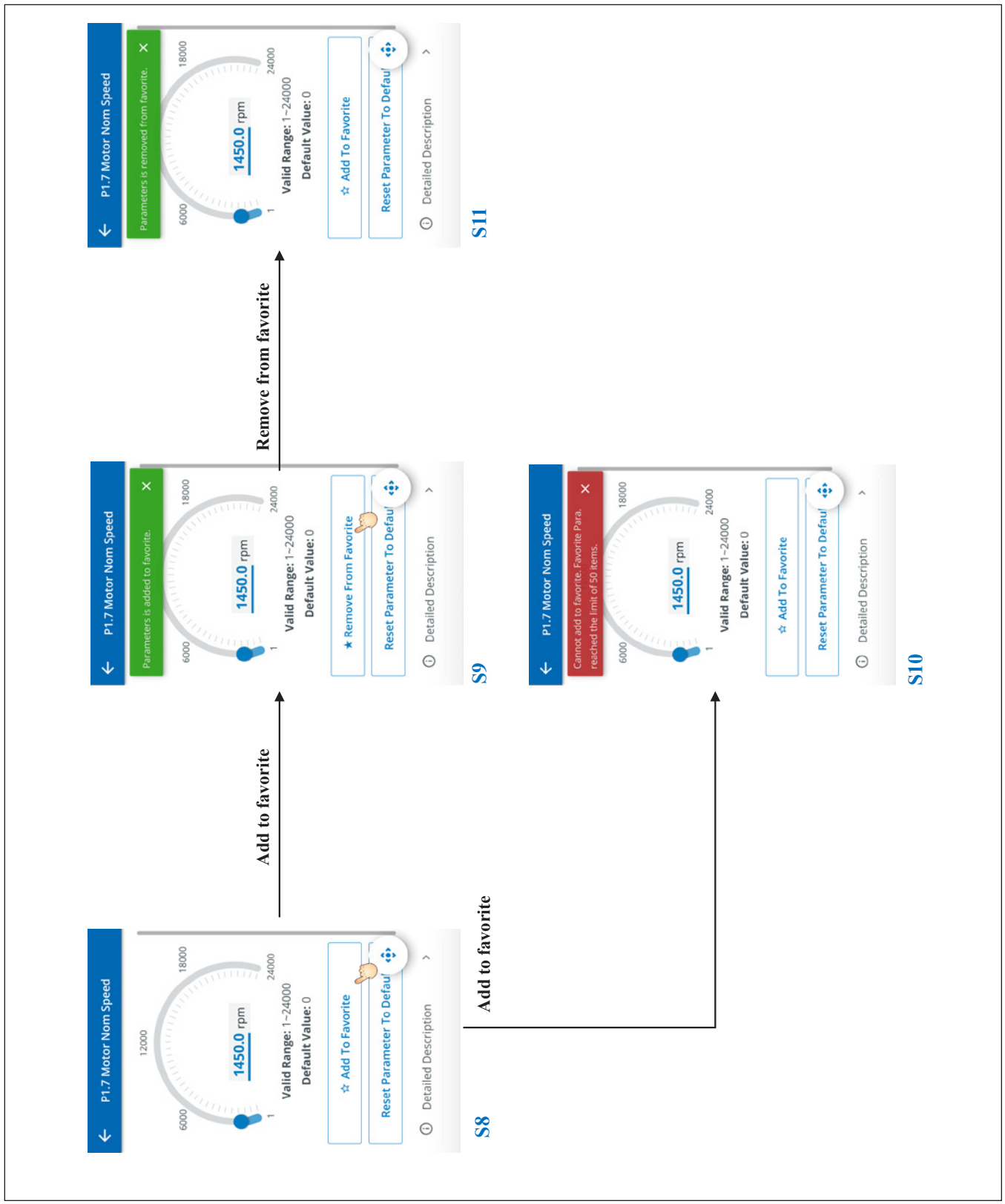


Parameter download from keypad

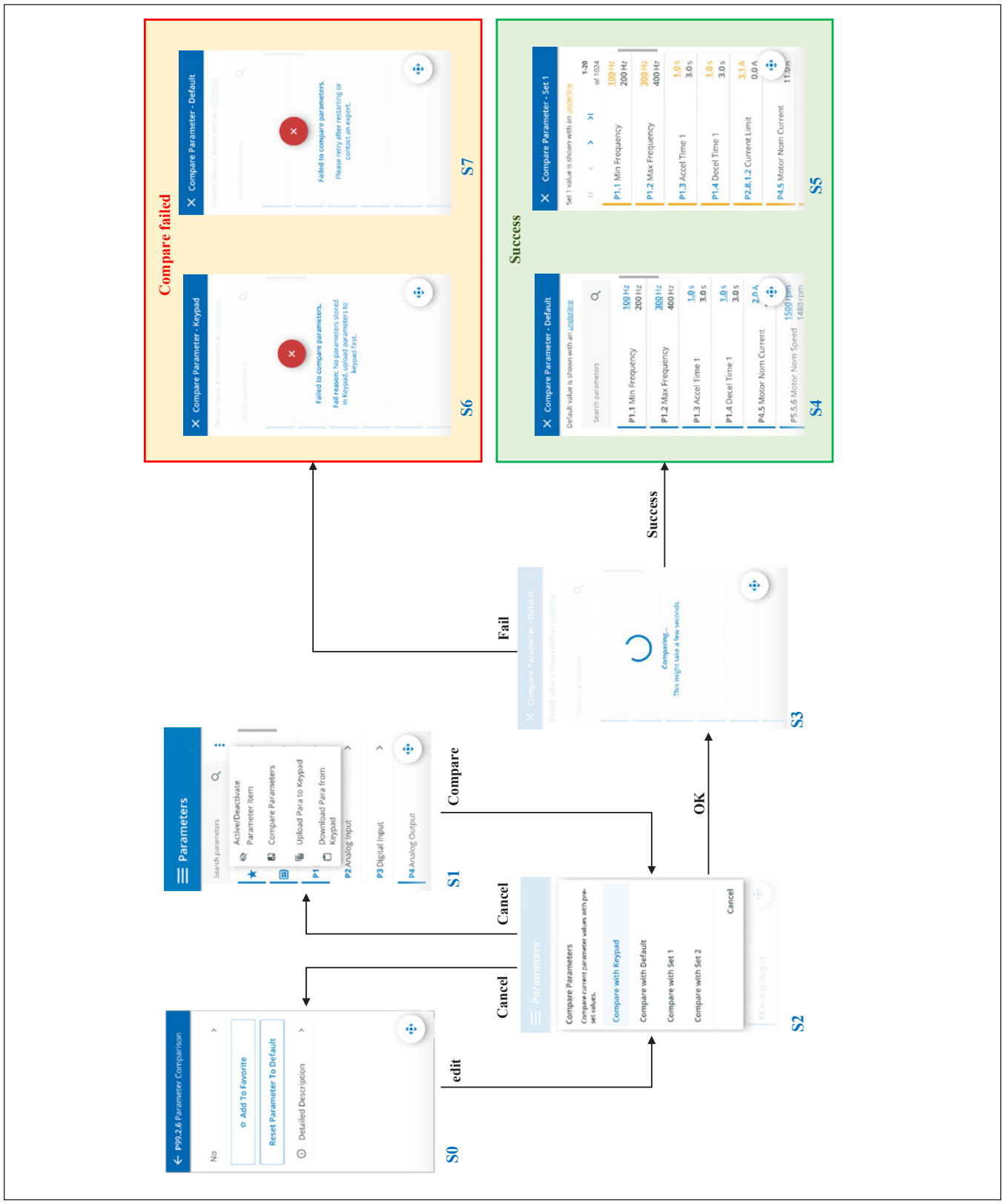


Parameter favorite

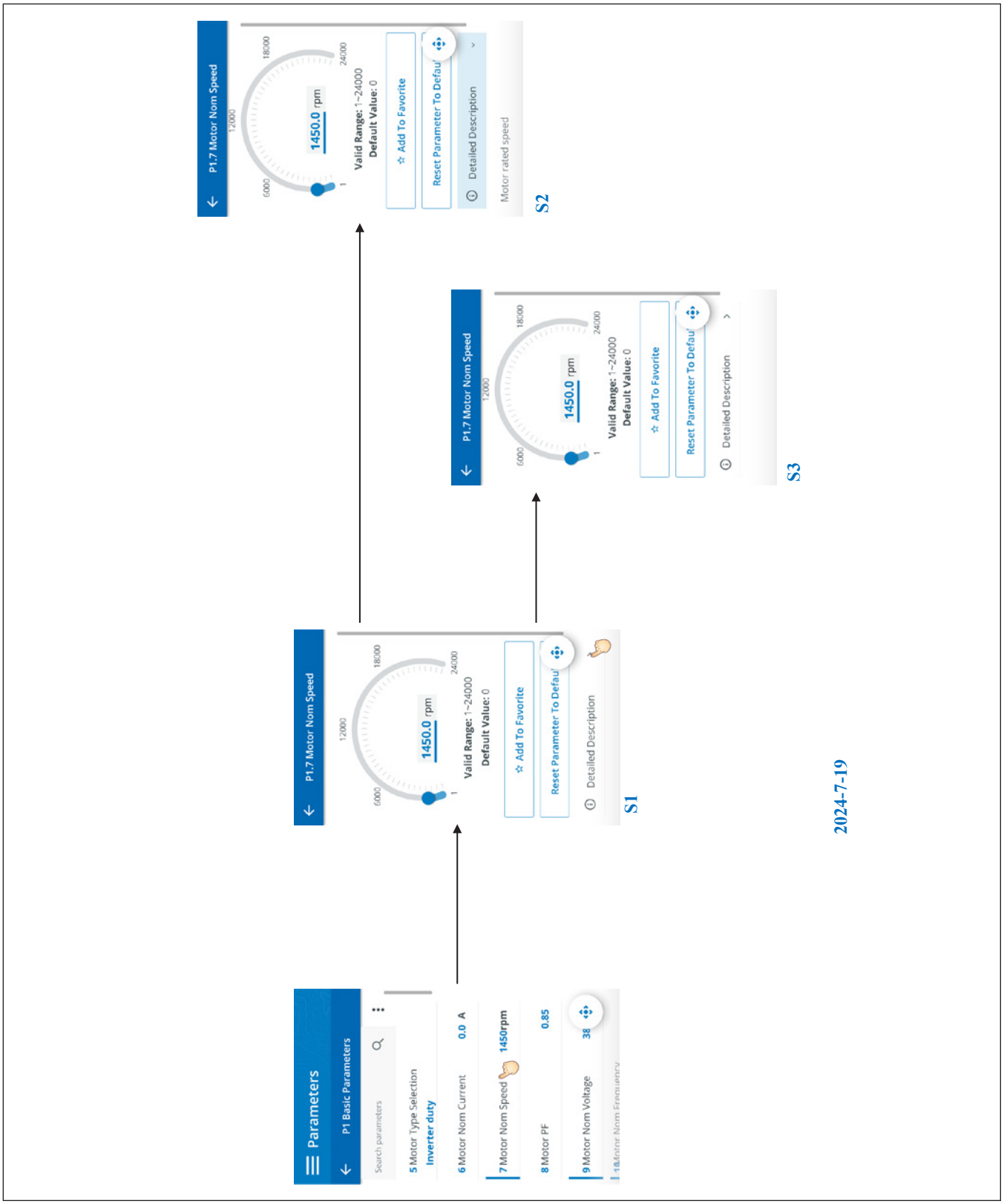



P1.7 Motor Nom Speed
Parameters is removed from favorite.
1450.0 rpm
Valid Range: 1~24000
Default Value: 0
Add To Favorite
Reset Parameter To Defaul
Detailed Description
S11
Remove from favorite
P1.7 Motor Nom Speed
Parameters is added to favorite.
1450.0 rpm
Valid Range: 1~24000
Default Value: 0
Remove From Favorite
Reset Parameter To Defaul
Detailed Description
S9
Add to favorite
P1.7 Motor Nom Speed
Cannot add to favorite. Favorite Para. reached the limit of 50 items.
1450.0 rpm
Valid Range: 1~24000
Default Value: 0
Add To Favorite
Reset Parameter To Defaul
Detailed Description
S10
Add to favorite
P1.7 Motor Nom Speed
1450.0 rpm
Valid Range: 1~24000
Default Value: 0
Add To Favorite
Reset Parameter To Defaul
Detailed Description
S8

Parameter compare



View long description of parameters

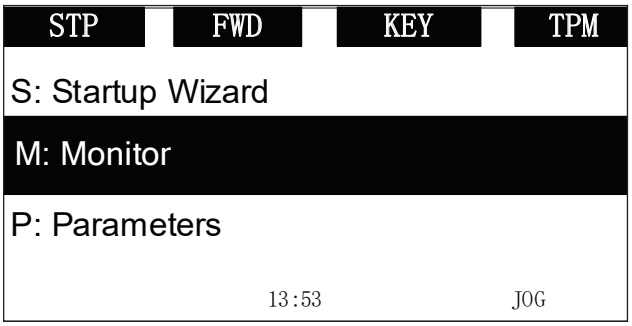


Chapter 3—Menu overview

Main menu page

The data on the keypad are arranged in menus and sub-menus. The first menu level consists of M, P, F, B, T, O and S, and it is called the Main menu.

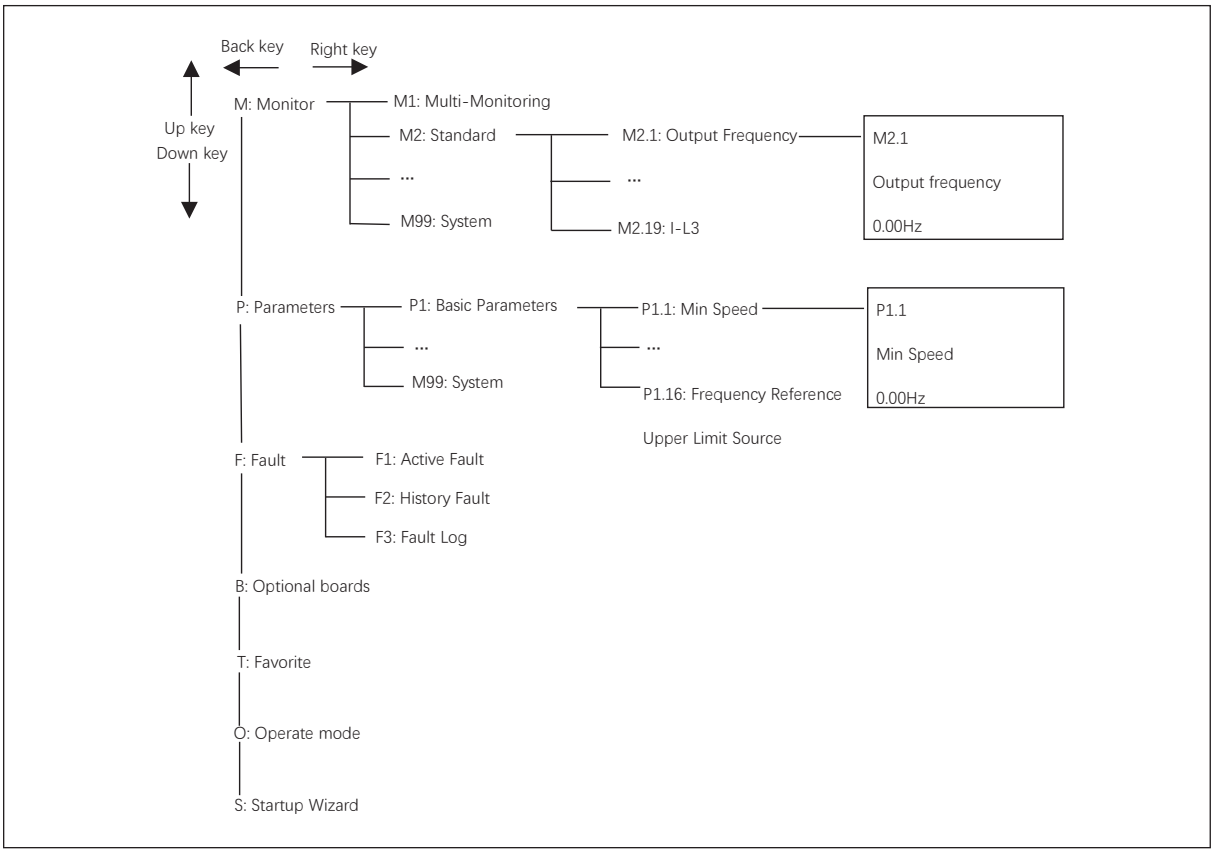
Figure 17. Main menu page.



Menu navigation

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

Figure 18. Main menu navigation.



Menu structure

Table 11. Keypad menus.

Item	Description		Item	Description		Item	Description	
Monitor	M1	Multi-monitoring	Parameters	P1	Basic parameters	Fault	F1	Active Fault
	M2	Standard		P2	Analog inputs		F2	History Fault
	M3	Scaled display		P3	Digital input		F3	Fault Log
	M4	IO status		P4	Analog output			
	M5	AI monitor		P5	Digital output	Optional boards	Bx	Slot A
	M6	AO monitor		P7	Drive control		Bx	Slot B
	M10	PID1 monitoring		P8	Motor control		Bx	Slot C
	M11	PID2 monitoring		P10	PID controller 1		Bx	Slot D
	M14	SD card plug in status		P11	PID controller 2			
	M41	Multi pump monitoring		P14	Master follower	Favorite	—	
	M42	Misc.		P15	Jog function	Operate Mode	O1	Output Frequency
	M43	Option cards		P16	Inch function		O2	Freq Reference
	M96	Fieldbus monitor		P22	Bypass		O3	Motor Speed
	M97	Energy savings		P23	Brake		O4	Motor Current
	M98	Energy counter		P24	Ext. brake		O5	Motor Torque
	M99	Run-time counters		P25	External faults		O6	Motor Power
				P26	Protections		O7	Motor Voltage
				P27	Supervisions		O8	DC-Link Voltage
				P30	Interval settings		O9	Unit Temperature
				P40	HVAC		O10	Motor Temperature
				P41	Pump		R11	Keypad Torque Ref
				P80	Logic		R12	Keypad Reference
				P81	Logic engine		R13	PID1 Keypad Setpoint 1
				P95	Keypad		R14	PID2 Keypad Setpoint 2
				P96	Communication			
				P98	User access level operation			
				P99	System			

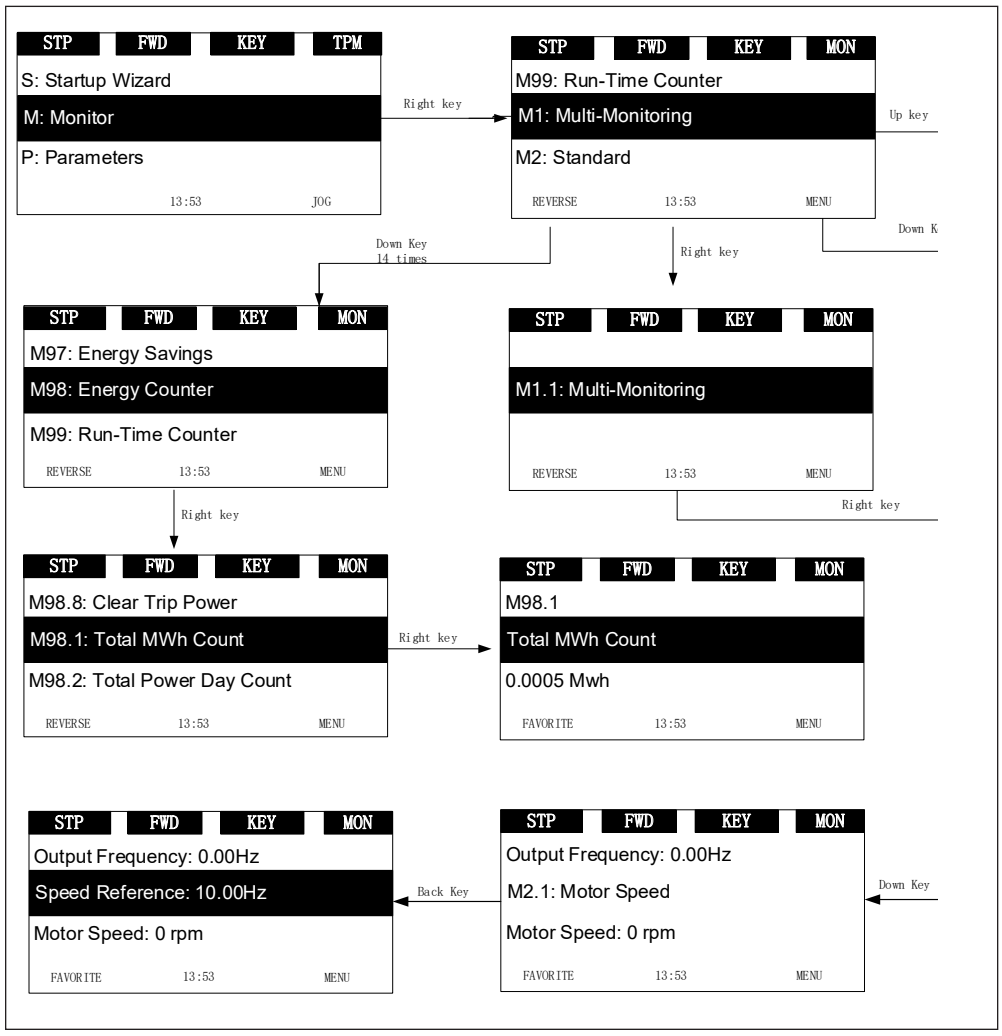
Note: Will vary depending on application selected.

M—Monitor

In the monitor page, user shall not be able to edit the parameters except multi-monitor parameter. Multi-monitor parameters allow for displaying nine monitor values on display. The nine values can be changed to any of the listed values.

The navigation for monitor is as **Figure 19**.

Figure 19. M—Monitor.



F—Fault

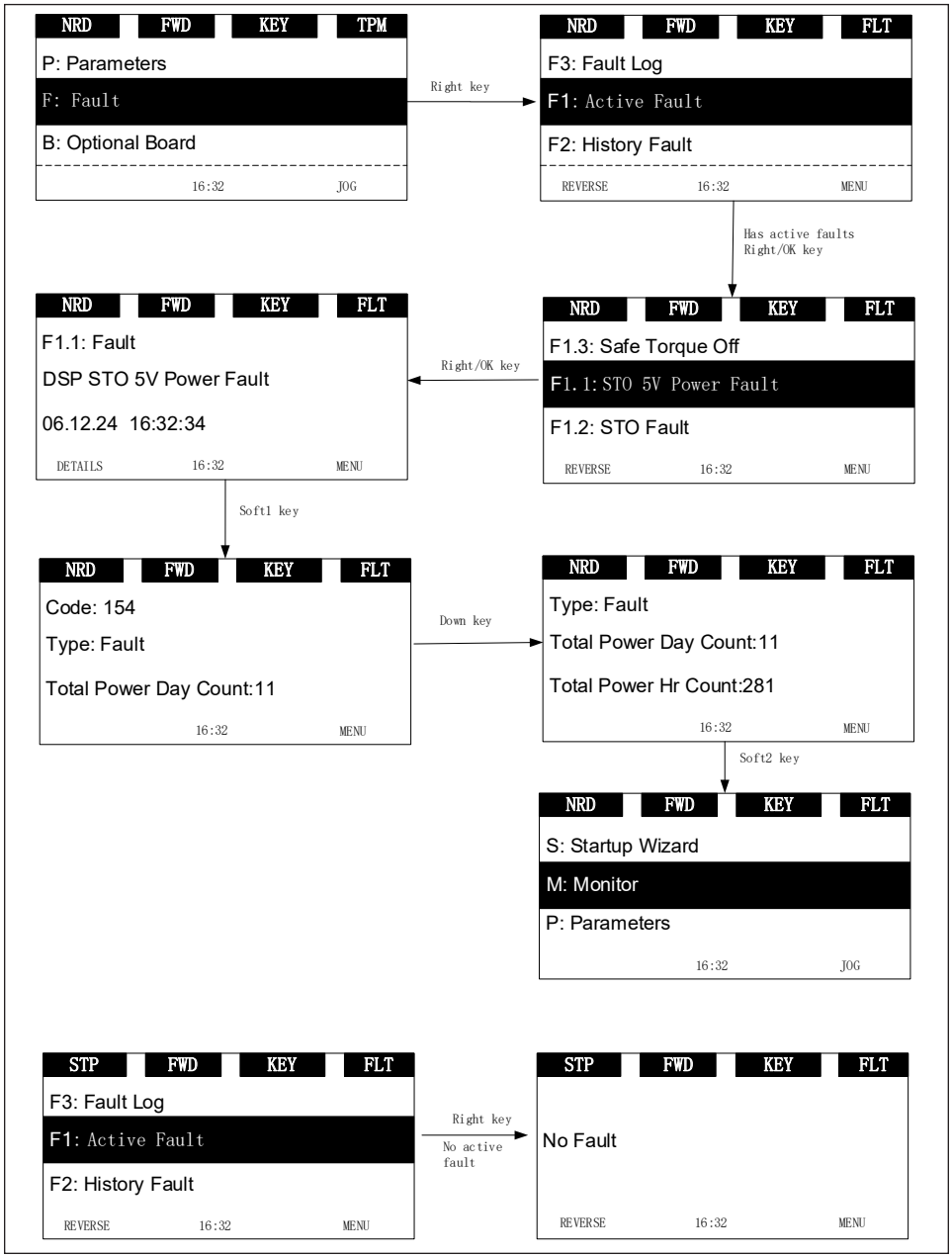
There are three fault pages. The first page F1 contains the active faults; as soon as an active fault is detected, it will automatically pop-up. The second page F2 contains the fault history with the last 10 fault messages. The third page F3 is the fault log, which stores the last 50 messages without fault details.

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

Active fault

The navigation for active faults is as **Figure 20**.

Figure 20. Active faults.

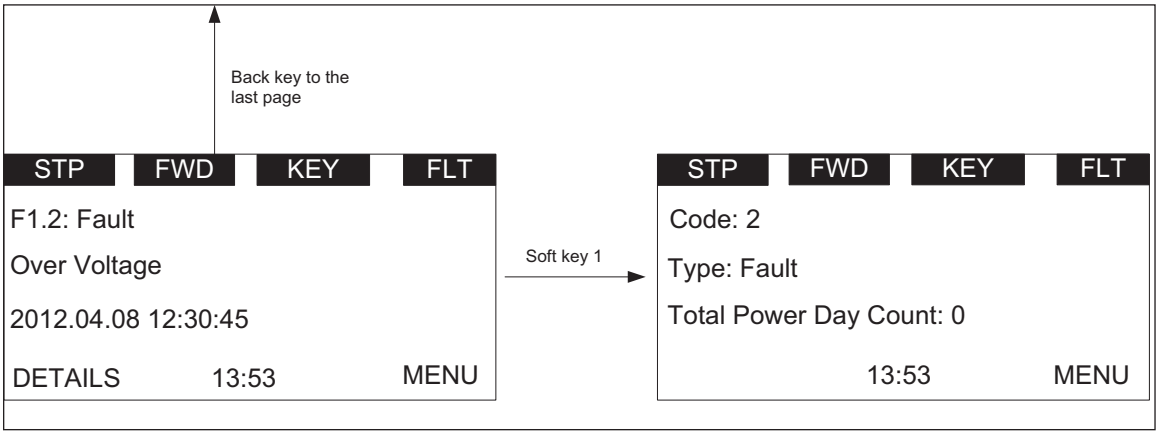


After the DETAIL soft key is pressed, the following detail information about the fault shall be shown: fault code, type, power day count, power hour count, frequency, current, voltage, power, torque, DC voltage, unit temperature, run status, direction, warning, zero speed, Mwh count, at reference.

Pop-up fault

The navigation for the pop-up active fault is as **Figure 21**.

Figure 21. Pop-up active faults.



The latest active fault page shall pop up when there is a new active fault, 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.

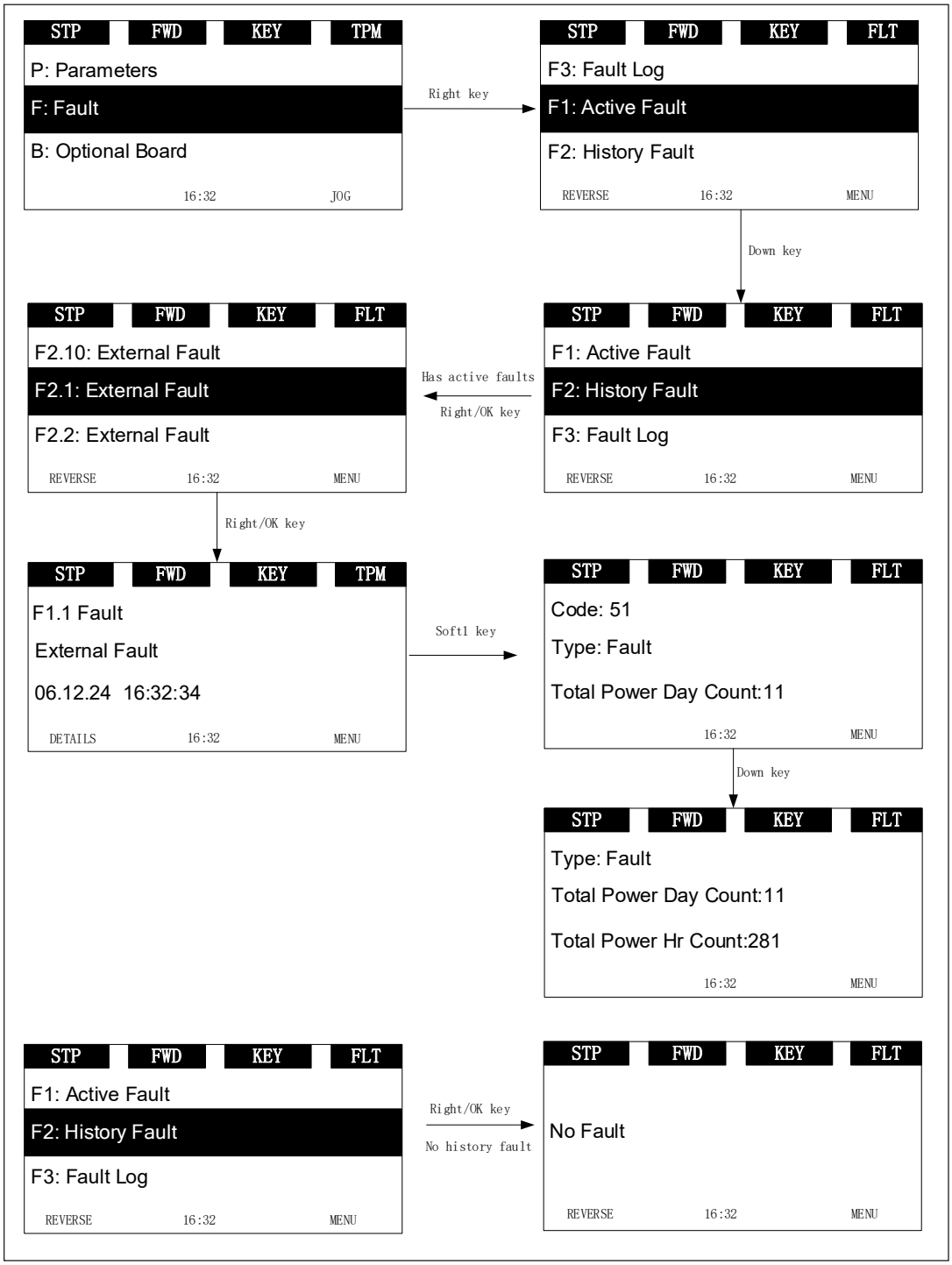
The page for active faults and pop-up faults are the same, except one: the response to the "Back" key. In active faults page, if the Back key is pressed, it returns to the last level menu. In pop-up faults page, it returns to the last page.

Fault history

The navigation for fault history is as **Figure 22**.

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

Figure 22. Fault history.



Fault Log

The Fault log will store the last 50 faults in it with 1 being the most recent and 50 being the oldest. Only the fault code, name, and time stamp are stored with these faults.

P—Parameter

The navigation for the parameter menu is shown in **Figure 23**.

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

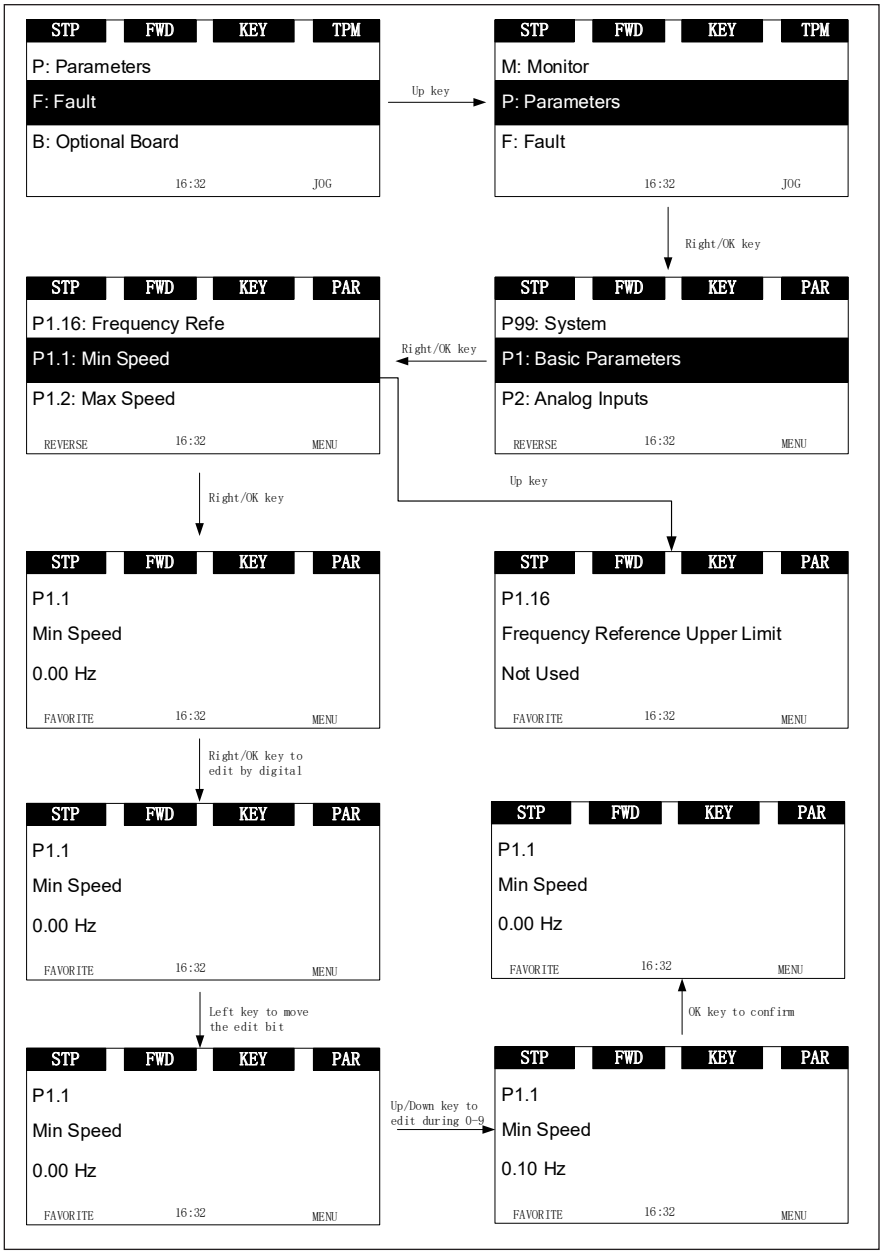
In parameter page, the parameter name shall be shown in the third line (such as Min Frequency).

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

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 not be edited.

Figure 23. Parameter menu overview.



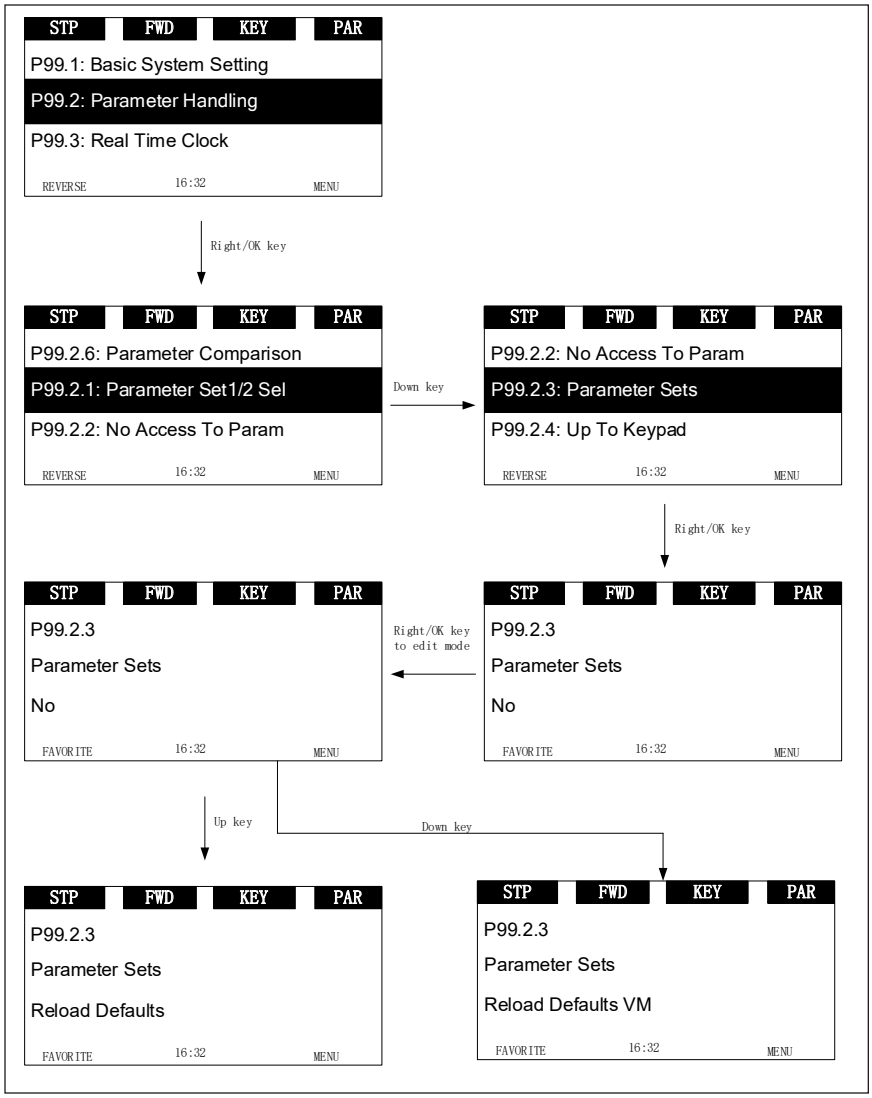
There are several special pages:

1. “Parameter Sets“ (ID619). See **Figure 24**

User shall be able to load or store parameters. The options are as follows: Reload Defaults, Reload Set 1, Reload Set 2, Store Set 1, Store Set 2, Reset, Reload Defaults VM. 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.
- “Reload Defaults VM” is for the sales stand. Do not use on a fully functioning drive.

Figure 24. Parameter sets.

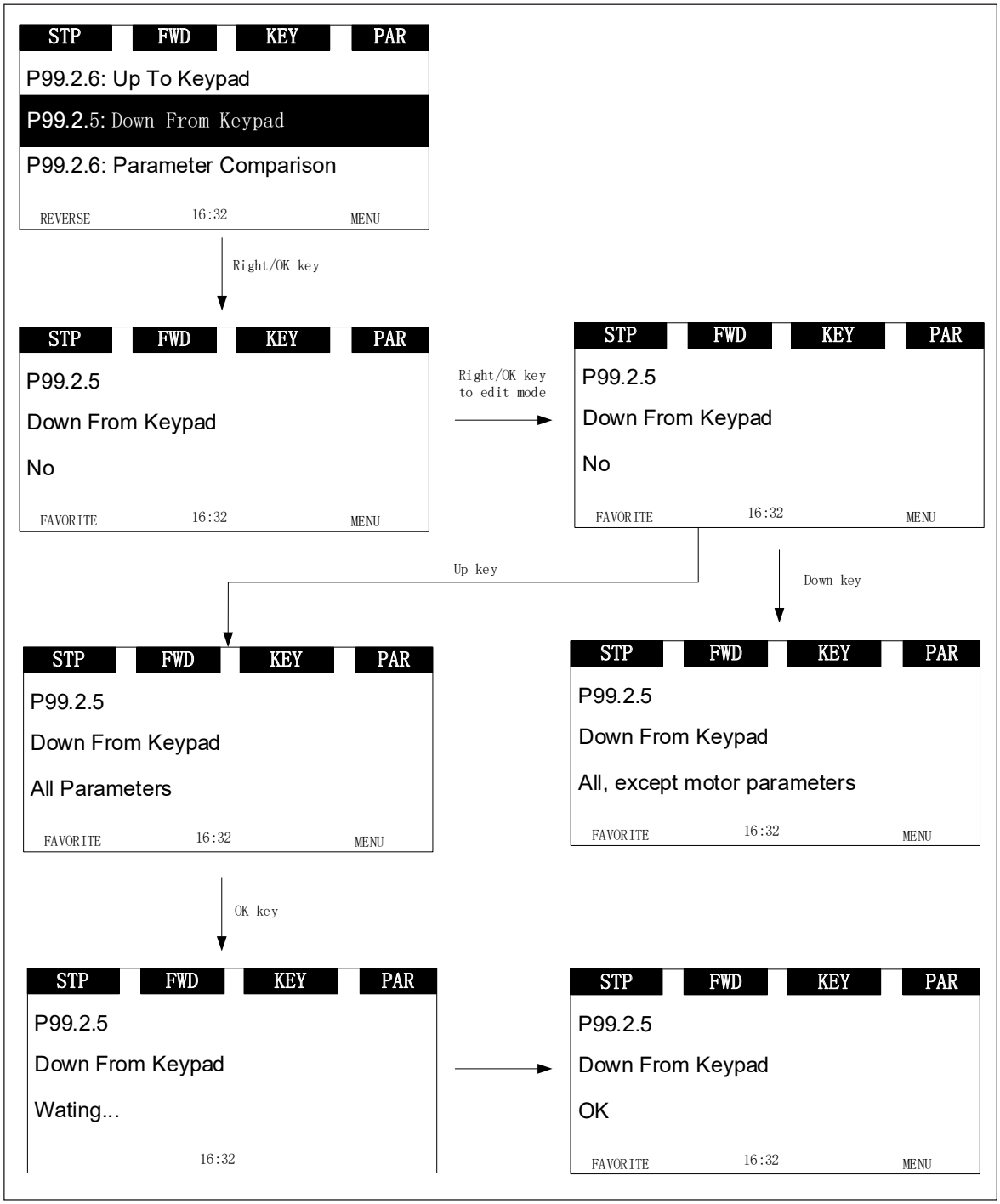


2. “Up To Keypad“ (ID620) and “Down From Keypad“ (ID621)

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

   This stores the parameters to keypad for transferring. Down from keypad is to download parameters from keypad to the drive. Up to keypad takes the parameters from the drive and loads them to the keypad.

Figure 25. Down from keypad.



3. "Parameter Comparison" (ID623)

   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.

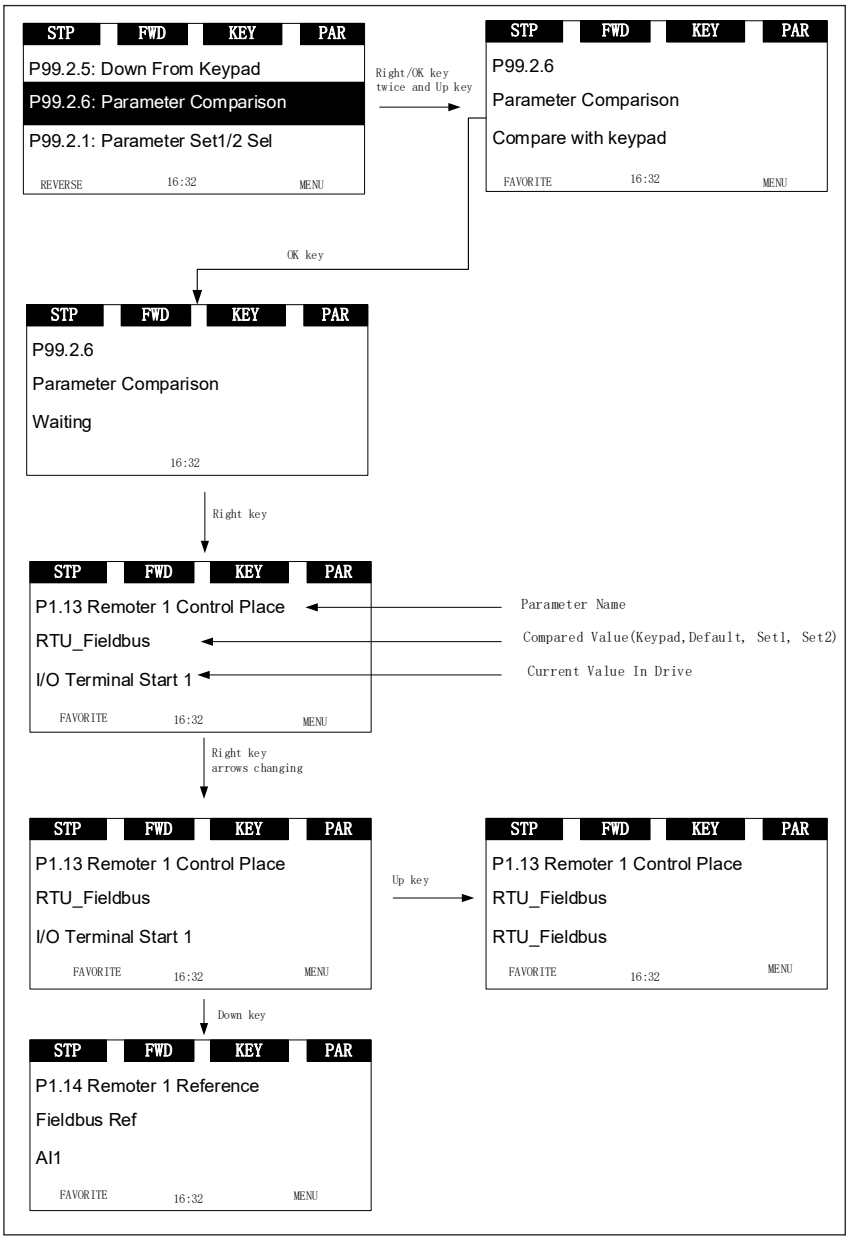
   If the user wants to modify the current value, the user shall be able to enter the edit mode by right key.

   The 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 26**.

Figure 26. Parameters comparison.



4. “Password“ (ID624)

   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 enter the password before editing. The user must enter current password before changing the password.

   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 27**.

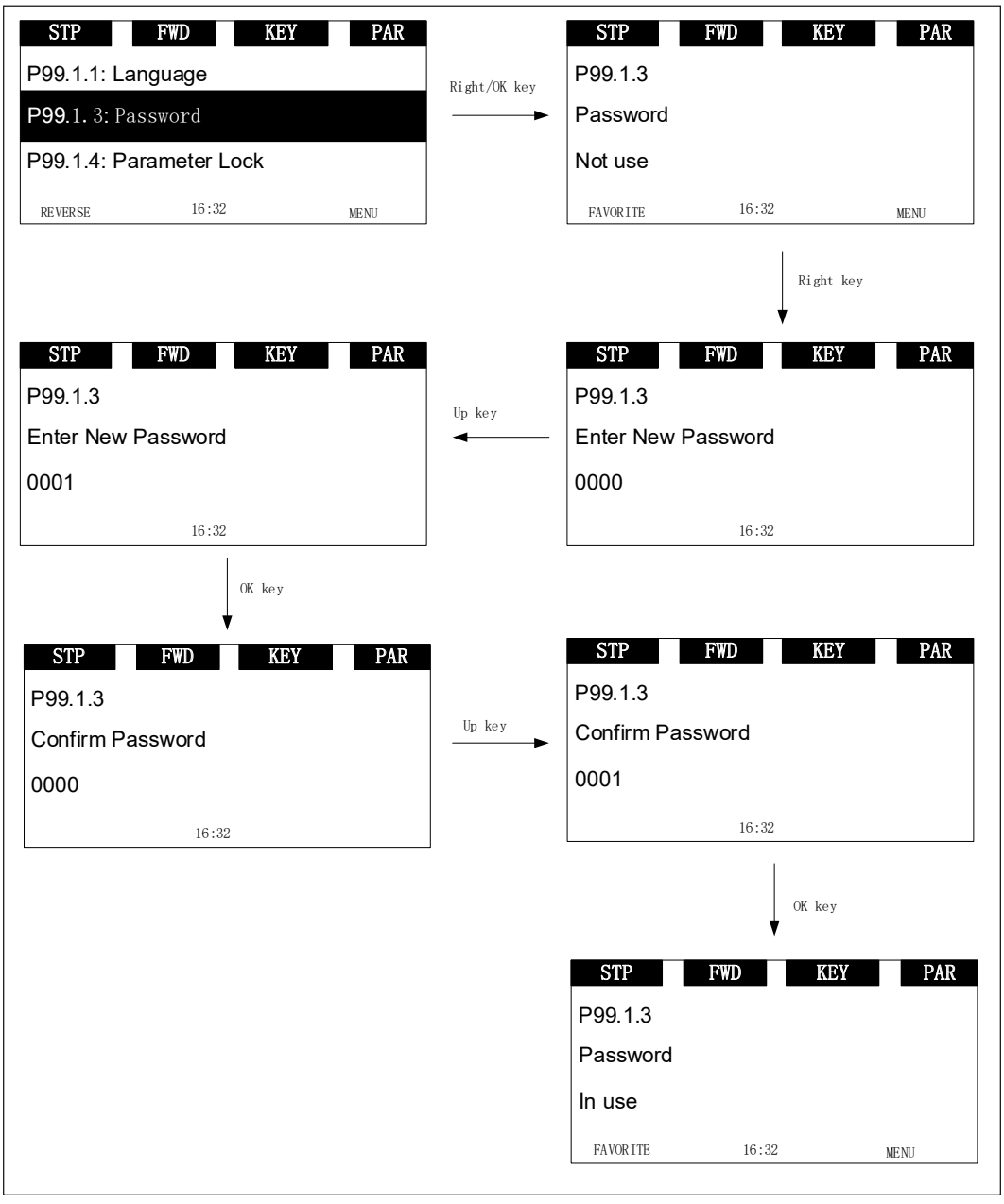
   Enter the password setting page. If the password is 0000, then the “Not use” shall be shown. If the password is not 0000, then the “in use” shall be shown.

   If the password is in use, and user inputs the wrong password, then the “Password incorrect” shall be shown.

   After “Password incorrect” is shown 3 seconds, the page shall return to the password entry 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 27. Password.



Value edit

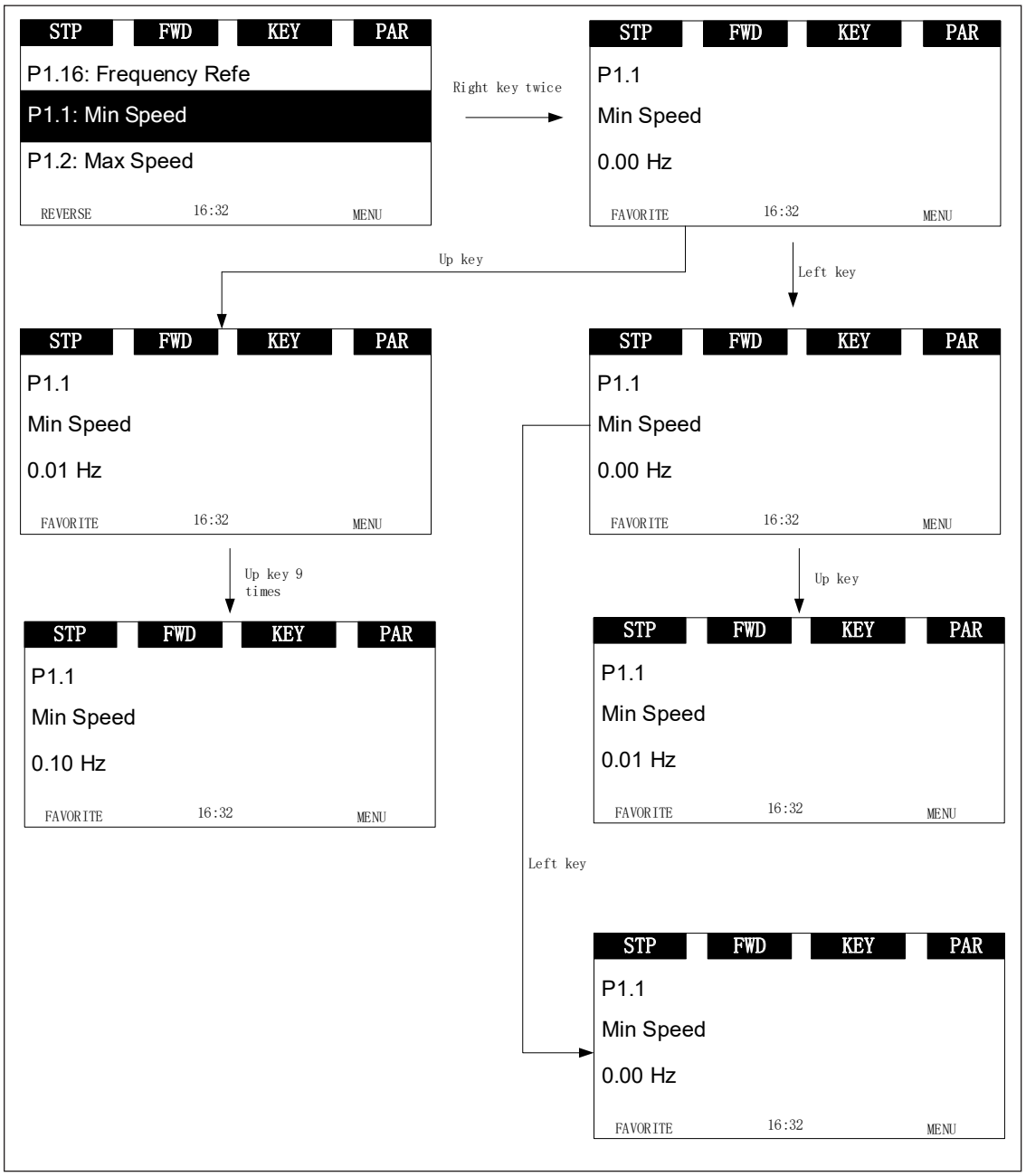
This topic shows the methods to edit value, and what will happen to edit value when password is in use and parameter lock is enabled.

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

For details, please see **Figure 28**. 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.

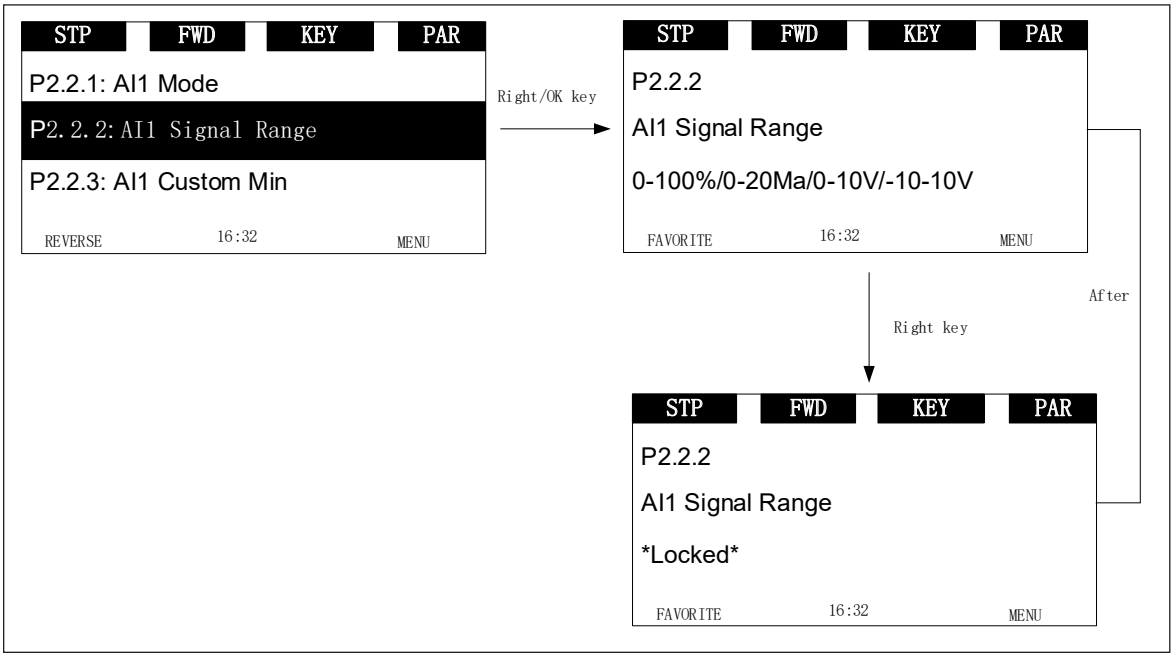
User shall use Left/Right key to change the current editable bit. When editing one number, it increases/decreases circularly, for example, pressing Up key can change to 9 from 0.

Figure 28. Edit parameter value.



1. If password is in use, password shall be needed to check before edit parameter value.
2. If no action is taken within 1 min., 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 29. Parameter locked.



T—favorite

Favorites collect the user's favorite parameters. The 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 14**). 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 14**).

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 the 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.

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

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

Up/Down buttons

OK button

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

Back/Reset button.

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

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

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

Table 12. Startup wizard instructions.

Item	Description		Touch Keypad	Membrane Keypad
1	Need installer level to continue Press OK		x	x
2	User Access Level	0 = Observer	x	x
		1 = Operator		
		2 = Installer		
3	Startup Wizard Press OK		x	x
4	Language	0 = English	x	x
		1 = 中文		
		2 = Deutsch		
5	Drive Time Offset	0 = GMT/UTC		
		1 = GMT-11:00		
		2 = GMT-10:00		
		3 = GMT-09:00		
		4 = GMT-08:00		
		5 = GMT-07:00		
		6 = GMT-06:00		
		7 = GMT-05:00		
		8 = GMT-04:30		
		9 = GMT-04:00		
		10 = GMT-03:30	x	x
		11 = GMT-03:00		
		12 = GMT-02:00		
		13 = GMT-01:00		
		14 = GMT+01:00		
		15 = GMT+02:00		
		16 = GMT+03:00		
		17 = GMT+03:30		
		18 = GMT+04:00		
		19 = GMT+05:00		
		20 = GMT+05:30		
		21 = GMT+05:45		
		22 = GMT+06:00		
		23 = GMT+06:30		
		24 = GMT+07:00		
		25 = GMT+08:00		
		26 = GMT+09:00		
		27 = GMT+09:30		
		28 = GMT+10:00		
		29 = GMT+11:00		
		30 = GMT+12:00		
		31 = GMT+13:00		

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
6	Daylight Saving	0 = Off	x	x
		1 = EU		
		2 = US		
7	Real Time Clock	yy.mm.dd	x	x
		hh:mm:ss		
8	Motor Type Selection	0 = Inverter duty	x	x
		1 = IPM		
		2 = SPM		
9	Motor Control Mode	0 = Freq Control		
		1 = Speed Control		
		2 = PM control1		
		3 = PM control2	x	x
		5 = Open Loop Speed Control		
		6 = Open Loop Torque Control		
		7 = Closed Loop Speed Control		
		8 = Closed Loop Torque Control		
10	Max Speed	Min: 400.00Hz	x	x
		Max: Min Speed		
11	Min Speed	Min: 0.00Hz	x	x
		Max: Max Speed		
12	Current Limit	Min: DriveNomCurrCT*1/10	x	x
		Max: DriveNomCurrCT*2		
13	Motor Nom Current	Min: DriveNomCurrCT*1/10	x	x
		Max: DriveNomCurrCT*2		
14	Motor Nom Speed	Min: 1	x	x
		Max: 24000		
15	Motor PF	Min: 0.30	x	x
		Max:1.00		
16	Motor Nom Voltage	Min: 180	x	x
		Max:690		
17	Motor Nom Frequency	Min: 8.00	x	x
		Max:400.00		
18	Accel Time 1	Min: 0.1	x	x
		Max:3000.0		
19	Decel Time 1	Min: 0.1	x	x
		Max:3000.0		

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
20	Local Control Place	0 = Keypad		
		1 = I/O Terminal Start 1		
		2 = I/O Terminal Start 2		
		3 = RTU_Fieldbus	x	x
		4 = TCP_Fieldbus		
		5 = EIP_Fieldbus		
		7 = WEBUI_Fieldbus		
		8 = REMOTEIOT_Fieldbus		
21	Local Reference	0 = AI1		
		1 = AI2		
		2 = Slot A: AI1		
		3 = Slot B: AI1		
		4 = AI1 Joystick		
		5 = AI2 Joystick		
		6 = Keypad		
		7 = Fieldbus Ref		
		8 = Motor Pot		
		9 = Max Frequency		
		10 = AI1 + AI2	x	x
		11 = AI1 - AI2		
		12 = AI2 - AI1		
		13 = AI1 * AI2		
		14 = AI1 or AI2		
		15 = MIN(AI1,AI2)		
		16 = MAX(AI1,AI2)		
		17 = PID1 Control Output		
		18 = PID2 Control Output		
		19 = High Freq Pulse Input 1		
		20 = High Freq Pulse Input 2		
		21 = Slot C: AI1		
		22 = Slot D: AI1		
22	PID1 Process Unit	0 = %		
		1 = 1/min		
		2 = rpm		
		3 = ppm		
		4 = pps		
		5 = l/s	x	x
		6 = l/min		
		7 = l/h		
		8 = kg/s		
		9 = kg/min		

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
		10 = kg/h		
		11 = m3/s		
		12 = m3/min		
		13 = m3/h		
		14 = m/s		
		15 = mbar		
		16 = bar		
		17 = Pa		
		18 = kPa		
		19 = mVS		
		20 = kW		
		21 = Deg. C		
		22 = GPM		
		23 = gal/s		
		24 = gal/min		
		25 = gal/h		
		26 = lb/s		
		27 = lb/min	x	x
		28 = lb/h		
		29 = CFM		
		30 = ft3/s		
		31 = ft3/min		
		32 = ft3/h		
		33 = ft/s		
		34 = in wg		
		35 = ft wg		
		36 = PSI		
		37 = lb/in2		
		38 = HP		
		39 = Deg. F		
		40 = PA		
		41 = WC		
		42 = HG		
		43 = ft		
		44 = m		
23	PID1 Process Unit Min	Min: 1 Max: 24000	x	x
24	PID1 Process Unit Max	Min: 1 Max: 24000	x	x

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
25	PID1 Set Point 1 Source	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 Process Data Input 1		
		8 = FB Process Data Input 2		
		9 = FB Process Data Input 3		
		10 = FB Process Data Input 4		
		11 = FB Process Data Input 5		
		12 = FB Process Data Input 6	x	x
		13 = FB Process Data Input 7		
		14 = FB Process Data Input 8		
		15 = PID2 Output		
		16 = Multi Drive Network		
		17 = FB PID1 Set Point 1		
		18 = FB PID1 Set Point 2		
		19 = High Freq Pulse Input 1		
		20 = High Freq Pulse Input 2		
		21 = Slot C: AI1		
		22 = Slot D: AI1		
		23 = Preset Speed Ref		
		24 = Ellen Reference		
26	PID1 Keypad Set Point 1	Min: PID1 Process Unit Min	x	x
		Max: PID1 Process Unit Max		
27	PID1 Feedback 1 Source	0 = Not Used		
		1 = AI1		
		2 = AI2		
		3 = Slot A: AI1		
		4 = Slot B: AI1		
		5 = FB Process Data Input 1		
		6 = FB Process Data Input 2	x	x
		7 = FB Process Data Input 3		
		8 = FB Process Data Input 4		
		9 = FB Process Data Input 5		
		10 = FB Process Data Input 6		
		11 = FB Process Data Input 7		
		12 = FB Process Data Input 8		

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
		13 = PT100_TEMPERTURE,PT100 Temperture		
		14 = PID2 Output		
		15 = SlotA PT100 Temp Channel 1		
		16 = SlotA PT100 Temp Channel 2		
		17 = SlotA PT100 Temp Channel 3		
		18 = SlotB PT100 Temp Channel 1		
		19 = SlotB PT100 Temp Channel 2		
		20 = SlotB PT100 Temp Channel 3		
		21 = FB PID1 Feedback 1		
		22 = FB PID1 Feedback 2		
		23 = High Freq Pulse Input 1	x	x
		24 = High Freq Pulse Input 2		
		25 = Slot C: AI1		
		26 = Slot D: AI1		
		27 = SlotC PT100 Temp Channel 1		
		28 = SlotC PT100 Temp Channel 2		
		29 = SlotC PT100 Temp Channel 3		
		30 = SlotD PT100 Temp Channel 1		
		31 = SlotD PT100 Temp Channel 2		
		32 = SlotD PT100 Temp Channel 3		
28	PID1 Feedback 1 Min	Min: -200.00	x	x
		Max: 200.00		
29	PID1 Feedback 1 Max	Min: -200.00	x	x
		Max: 200.00		
30	PID1 Error Inversion	0 = Not Inverted	x	x
		1 = Inverted		
31	IP Address Mode	0 = Static IP	x	
		1 = DHCP with AutoIP		
32	Static IP Address	192.168.1.254	x	
33	Modbus TCP Enable	0 = Disabled	x	
		1 = Enabled		
34	Modbus TCP Trusted IP Enable	0 = Disabled	x	x
		1 = Enabled		
35	Trusted IP White List		x	x
36	Bluetooth Enable	0 = Disabled	x	x
		1 = Enabled		
37	Bluetooth Broadcast Mode	0 = Off	x	x
		1 = On		

Table 12. Startup wizard instructions, (continued).

Item	Description		Touch Keypad	Membrane Keypad
38	Master Follower Mode	0 = Off		
		1 = Master	x	
		2 = Follower		
39	Synchronization Mode	0 = Speed Synchronization	x	
		1 = Torque Synchronization		
40	Communication Link	0 = Off	x	
		1 = Fiber Optic Serial		
41	Speed Ratio Refresh Mode	0 = No Action		
		1 = Digital Input	x	
		2 = Continuous Change		
42	Torque Ratio		x	
43	Follower Incoming Reference	0 = Analog Input 1		
		1 = Analog Input 2		
		2 = Fieldbus Reference		
		3 = SlotA:Encoder 1	x	
		4 = SlotA:Encoder 2		
		5 = Master Reference		
		6 = High Freq. DI		
44	Follower Start Delay	Min: 0.0 s	x	
		Max: 3600.0 s		
45	Follower Stop Delay	Min: 0.0 s	x	
		Max: 3600.0 s		
46	Master Outgoing Reference	0 = Analog Input 1		
		1 = Analog Input 2		
		2 = Master Reference	x	
		3 = Master Ramp Out		
		4 = SlotA:Encoder 1		
		5 = SlotA:Encoder 2		
47	Follower Stop Mode	0 = Coasting	x	
		1 = Ramp		
		2 = As Master		
48	Speed Ratio		x	
49	Speed Ratio Ramp Time	Min: 0	x	
		Max: 1000000 ms		

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

Chapter 5—Onboard inputs/outputs

Introduction

The PowerXL DX1 is designed for a large set of applications with the ability to have advanced motor control systems. The application is designed with 2 control places that use 6 digital inputs, 1 analog input, and 2 relay outputs that are programmable. Motor controlwise, it provides the ability to do open loop speed control, open loop torque control, closed loop speed control, closed loop torque control, and permanent magnet control modes. DX1 offers the ID run (auto tune) feature to optimize the speed and torque loops. 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.

I/O Controls

- "Terminal to Function" (TTF) Programming

  The design behind the programming of the digital inputs in the DX1 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:6. 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, B, C, or D, 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 DX1 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 DX1 are explained in "Appendix A – Description of Parameters." of this manual, The explanations are arranged according to the parameter number.

For the DI function, we use terminal programming method to function (TTF), where there is a fixed input that gets programmed to a list of functions. This allows for multiple inputs to be used for different functions. Connecting a certain input with a certain parameter function is done by give a parameter an appropriate value. The value is formed by the location of the input, either being on the standard control board or an external option board and the slot in which it is located.

Normally Open/Normally Close selection

The Normally Open selection would make the selected function always off. Essentially this is a virtual switch that is always open.

The Normally Close selection would make the selected function always on. Essentially this is a virtual switch that is always closed.

These options are assigned to a function if we want to force a state without using a hardware input.

Example:

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

DIGIN selection

This allows assignment of a hardware digital input to a function, this is set in a format of DigIN:X where X is one of the 6 digital inputs on the main control board.

Example:

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

Option board DigIN selection

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

Example:

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

Time Channel selection

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

Example:

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

Control I/O configuration

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

Table 13. Multi-purpose application default I/O configuration.

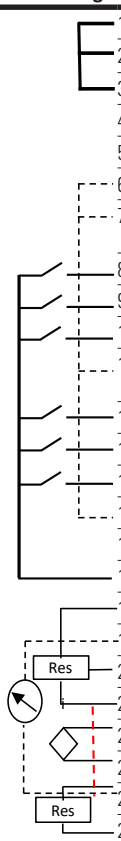
External wiring	Pin	Signal name	Signal	Default setting	Description
	1	24V	+24 Vdc		supply source of STO
	2	STO1	Safety torque off 1		Function safety related port, normally connect 24V
	3	STO2	Safety torque off 2		Function safety related port, normally connect 24V
	4	GND_I	I/O signal ground		STO Ground
	5	DO1	Digital output 1	Ready	Shows the drive is ready to run
	6	GND_I	I/O signal ground		I/O ground
	7	CMA	DIN1 to DIN3 common	Grounded	Isolated ground for DIN1-DIN3, could be connect to ground via parameter setting P3.3.1
	8	DIN1	Digital input 1	Run forward	Input starts drive in forward direction (start enable)
	9	DIN2	Digital input 2	Run reverse	Input starts drive in reverse direction (start enable)
	10	DIN3	Digital input 3	External fault	Input causes drive to fault
	11	CMB	DIN4 to DIN6 common	Grounded	Isolated ground for DIN4-DIN6, could be connect to ground via parameter setting P3.3.2
	12	DIN4	Digital input 4	Fault reset	Input resets active faults
	13	DIN5	Digital input 5	Preset speed b0	Sets frequency output to preset speed 1
	14	DIN6	Digital input 6	Preset speed b1	Sets frequency output to preset speed 2
	15	GND_I	I/O signal ground		I/O ground
	16	24V_I	+24 Vdc input		External control voltage input
	17	24V_O	+24 Vdc output		Control voltage output (250 mA max.)
	18	10REF	Ref. Output voltage	10V	10 Vdc supply source
	19	AO1+	Analog output 1	Output frequency	Shows output frequency to motor 0–60 Hz (4 mA to 20 mA)
	20	AI1+	Analog input 1 +	Remote1 reference	Remote1 reference default select use analog input1
	21	AI1-	Analog input 1 -		Analog I/O ground, could be configured to disconnect from ground.
	22	AI2+	Analog input 2 +	PID feedback 1 source	PID feedback 1 source default select use analog input2
	23	AI2-	Analog input 2 -		I/O ground, could be disconnected from ground by keypad setting
	24	GND_C	Thermistor input signal ground		Ground for reference
	25	THER	Motor thermistor		Thermistor input that triggers at 4.7k ohm
	26	485_A	Rs-485 Signal A/+	—	Fieldbus communication (Modbus, BACnet)
	27	485_B	Rs-485 Signal B/-	—	Fieldbus communication (Modbus, BACnet)
	28	RY1NC	Relay 1 normally closed	Run	Relay output 1 shows VFD is in a run state
	29	RY1CM	Relay 1 common		
	30	RY1NO	Relay 1 normally open		
	31	RY2NO	Relay 2 normally open		
	32	RY2CM	Relay 2 common		
	33	RY2NC	Relay 2 normally closed	Fault	Relay output 2 shows VFD is in a fault state

Table 13. Multi-purpose application default I/O configuration, continued.

Notes: Parameter settings

Code	Parameter	Default	ID	Note
P3.3.1	CMA To GND_I Enable	0	3970	0 = Disabled, 1 = Enabled
P3.3.2	CMB To GND_I Enable	0	3971	0 = Disabled, 1 = Enabled
P96.4.3	"RS485 Terminal Resistance Connect"	0	3969	0 = No 1 = yes
P2.2.1	AI1 mode	1	222	0 = 0 - 20 mA
				1 = 0 -10 V
				2 = -10 - +10 V
P2.2.2	AI1 signal range	0	175	0 = 0-100%/0-20mA/0-10V/-10-10V
				1 = 20-100%/4-20mA/2-10V/-6-10V
				2 = Customized
P2.3.1	AI2 mode	0	223	0 = 0 - 20 mA
				1 = 0 -10 V
				2 = -10 - +10 V
P2.3.2	AI2 signal range	1	183	0 = 0-100%/0-20mA/0-10V/-10-10V
				1 = 20-100%/4-20mA/2-10V/-6-10V
				2 = Customized

Notes: The above wiring demonstrates a SINK configuration. It is important that CMA and CMB are wired to ground (as shown by dashed line).If a SOURCE configuration is desired, wire 24 V to CMA and CMB and close the inputs to ground by parameter setting.
When using the +10 V for AI1, it is important to wire AI1-to GND_C (as shown by dashed line). If using +10 V for AI1 or AI2, terminals 21, 23, and 24 need to be jumpered together.

Table 14. 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
A/B Terminals	

① Shielded wire recommended.

Chapter 6—Parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given in "Appendix A – 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 15. Monitor—M1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M1.1	Multi-Monitoring				Output Frequency Speed Reference Motor Speed Motor Current Motor Torque Torque Reference Motor Power Motor Voltage DC-link Voltage	1753		

Table 16. Standard—M2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M2.1	Output Frequency			Hz		1		
M2.2	Speed Reference			Varies		3912		
M2.3	Motor Speed			rpm		3975		
M2.4	Motor Current			A		3		
M2.5	Motor Torque			%		4		
M2.6	Torque Reference			%		15		
M2.7	Motor Power			%		5		
M2.8	Motor Voltage			V		6		
M2.9	DC-link Voltage			V		7		
M2.10	Unit Temperature			Deg. C		8		
M2.11	Motor Temperature			Deg. C		9		
M2.12	Latest Fault Code					28		Refer to 'Appendix B' for fault code information
M2.13	Instant Motor Power			kW		1686		
M2.14	v- L1/L2					1056		
M2.15	v- L2/L3					1057		
M2.16	v- L3/L1					1058		
M2.17	I-L1			A		3828		
M2.18	I-L2			A		3829		
M2.19	I-L3			A		3830		

Table 17. Scaled display—M3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special Note	Note
M3.1	Output			Varies		2445		
M3.2	Reference			Varies		2447		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 18. IO status—M4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special Note	Note
M4.1	DI1, DI2, DI3					12		
M4.2	DI4, DI5, DI6					13		
M4.4	DO1,Virtual RO1,Virtual RO2					14		
M4.7	RO1, RO2					557		
M4.8	High Freq Pulse Input 1 Value			Hz		3848		
M4.9	High Freq Pulse Input 2 Value			Hz		3861		
M4.10	High Freq Pulse Output Value			Hz		3874		
M4.11	Control board DI Status					3214		

Table 19. AI monitor—M5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M5.1	Analog Input 1			Varies		10		
M5.2	Analog Input 2			Varies		11		

Table 20. AO monitor—M6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M6.1	Analog Output 1			Varies		25		

Table 21. PID1 monitoring—M10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M10.1	PID1 Set Point			Varies		16		
M10.2	PID1 Feedback			Varies		18		
M10.3	PID1 Error Value			Varies		20		
M10.4	PID1 Output			%		22		
M10.5	PID1 Status					23		0 = Stopped 1 = Running 2 = Sleep Mode

Table 22. PID2 monitoring—M11.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M11.1	PID2 Set Point			Varies		32		
M11.2	PID2 Feedback			Varies		34		
M11.3	PID2 Error Value			Varies		36		
M11.4	PID2 Output			%		38		
M11.5	PID2 Status					39		See Par ID 23

Table 23. SD card plug in status—M14.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M14.1	SD Card Plug In					3972		0 = No 1 = Yes

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Multi pump monitoring

Table 24. MPC General—M41.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.1.1	Running Motors					26		

Table 25. Operate mode—M41.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.2.1	MPC Drive1 Operate Mode					2218		0 = Offline 1 = Slave Drive 2 = Master Drive 3 = Redundant Drive
M41.2.2	MPC Drive2 Operate Mode					2230		See Par ID 2218
M41.2.3	MPC Drive3 Operate Mode					2242		See Par ID 2218
M41.2.4	MPC Drive4 Operate Mode					2254		See Par ID 2218
M41.2.5	MPC Drive5 Operate Mode					2266		See Par ID 2218

Table 26. Status—M41.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.3.1	MPC Drive1 Status				5	2219		0 = Stopped 1 = Sleep 2 = Regulating 3 = Wait for CMD 4 = Following 5 = Unknown 6 = Local Control 7 = Local Control
M41.3.2	MPC Drive2 Status				5	2231		See Par ID 2219
M41.3.3	MPC Drive3 Status				5	2243		See Par ID 2219
M41.3.4	MPC Drive4 Status				5	2255		See Par ID 2219
M41.3.5	MPC Drive5 Status				5	2267		See Par ID 2219

Table 27. Network status—M41.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.4.1	MPC Drive1 Network Status					2220		0 = Disconnected 1 = Fault 2 = Local Control 3 = Pump Lost 4 = Need Alternation 5 = No Error
M41.4.2	MPC Drive2 Network Status					2232		See Par ID 2220
M41.4.3	MPC Drive3 Network Status					2244		See Par ID 2220
M41.4.4	MPC Drive4 Network Status					2256		See Par ID 2220
M41.4.5	MPC Drive5 Network Status					2268		See Par ID 2220

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 28. Latest fault code—M41.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.5.1	MPC Drive1 Last Fault Code					2221		
M41.5.2	MPC Drive2 Last Fault Code					2233		
M41.5.3	MPC Drive3 Last Fault Code					2245		
M41.5.4	MPC Drive4 Last Fault Code					2257		
M41.5.5	MPC Drive5 Last Fault Code					2269		

Table 29. Output frequency—M41.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.6.1	MPC Drive1 f-Out			Hz		2222		
M41.6.2	MPC Drive2 f-Out			Hz		2234		
M41.6.3	MPC Drive3 f-Out			Hz		2246		
M41.6.4	MPC Drive4 f-Out			Hz		2258		
M41.6.5	MPC Drive5 f-Out			Hz		2270		

Table 30. Output voltage—M41.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.7.1	MPC Drive1 V-Out			V		2223		
M41.7.2	MPC Drive2 V-Out			V		2235		
M41.7.3	MPC Drive3 V-Out			V		2247		
M41.7.4	MPC Drive4 V-Out			V		2259		
M41.7.5	MPC Drive5 V-Out			V		2271		

Table 31. Output current—M41.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.8.1	MPC Drive1 I-Out			A		2224		
M41.8.2	MPC Drive2 I-Out			A		2236		
M41.8.3	MPC Drive3 I-Out			A		2248		
M41.8.4	MPC Drive4 I-Out			A		2260		
M41.8.5	MPC Drive5 I-Out			A		2272		

Table 32. Output torque—M41.9.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.9.1	MPC Drive1 M-Out			%		2225		
M41.9.2	MPC Drive2 M-Out			%		2237		
M41.9.3	MPC Drive3 M-Out			%		2249		
M41.9.4	MPC Drive4 M-Out			%		2261		
M41.9.5	MPC Drive5 M-Out			%		2273		

Table 33. Output power—M41.10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.10.1	MPC Drive1 P-Out			%		2226		
M41.10.2	MPC Drive2 P-Out			%		2238		
M41.10.3	MPC Drive3 P-Out			%		2250		
M41.10.4	MPC Drive4 P-Out			%		2262		
M41.10.5	MPC Drive5 P-Out			%		2274		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 34. Output speed—M41.11.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.11.1	MPC Drive1 n-Out			rpm		2227		
M41.11.2	MPC Drive2 n-Out			rpm		2239		
M41.11.3	MPC Drive3 n-Out			rpm		2251		
M41.11.4	MPC Drive4 n-Out			rpm		2263		
M41.11.5	MPC Drive5 n-Out			rpm		2275		

Table 35. Accu. run time—M41.12.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M41.12.1	MPC Drive1 t-Run			h		2228		
M41.12.2	MPC Drive2 t-Run			h		2240		
M41.12.3	MPC Drive3 t-Run			h		2252		
M41.12.4	MPC Drive4 t-Run			h		2264		
M41.12.5	MPC Drive5 t-Run			h		2276		

Table 36. Misc—M42.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M42.1	PT100 Temperture			Deg. C	1000.0	27		

Table 37. Option cards—M43.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M43.1	SlotA DI Status					3248		
M43.2	SlotB DI Status					3249		
M43.3	SlotC DI Status					3653		
M43.4	SlotD DI Status					3766		

Table 38. Fieldbus monitor—M96.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M96.1	Control Board DIDO Status					2209		
M96.2	Application Status Word					29		
M96.3	Standard Status Word					2414		
M96.4	FB Status Word					2101		
M96.5	FB Ctrol Word					2001		
M96.6	FB Speed Reference	0.00	200.00	%		2003		
M96.7	FB Torque Ref	-300.0	300.0	%		2541		

Table 39. Energy savings—M97.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M97.1	Energy Savings			Varies	0.000	2120		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 40. Energy counter—M98.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M98.1	Total MWh Count			Mwh		601		
M98.2	Total Power Day Count			Days		603		
M98.3	Total Power Hr Count			Hrs		606		
M98.4	Trip MWh Count			Mwh		604		
M98.5	Clear Trip MWh Count					635		0 = Not Reset 1 = Reset
M98.6	Trip Power Day Count					636		
M98.7	Trip Power Hr Count					637		
M98.8	Clear Trip Power Count					639		See Par ID 635

Table 41. Run-time counters—M99.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
M99.1	Total Run Time Count			h		2827		
M99.2	Trip Run Time Count			h		2829		
M99.3	Numbers Of Start					2830		

Parameters

Table 42. Basic parameters—P1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P1.1	Min Speed	0.00	See Par ID 3918	Varies	0.00	3916		
P1.2	Max Speed	See Par ID 3916	400.00	Varies	MaxFreqMFG	3918	①	
P1.3	Accel Time 1	0.1	3000.0	s	3.0	103		
P1.4	Decel Time 1	0.1	3000.0	s	3.0	104		
P1.5	Motor Type Selection				0	1820	①②	0 = Inverter duty 1 = IPM 2 = SPM
P1.6	Motor Nom Current	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	486	①	
P1.7	Motor Nom Speed	1	24000	rpm	MotorNomSpeedMFG	489	①	
P1.8	Motor PF	0.30	1.00		0.85	490	①	
P1.9	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	①	
P1.10	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	①	
P1.11	Local Control Place				0	1695	①	0 = Keypad 1 = I/O Terminal Start 1 2 = I/O Terminal Start 2 3 = RTU_Fieldbus 4 = TCP_Fieldbus 5 = EIP_Fieldbus 7 = WEBUI_Fieldbus 8 = REMOTEIOT_Fieldbus

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 42. Basic parameters—P1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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
P1.12	Local Reference				6	136	①②	11 = AI1 - AI2
								12 = AI2 - AI1
								13 = AI1 * AI2
								14 = AI1 or AI2
								15 = MIN(AI1,AI2)
								16 = MAX(AI1,AI2)
								17 = PID1 Control Output
								18 = PID2 Control Output
								19 = High Freq Pulse Input 1
								20 = High Freq Pulse Input 2
								21 = Slot C: AI1
								22 = Slot D: AI1
								0 = I/O Terminal Start 1
								1 = RTU_Fieldbus
								2 = I/O Terminal Start 2
								3 = Keypad
P1.13	Remote 1 Control Place				0	135	①	4 = TCP_Fieldbus
								5 = EIP_Fieldbus
								6 = PROFINET_Fieldbus
								7 = WEBUI_Fieldbus
								8 = REMOTEIOT_Fieldbus
P1.14	Remote 1 Reference				0	137	①②	See Par ID 136
P1.15	Frequency Reference Upper Limit	See Par ID 3916	See Par ID 3918	Hz	50.00	2840		
P1.16	Frequency Reference Upper Limit Source				0	2841		0 = Not Used
								1 = Freq Ref upper
								2 = AI1
								3 = AI2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Analog input

Table 43. Basic setting AI—P2.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P2.1.1	AI Ref Scale Min Value	0.00	See Par ID 145	Hz	0.00	144		
P2.1.2	AI Ref Scale Max Value	See Par ID 144	400.00	Hz	0.00	145		
P2.1.6	Fine Tuning Input				0	2484	①	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Slot C: AI1 6 = Slot D: AI1 7 = Fieldbus
P2.1.7	Fine Tuning Min	0.0	100.0	%	0.0	2485	①	
P2.1.8	Fine Tuning Max	0.0	100.0	%	0.0	2486	①	

Table 44. AI1 settings—P2.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P2.2.1	AI1 Mode				1	222		0 = 0 - 20 mA 1 = 0 -10 V 2 = -10 - +10 V
P2.2.2	AI1 Signal Range				0	175		0 = 0-100%/0-20mA/0-10V/-10-10V 1 = 20-100%/4-20mA/2-10V/-6-10V 2 = Customized
P2.2.3	AI1 Custom Min	0.00	See Par ID 177	%	0.00	176		
P2.2.4	AI1 Custom Max	See Par ID 176	100.00	%	100.00	177		
P2.2.5	AI1 Filter Time	0.00	10.00	s	0.10	174		
P2.2.6	AI1 Signal Invert				0	181		0 = Not Inverted 1 = Inverted
P2.2.7	AI1 Joystick Hyst	0.00	20.00	%	0.00	178		
P2.2.8	AI1 Sleep Limit	0.00	100.00	%	0.00	179		
P2.2.9	AI1 Sleep Delay	0.00	320.00	s	0.00	180		
P2.2.10	AI1 Joystick Offset	-50.00	50.00	%	0.00	133		
P2.2.11	Analog Input 1 Scale	10	1000	%	100	3775		
P2.2.12	Analog Input 1 Offset	-100.00	100.00	%	0.00	3776		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 45. AI2 settings—P2.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P2.3.1	AI2 Mode				0	223		See Par ID 222
P2.3.2	AI2 Signal Range				1	183		See Par ID 175
P2.3.3	AI2 Custom Min	0.00	See Par ID 185	%	0.00	184		
P2.3.4	AI2 Custom Max	See Par ID 184	100.00	%	100.00	185		
P2.3.5	AI2 Filter Time	0.00	10.00	s	0.10	182		
P2.3.6	AI2 Signal Invert				0	189		See Par ID 181
P2.3.7	AI2 Joystick Hyst	0.00	20.00	%	0.00	186		
P2.3.8	AI2 Sleep Limit	0.00	100.00	%	0.00	187		
P2.3.9	AI2 Sleep Delay	0.00	320.00	s	0.00	188		
P2.3.10	AI2 Joystick Offset	-50.00	50.00	%	0.00	134		
P2.3.11	Analog Input 2 Scale	10	1000	%	100	3777		
P2.3.12	Analog Input 2 Offset	-100.00	100.00	%	0.00	3778		

Digital input

Table 46. Basic setting—P3.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P3.3.1	CMA To GND Enable				0	3970	①	0 = Disabled
								1 = Enabled
P3.3.2	CMB To GND Enable				0	3971	①	See Par ID 3970

High freq pulse input 1

Table 47. Basic setting—P3.4.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Normal DI
P3.4.1.1	High Freq Pulse Input 1 Type				0	3843	①⑥	1 = General Pulse Input
								2 = PWM Input

Table 48. Parameters—P3.4.2

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Speed Reference
P3.4.2.1	High Freq Pulse Input 1 Func				0	3844		1 = PID1 Setpoint
								2 = PID1 Feedback 1
								3 = Motor Torque
P3.4.2.2	High Freq Pulse Input 1 Scale	10	1000	%	100	3845		
P3.4.2.3	High Freq Pulse Input 1 Offset	-100.00	100.00	%	0.00	3846		
P3.4.2.4	High Freq Pulse Input 1 Filter Time	0	1000	ms	10	3847		
P3.4.2.5	High Freq Pulse Input 1 Min	0	50000	Hz	0	3849		
P3.4.2.6	High Freq Pulse Input 1 Max	0	50000	Hz	50000	3850		
								0 = No Action
P3.4.2.7	High Freq Pulse Input 1 Fault				0	3851		1 = Warning
								2 = Fault

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 48. Parameters—P3.4.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P3.4.2.8	High Freq Pulse Input 1 Low Limit	0	50000	Hz	0	3852		
P3.4.2.9	High Freq Pulse Input 1 High Limit	0	50000	Hz	0	3853		
P3.4.2.10	High Freq Pulse Input 1 Check Delay	0	32000	s	0	3854		
P3.4.2.11	High Freq Pulse Input 1 Hyst Level	0	50000	Hz	0	3855		

High freq pulse input 2

Table 49. Basic setting—P3.5.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P3.5.1.1	High Freq Pulse Input 2 Type				0	3856	①⑥	See Par ID 3843

Table 50. Parameters—P3.5.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P3.5.2.1	High Freq Pulse Input 2 Func				0	3857		See Par ID 3844
P3.5.2.2	High Freq Pulse Input 2 Scale	10	1000	%	100	3858		
P3.5.2.3	High Freq Pulse Input 2 Offset	-100.00	100.00	%	0.00	3859		
P3.5.2.4	High Freq Pulse Input 2 Filter Time	0	1000	ms	10	3860		
P3.5.2.5	High Freq Pulse Input 2 Min	0	50000	Hz	0	3862		
P3.5.2.6	High Freq Pulse Input 2 Max	0	50000	Hz	50000	3863		
P3.5.2.7	High Freq Pulse Input 2 Fault				0	3864		See Par ID 3851
P3.5.2.8	High Freq Pulse Input 2 Low Limit	0	50000	Hz	0	3865		
P3.5.2.9	High Freq Pulse Input 2 High Limit	0	50000	Hz	0	3866		
P3.5.2.10	High Freq Pulse Input 2 Check Delay	0	32000	s	0	3867		
P3.5.2.11	High Freq Pulse Input 2 Hyst level	0	50000	Hz	0	3868		

Analog output

Basic settings A0

Table 51. AO1—P4.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P4.2.1	AO1 Mode				0	227		See Par ID 222
P4.2.2	AO1 Function				1	146	②	0 = Not Used 1 = Output Frequency 2 = Speed Reference 3 = Motor Speed 4 = Motor Current

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 51. AO1—P4.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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
P4.2.2	AO1 Function				1	146	②	20 = AI2
								21 = Output Freq (-2-+2N)
								22 = Motor Torque (-2-+2N)
								23 = Motor Power (-2-+2N)
								25 = FB Process Data Input 1
								26 = FB Process Data Input 2
								27 = FB Process Data Input 3
								28 = FB Process Data Input 4
								29 = FB Process Data Input 5
								30 = FB Process Data Input 6
								31 = FB Process Data Input 7
								32 = FB Process Data Input 8
								33 = SlotA PT100 Temp Channel 1
								34 = SlotA PT100 Temp Channel 2
								35 = SlotA PT100 Temp Channel 3
								36 = SlotB PT100 Temp Channel 1
								37 = SlotB PT100 Temp Channel 2
								38 = SlotB PT100 Temp Channel 3
								39 = User Defined Output
								40 = Motor Current (-2-+2N)
								41 = SlotC PT100 Temp Channel 1
								42 = SlotC PT100 Temp Channel 2
								43 = SlotC PT100 Temp Channel 3
								44 = SlotD PT100 Temp Channel 1
								45 = SlotD PT100 Temp Channel 2
								46 = SlotD PT100 Temp Channel 3
P4.2.3	AO1 Filter Time	0.00	10.00	s	1.00	147		
P4.2.8	AO1 Minimum				1	149		0 = 0V / 0 mA
								1 = 2V / 4 mA
P4.2.9	AO1 Scale	10	1000	%	100	150		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 51. AO1—P4.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P4.2.10	AO1 Inversion				0	148		See Par ID 181
P4.2.11	AO1 Offset	-100.00	100.00	%	0.00	173		

Digital output

Table 52. Relais—P5.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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
P5.1.1	RO1 Function				2	152	②	13 = Drive Over Temperature Fault
								14 = Over Current Fault
								15 = Over Voltage Fault
								16 = Under Voltage Fault
								17 = Analog Input Less Then 4mA
								18 = Ext Brake Control
								19 = Ext Brake Inverted
								20 = Torq Limit Superv
								21 = Ref Limit Superv
								22 = Control from I/O
								23 = Direction Dis-match Set Direction
								24 = Thermistor Input Fault
								26 = In Bypass Mode
								27 = Ext Fault/Warning
								28 = Remote Control
								29 = Jog Speed Select
								30 = Motor Overload
								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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 52. Relais—P5.1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								38 = TC3 Status
								39 = Emergency 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
P5.1.1	RO1 Function				2	152	②	47 = Motor 5 Control
								48 = Logic Fulfilled
								49 = PID1 Sleep
								50 = PID2 Sleep
								51 = Motor Current 1 Supv
								52 = Motor Current 2 Supv
								53 = Second AI Limit Supv
								54 = DC Charge Switch Close
								55 = Preheat Active
								56 = Cold Weather Active
								57 = Prime Pump Active
								58 = 2nd Stage Ramp Frequency Active
								59 = STO Fault
								60 = Run Bypass/Drive
								61 = Bypass Overload Fault
								62 = Bypass Run
								63 = Auto Change To Local On COM Fault
								64 = Modbus RTU Comm Fault
								65 = Modbus TCP Comm Fault
								71 = Jockey Pump Active
								72 = Lube Pump Active
								73 = PID1 Low Feedback
								74 = PID1 High Feedback
								75 = PID2 Low Feedback
								76 = PID2 High Feedback
								77 = Master in MPFC
								78 = Clean Power Interlock Fault
								79 = Valve Control
								80 = Inch Speed Select
								81 = AI Fault
								83 = SlotD Fieldbus Com Fault
								84 = Speed Limit Superv

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 52. Relais—P5.1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P5.1.2	RO1 On Delay	0.0	320.0	s	0.0	2112		
P5.1.3	RO1 Off Delay	0.0	320.0	s	0.0	2113		
P5.1.4	RO2 Function				3	153	②	See Par ID 152
P5.1.5	RO2 On Delay	0.0	320.0	s	0.0	2114		
P5.1.6	RO2 Off Delay	0.0	320.0	s	0.0	2115		

Table 53. Digital outputs—P5.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P5.2.1	DO1 Function				1	151	②	See Par ID 152

Table 54. Virtual outputs—P5.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P5.3.1	Virtual RO1 Function				0	2463	②	See Par ID 152
P5.3.2	Virtual RO1 On Delay	0.0	320.0	s	0.0	2848		
P5.3.3	Virtual RO1 Off Delay	0.0	320.0	s	0.0	2849		
P5.3.4	Virtual RO2 Function				0	2464	②	See Par ID 152
P5.3.5	Virtual RO2 On Delay	0.0	320.0	s	0.0	2850		
P5.3.6	Virtual RO2 Off Delay	0.0	320.0	s	0.0	2851		

High freq pulse output

Table 55. Basic setting—P5.4.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P5.4.1.1	High Freq Pulse Output Type				0	3869	①⑥	0 = Normal DO 1 = General Pulse Output 2 = PWM Output

Table 56. Parameters—P5.4.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P5.4.2.1	High Freq Pulse Output Source				1	3870		0 = Not Used 1 = Output Frequency 2 = Speed 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

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 56. Parameters—P5.4.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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-+2N)
P5.4.2.1	High Freq Pulse Output Source				1	3870		22 = Motor Torque (-2-+2N)
								23 = Motor Power (-2-+2N)
								25 = FB Process Data Input 1
								26 = FB Process Data Input 2
								27 = FB Process Data Input 3
								28 = FB Process Data Input 4
								29 = FB Process Data Input 5
								30 = FB Process Data Input 6
								31 = FB Process Data Input 7
								32 = FB Process Data Input 8
								33 = SlotA PT100 Temp Channel 1
								34 = SlotA PT100 Temp Channel 2
								35 = SlotA PT100 Temp Channel 3
								36 = SlotB PT100 Temp Channel 1
								37 = SlotB PT100 Temp Channel 2
								38 = SlotB PT100 Temp Channel 3
								39 = User Defined Output
								40 = Motor Current (-2-+2N)
								41 = SlotC PT100 Temp Channel 1
								42 = SlotC PT100 Temp Channel 2
								43 = SlotC PT100 Temp Channel 3
								44 = SlotD PT100 Temp Channel 1
								45 = SlotD PT100 Temp Channel 2
P5.4.2.1, cont.	High Freq Pulse Output Source				1	3870		46 = SlotD PT100 Temp Channel 3
P5.4.2.2	High Freq Pulse Output Scale	10	1000	%	100	3871		
P5.4.2.3	High Freq Pulse Output Offset	-100.00	100.00	%	0.00	3872		
P5.4.2.4	High Freq Pulse Output Filter Time	0	1000	ms	10	3873		
P5.4.2.5	High Freq Pulse Output Min	0	50000	Hz	0	3875		
P5.4.2.6	High Freq Pulse Output Max	0	50000	Hz	50000	3876		
P5.4.2.7	High Freq Pulse Output Fault				0	3877		See Par ID 3851
P5.4.2.8	High Freq Pulse Output Low Limit	0	50000	Hz	0	3878		
P5.4.2.9	High Freq Pulse Output High Limit	0	50000	Hz	0	3879		
P5.4.2.10	High Freq Pulse Output Check Delay	0	32000	s	0	3880		
P5.4.2.11	High Freq Pulse Output Hyst Level	0	50000	Hz	0	3881		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Drive control

Table 57. Basic drive control settings—P7.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.1.1	IO Terminal 1 Start Stop Logic				0	143	①	0 = Forward - Reverse 1 = Start - Reverse 2 = Start - Enable 3 = 3 Wire Control
P7.1.2	IO Terminal 1 Start Signal 1				2	190	②	0 = DigIN:NormallyOpen 1 = DigIN:NormallyClose 2 = DigIN: 1 3 = DigIN: 2 4 = DigIN: 3 5 = DigIN: 4 6 = DigIN: 5 7 = DigIN: 6 8 = DigIN: A: IO1: 1 9 = DigIN: A: IO1: 2 10 = DigIN: A: IO1: 3 11 = DigIN: A: IO5: 1 12 = DigIN: A: IO5: 2 13 = DigIN: A: IO5: 3 14 = DigIN: A: IO5: 4 15 = DigIN: A: IO5: 5 16 = DigIN: A: IO5: 6 17 = DigIN: B: IO1: 1 18 = DigIN: B: IO1: 2 19 = DigIN: B: IO1: 3 20 = DigIN: B: IO5: 1 21 = DigIN: B: IO5: 2 22 = DigIN: B: IO5: 3 23 = DigIN: B: IO5: 4 24 = DigIN: B: IO5: 5 25 = DigIN: B: IO5: 6 26 = Time Channel 1 27 = Time Channel 2 28 = Time Channel 3 29 = RO1 Function 30 = RO2 Function 31 = Virtual RO1 Function 32 = Virtual RO2 Function 33 = DigIN: C: IO1: 1 34 = DigIN: C: IO1: 2 35 = DigIN: C: IO1: 3 36 = DigIN: C: IO5: 1

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 59. Basic drive control settings—P7.1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.1.2, cont.	IO Terminal 1 Start Signal 1				2	190	②	37 = DigIN: C: IO5: 2
								38 = DigIN: C: IO5: 3
								39 = DigIN: C: IO5: 4
								40 = DigIN: C: IO5: 5
								41 = DigIN: C: IO5: 6
								42 = DigIN: D: IO1: 1
								43 = DigIN: D: IO1: 2
								44 = DigIN: D: IO1: 3
								45 = DigIN: D: IO5: 1
								46 = DigIN: D: IO5: 2
								47 = DigIN: D: IO5: 3
								48 = DigIN: D: IO5: 4
								49 = DigIN: D: IO5: 5
								50 = DigIN: D: IO5: 6
P7.1.3	IO Terminal 1 Start Signal 2				3	191	②	See Par ID 190
P7.1.4	IO Terminal 2 Start Stop Logic				0	2206	①	See Par ID 143
P7.1.5	IO Terminal 2 Start Signal 1				2	2207	②	See Par ID 190
P7.1.6	IO Terminal 2 Start Signal 2				3	2208	②	See Par ID 190
P7.1.7	Reverse				0	198	②	See Par ID 190
P7.1.8	Reverse Enable				1	1679	①	0 = Disabled
								1 = Enabled
P7.1.9	Run Enable				1	194	②	See Par ID 190
P7.1.10	Run Remove Stop Mode				0	2667		0 = Coasting
								1 = Ramp
								2 = Current Limit
								3 = Torque Limit
P7.1.12	Fault Reset				5	200	②	See Par ID 190
P7.1.13	Start Mode				0	252		0 = Ramp
								1 = Flying Start From Stop Frequency
								2 = Flying Start From Max Frequency
P7.1.14	Stop Mode				1	253		See Par ID 2667
P7.1.15	Fault Reset Start				0	2483		0 = Follow Run Command
								1 = Rising Edge After Fault Reset
P7.1.16	Power Loss Function				0	267		0 = Disabled
								1 = Decel Mode
								2 = Coast Mode
P7.1.17	Power Loss Time	0.3	5.0	s	2.0	268		
P7.1.18	Bumpless Enable				0	2462		See Par ID 1679
P7.1.19	Switching Frequency	MinSwitchFreq	MaxSwitchFreq	kHz	DefaultSwitchFreqCT	2522		
P7.1.20	Sine Filter Enable				0	1665		See Par ID 1679
P7.1.21	Ext Fault-AR				1	747	②	See Par ID 190
P7.1.22	HOA Source				0	2465	①	0 = Disabled
								1 = IO Terminal
								2 = Keypad

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 58. Reference functions—P7.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.2.1	Min Speed	0.00	See Par ID 3918	Varies	0.00	3916		
P7.2.2	Max Speed	See Par ID 3916	400.00	Varies	MaxFreqMFG	3918	①	
P7.2.3	Keypad Reference	See Par ID 3916	See Par ID 3918	Varies	0.00	3914		
P7.2.4	Keypad Torque Ref	-300.0	300.0	%	0.0	782		
P7.2.5	AI Ref Source Select				0	208	②	See Par ID 190
P7.2.6	Preset Speed B0				6	205	②	See Par ID 190
P7.2.7	Preset Speed B1				7	206	②	See Par ID 190
P7.2.8	Preset Speed B2				0	207	②	See Par ID 190
P7.2.10	Motor Pot Ramp Time	0.1	2000.0	Hz/s	10.0	156		
P7.2.11	Motor Pot Ref Reset				0	169		0 = No Reset 1 = Reset: Stop + Power Down 2 = Reset: Power Down
P7.2.12	Change PhaseSequence Motor				0	2515	①	0 = Change Disable 1 = Change Enable
P7.2.13	Accel Pot Value				0	203	②	See Par ID 190
P7.2.14	Decel Pot Value				0	204	②	See Par ID 190
P7.2.15	Reset Pot Zero				0	216	②	See Par ID 190
P7.2.16	Speed Trim Setting				0	4011		0 = Disabled 1 = PID1 Output 2 = PID2 Output
P7.2.17	Torque Trim Setting				0	4012		See Par ID 2860

Table 59. Control place—P7.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.3.1	Power Up Local Remote Select				0	1685		0 = Hold Last 1 = Local Control 2 = Remote control
P7.3.2	Remote 1/2 Select				0	209	①②	See Par ID 190
P7.3.5	HOA On/Off				1	2395	②	See Par ID 190
P7.3.6	Local Control				0	197	②	See Par ID 190
P7.3.7	Remote Control				9	196	②	See Par ID 190
P7.3.8	Local Control Place				0	1695	①	See Par ID 1695
P7.3.9	Local Reference				6	136	①②	See Par ID 136
P7.3.10	Remote 1 Control Place				0	135	①	See Par ID 135
P7.3.11	Remote 1 Reference				0	137	①②	See Par ID 136
P7.3.12	Remote 2 Control Place				1	138	①	See Par ID 135
P7.3.13	Remote 2 Reference				7	139	①②	See Par ID 136

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 60. Ramp—P7.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.4.1	Accel/Decel Time Set				0	195	②	See Par ID 190
P7.4.4	Accel/Decel Prohibit				0	201	②	See Par ID 190
P7.4.5	Accel Time 1	0.1	3000.0	s	3.0	103		
P7.4.6	Decel Time 1	0.1	3000.0	s	3.0	104		
P7.4.7	Ramp 1 Shape	0.0	10.0	s	0.0	247		
P7.4.8	Accel Time 2	0.1	3000.0	s	10.0	249		
P7.4.9	Decel Time 2	0.1	3000.0	s	10.0	250		
P7.4.10	Ramp 2 Shape	0.0	10.0	s	0.0	248		
P7.4.11	2nd Stage Ramp Frequency	See Par ID 3916	See Par ID 3918	Hz	30.00	2444	①	

Table 61. Preset speeds—P7.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.5.1	Preset Speed 1	0.00	See Par ID 3918	Varies	5.00	3932		
P7.5.2	Preset Speed 2	0.00	See Par ID 3918	Varies	10.00	3934		
P7.5.3	Preset Speed 3	0.00	See Par ID 3918	Varies	15.00	3936		
P7.5.4	Preset Speed 4	0.00	See Par ID 3918	Varies	20.00	3938		
P7.5.5	Preset Speed 5	0.00	See Par ID 3918	Varies	25.00	3940		
P7.5.6	Preset Speed 6	0.00	See Par ID 3918	Varies	30.00	3942		
P7.5.7	Preset Speed 7	0.00	See Par ID 3918	Varies	35.00	3944		

Table 62. Auto restart—P7.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.6.1	AR Wait Time	1.00	300.00	s	1.00	321		
P7.6.2	AR Trail Time	0.00	600.00	s	30.00	322		
P7.6.3	AR Start Function				0	323		0 = Flying Start From Stop Frequency 1 = Ramp 2 = Flying Start From Max Frequency
P7.6.4	Undervoltage Attempts	0	10		1	324		
P7.6.5	OverVoltage Attempts	0	10		1	325		
P7.6.6	OverCurrent Attempts	0	3		1	326		
P7.6.7	4mA Fault Attempts	0	10		1	327		
P7.6.8	Motor Temp Fault Attempts	0	10		1	329		
P7.6.9	External Fault Attempts	0	10		1	328		
P7.6.10	Underload Attempts	0	10		1	336		
P7.6.11	Number Of Tries After AI Trip	0	10		1	3842		

Table 63. Cold weather function—P7.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P7.7.1	Cold Weather Mode				0	2126		See Par ID 1679
P7.7.2	Cold Weather Volt. Level	0.0	20.0	%	2.0	2127		
P7.7.3	Cold Weather Time Out	0	10	min	3	2128		
P7.7.4	Cold Weather Password					2129		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Motor control

Table 64. Basic motor control settings—P8.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Freq Control
								1 = Speed Control
								2 = PM control1
P8.1.1	Motor Control Mode				0	287	①②	3 = PM control2
								5 = Open Loop Speed Control
								6 = Open Loop Torque Control
								7 = Closed Loop Speed Control
								8 = Closed Loop Torque Control
P8.1.2	Current Limit	DriveNomCurr CT*1/10	DriveNomCurr CT*2	A	DriveNomCurrVT	107	①	
P8.1.3	Second Motor Para Select				0	217	②	See Par ID 190
								0 = Follow Motor Setting
P8.1.4	Encoder Signal Selection				0	3767	①	1 = SlotA:Encoder 1
								2 = SlotA:Encoder 2
P8.1.5	Encoder 1 Scale				1.000	3837		
P8.1.6	Encoder 2 Scale				1.000	3838		

Table 65. Skip frequencies—P8.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.2.1	Skip Range Ramp Factor	0.1	10.0		1.0	264		
P8.2.2	Skip F1 Low Limit	0.00	See Par ID 3922	Varies	0.00	3920		
P8.2.3	Skip F1 High Limit	See Par ID 3920	400.00	Varies	0.00	3922		
P8.2.4	Skip F2 Low Limit	0.00	SkipRange2 HighLimit	Varies	0.00	3924		
P8.2.5	Skip F2 High Limit	SkipRange2 LowLimit	400.00	Varies	0.00	3926		
P8.2.6	Skip F3 Low Limit	0.00	See Par ID 3930	Varies	0.00	3928		
P8.2.7	Skip F3 High Limit	See Par ID 3928	400.00	Varies	0.00	3930		

Table 66. Preheat Control—P8.3

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.3.1					0	2159		See Par ID 3970
								0 = DigIN:NormallyOpen
								1 = DigIN:NormallyClose
								2 = DigIN: 1
								3 = DigIN: 2
								4 = DigIN: 3
P8.3.2	Preheat Control Source				31	2160	②	5 = DigIN: 4
								6 = DigIN: 5
								7 = DigIN: 6
								8 = DigIN: A: IO1: 1
								9 = DigIN: A: IO1: 2
								10 = DigIN: A: IO1: 3
								11 = DigIN: A: IO5: 1

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 66. Preheat Control—P8.3, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								12 = DigIN: A: IO5: 2
								13 = DigIN: A: IO5: 3
								14 = DigIN: A: IO5: 4
								15 = DigIN: A: IO5: 5
								16 = DigIN: A: IO5: 6
								17 = DigIN: B: IO1: 1
								18 = DigIN: B: IO1: 2
								19 = DigIN: B: IO1: 3
								20 = DigIN: B: IO5: 1
								21 = DigIN: B: IO5: 2
								22 = DigIN: B: IO5: 3
								23 = DigIN: B: IO5: 4
								24 = DigIN: B: IO5: 5
								25 = DigIN: B: IO5: 6
								26 = Time Channel 1
								27 = Time Channel 2
								28 = Time Channel 3
								29 = Drive Temperature
P8.3.2	Preheat Control Source				31	2160	②	30 = SlotA PT100 Temp Channel 1
								31 = SlotA PT100 Temp Channel 2
								32 = SlotA PT100 Temp Channel 3
								33 = SlotA Max PT100 Temp
								34 = SlotB PT100 Temp Channel 1
								35 = SlotB PT100 Temp Channel 2
								36 = SlotB PT100 Temp Channel 3
								37 = SlotB Max PT100 Temp
								38 = DigIN: C: IO1: 1
								39 = DigIN: C: IO1: 2
								40 = DigIN: C: IO1: 3
								41 = DigIN: C: IO5: 1
								42 = DigIN: C: IO5: 2
								43 = DigIN: C: IO5: 3
								44 = DigIN: C: IO5: 4
								45 = DigIN: C: IO5: 5
								46 = DigIN: C: IO5: 6
								47 = DigIN: D: IO1: 1
								48 = DigIN: D: IO1: 2
								49 = DigIN: D: IO1: 3
								50 = DigIN: D: IO5: 1
								51 = DigIN: D: IO5: 2
								52 = DigIN: D: IO5: 3
								53 = DigIN: D: IO5: 4
								54 = DigIN: D: IO5: 5
								55 = DigIN: D: IO5: 6
								56 = SlotC PT100 Temp Channel 1

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 66. Preheat Control—P8.3, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								57 = SlotC PT100 Temp Channel 2
								58 = SlotC PT100 Temp Channel 3
								59 = SlotC Max PT100 Temp
								60 = SlotD PT100 Temp Channel 1
								61 = SlotD PT100 Temp Channel 2
P8.3.2	Preheat Control Source				31	2160	②	62 = SlotD PT100 Temp Channel 3
								63 = SlotD Max PT100 Temp
								64 = Four Slots Max PT100 Temp
P8.3.3	Preheat Enter Temp	-20.0	20.0	Deg. C	10.0	2161		
P8.3.4	Preheat Quit Temp	-10.0	40.0	Deg. C	20.0	2162		

Table 67. Motor data—P8.10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.10.1	Motor Type Selection				0	1820	①②	See Par ID 1820
P8.10.2	Motor Nom Current	DriveNomCurr CT*1/10	DriveNomCurr CT*2	A	DriveNomCurrCT	486	①	
P8.10.3	Motor Nom Speed	1	24000	rpm	MotorNomSpeedMFG	489	①	
P8.10.4	Motor PF	0.30	1.00		0.85	490	①	
P8.10.5	Motor Nom Voltage	180	690	V	MotorNomVoltMFG	487	①	
P8.10.6	Motor Nom Frequency	8.00	400.00	Hz	MotorNomFreqMFG	488	①	
								0 = No Action
								1 = Identification Only Stator Resistor
P8.10.8	Identification				0	299	②	2 = Identification with Run
								3 = Identification No Run
								4 = Identification Only Inertia
P8.10.9	Stator Resistor	0.001	65.535	ohm	0.001	771	①	
P8.10.10	Rotor Resistor	0.001	65.535	ohm	0.034	772	①	
P8.10.11	Leak Inductance	0.01	655.35	mh	0.12	773	①	
P8.10.14	Mutual Inductance	0.1	6553.5	mh	3.4	774	①	
P8.10.15	Excitation Current	0.0	DriveNomCurr CT*2	A	0.0	775	①	
P8.10.16	PM BEMF Voltage	0.0	6553.5	V	0.1	1882	①	
P8.10.17	PM q-axis stator inductance	0.00	655.35	mh	0.01	1883	①	
P8.10.18	PM d-axis stator inductance	0.00	655.35	mh	0.01	1884	①	
P8.10.19	Motor Inertia	0.001	65.535		0.038	2837	①	
P8.10.20	Observer Kp	1	3000	%	100	2901		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 68. Motor 2 data—P8.11.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.11.1	Motor 2 Type Selection				0	3276	①	See Par ID 1820
P8.11.2	Motor Nom Current 2	DriveNomCurrCT*1/10	DriveNomCurrCT*2	A	DriveNomCurrCT	577	①	
P8.11.3	Motor Nom Speed 2	1	20000	rpm	SecdMotorNomSpeedMFG	578	①	
P8.11.4	Motor PF 2	0.30	1.00		0.85	579	①	
P8.11.5	Motor Nom Volt 2	180	690	V	SecdMotorNomVoltMFG	580	①	
P8.11.6	Motor Nom Freq 2	8.00	400.00	Hz	SecdMotorNomFreqMFG	581	①	
P8.11.9	Stator Resistor 2	0.001	65.535	ohm	0.033	1419	①	
P8.11.10	Rotor Resistor 2	0.001	65.535	ohm	0.034	1420	①	
P8.11.11	Leak Inductance 2	0.01	655.35	mh	0.12	1421	①	
P8.11.14	Mutual Inductance 2	0.1	6553.5	mh	3.4	1422	①	
P8.11.15	Excitation Current 2	0.0	DriveNomCurrCT*2	A	0.0	1423	①	
P8.11.16	Second PM BEMF Voltage	0.0	6553.5	V	0.1	2842	①	
P8.11.17	Second PM q-axis Stator Inductance	0.00	655.35	mh	0.01	2843	①	
P8.11.18	Second PM d-axis Stator Inductance	0.00	655.35	mh	0.01	2844	①	
P8.11.19	Motor Inertia2	0.001	65.535		0.100	2838	①	

Table 69. V/f control—P8.20.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.20.1	V/Hz Optimization				0	109	①	See Par ID 1679
P8.20.2	V/Hz Ratio				0	108	①	0 = Linear 1 = Squared 2 = Programmable 3 = Linear + Flux Optimization
P8.20.3	Field Weakening Point	8.00	400.00	Hz	FieldWeakPointMFG	289	①	
P8.20.4	Voltage At FWP	10.00	200.00	%	100.00	290	①	
P8.20.5	V/Hz Mid Frequency	0.00	See Par ID 289	Hz	VHzCurveMidFreqMFG	291	①	
P8.20.6	V/Hz Mid Voltage	0.00	100.00	%	100.00	292	①	
P8.20.7	Zero Frequency Voltage	0.00	40.00	%	0.00	293	①	
P8.20.8	OverVoltage Control				3	294	①	0 = Disabled 1 = REF + 8Hz 2 = Max Freq 3 = Max Freq + 8Hz
P8.20.9	Over Voltage Controller Reference	0	0	V	0	1874	①	
P8.20.10	Load Drooping	0.00	100.00	%	0.00	298		
P8.20.11	Droop Control Filter Time Constant	0	3000	ms	0	1630		
P8.20.12	Slip Compensation Coefficient	0	500	%	100	1664		
P8.20.13	V/F Stable Kd	0	3000	%	100	1656		
P8.20.14	V/F Stable Kq	0	3000	%	100	1657		
P8.20.15	Overmodulation Enable				0	2835	①	See Par ID 1679
P8.20.16	Pulse Off Frequency	10	35	%	30	1762	①	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 70. SVC control—P8.21.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.21.1	Speed Error Filter Time Constant	0	3000	ms	0	1591		
P8.21.2	Speed Control Kp0	0.0	1000.0	%	0.0	1593		
P8.21.3	Speed Control Ti0	0.0	3200.0	ms	0.0	1594		
P8.21.4	Speed Control F0	0.00	See Par ID 3948	Varies	5.00	3946		
P8.21.5	Speed Control F1	See Par ID 3946	See Par ID 289	Varies	10.00	3948		
P8.21.6	Speed Control Kp1	0.0	1000.0	%	0.0	1599		
P8.21.7	Speed Control Ti1	0.0	3200.0	ms	0.0	1600		
P8.21.8	Motoring Power Limit	0.0	300.0	%	300.0	1607		
P8.21.9	Generator Power Limit	0.0	300.0	%	300.0	1608		
P8.21.10	Flux Reference	0.0	500.0	%	100.0	1620		
P8.21.12	Neg Speed Limit	-400.00	See Par ID 1576	Varies	-400.00	1574	①	
P8.21.13	Pos Speed Limit	See Par ID 1574	400.00	Varies	400.00	1576	①	
P8.21.14	Frequency Ramp Out FilterTime Constant	0	3000	ms	0	1585		
P8.21.19	Acc Compensation Time Constant	0.0	1000.0	%	0.0	1611		
P8.21.20	Acc Compensation Filter Time Constant	0	3000	ms	0	1612		
P8.21.25	Speed Reg BW0	0.00	30.00	Hz	0.00	3962		
P8.21.26	Speed Reg BW1	0.00	30.00	Hz	0.00	3963		
P8.21.27	Id Kp0	10.0	1000.0	Varies	100.0	4000		
P8.21.28	Id Ti0	10.0	1000.0	Varies	100.0	4001		
P8.21.29	Iq Kp0	10.0	1000.0	Varies	100.0	4002		
P8.21.30	Iq Ti0	10.0	1000.0	Varies	100.0	4003		
P8.21.31	Id Kp1	10.0	1000.0	Varies	100.0	4004		
P8.21.32	Id Ti1	10.0	1000.0	Varies	100.0	4005		
P8.21.33	Iq Kp1	10.0	1000.0	Varies	100.0	4006		
P8.21.34	Iq Ti1	10.0	1000.0	Varies	100.0	4007		
P8.21.35	Current Control F0	0.00	180.00	Hz	5.00	4008		
P8.21.36	Current Control F1	0.00	330.00	Hz	10.00	4009		

Table 71. Torque control—P8.22.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.22.5	Startup Torque Selection				0	1631		0 = Not Used 1 = TorqueMemory 2 = Reserve 3 = StartupTorqueFWD/REV
P8.22.6	Motoring Torque Limit	0.0	300.0	%	300.0	1602		
P8.22.7	Generator Torque Limit	0.0	300.0	%	300.0	1603		
P8.22.8	Torque Limit Forward	0.0	300.0	%	300.0	1604		
P8.22.9	Torque Limit Reverse	0.0	300.0	%	300.0	1605		
P8.22.10	Torque Memory Start	-300.0	300.0	%	0.0	1632		
P8.22.11	Startup Torque Forward	-300.0	300.0	%	0.0	1633		
P8.22.12	Startup Torque Reverse	-300.0	300.0	%	0.0	1634		
P8.22.13	Startup Torque Actual			%		1635		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 71. Torque control—P8.22, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P8.22.14	Startup Torque Time	0	10000	ms	50	1667		
P8.22.15	Torque Limit	0.0	400.0	%	400.0	295		
P8.22.16	Pull Out Torque	0.0	1000.0	%	250.0	1606		
P8.22.17	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 Process Data Input 1
								9 = PID1 Control Output
								10 = PID2 Control Output
								11 = FB Torque Ref
								12 = High Freq Pulse Input 1
								13 = High Freq Pulse Input 2
P8.22.17	Torque Ref Select (cont.)				0	303		14 = Slot C: AI1
								15 = Slot D: AI1
P8.22.18	Torque Ref Max	-300.0	300.0	%	100.0	304		
P8.22.19	Torque Ref Min	-300.0	300.0	%	0.0	305		
P8.22.20	Torque Reference Filter TC	0	32000	ms	0	1640		
P8.22.21	Speed Limiter Mode				0	1666		0 = NegFreqMax ... PosFreqMax
								1 = -|FreqRampOut| ... +|FreqRampOut|
								2 = NegFreqMax ... FreqRampout(MIN)
								3 = FreqRampOut ... PosFreqMax(MAX)
								4 = FreqRampOut ± WindowPos/NegWidth
								5 = 0 ... FreqRampOut(pos or neg direction)
								6 = FreqRamp ± WindowPos/ Neg/PosOff/NegOff
P8.22.22	Window Pos Width	0.00	50.00	Varies	2.00	3950		
P8.22.23	Window Neg Width	0.00	50.00	Varies	2.00	3952		
P8.22.24	Window Pos Off Limit	0.00	See Par ID 3950	Varies	0.00	3954		
P8.22.25	Window Neg Off Limit	0.00	See Par ID 3952	Varies	0.00	3956		
P8.22.26	Stop State Magnetisation Time	0	32000	s	0	1684	①	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 72. PM control—P8.23.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Align
P8.23.1	PM Initial Selection				1	1890	①	1 = Six Pluse
								2 = HFI
P8.23.2	PM Initial Time	0.0	60.0	s	0.7	1891	①	
P8.23.3	PM Excited Current	0	200	%	20	1892	①	
P8.23.4	PM Excited Current Off Frequency	10.00	See Par ID 488	%	20.00	1893	①	

PID controller 1

Table 73. PID1 Control—P10.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.1.1	PID1 Control Enable				1	550	②	See Par ID 190
P10.1.2	PID1 Set Point Select				0	351	②	See Par ID 190

Table 74. PID1 settings—P10.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.2.1	PID1 Control Gain	0.00	200.00	%	100.00	1294		
P10.2.2	PID1 Control ITime	0.00	600.00	s	1.00	1295		
P10.2.3	PID1 Control DTime	0.00	100.00	s	0.00	1296		
								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
P10.2.4	PID1 Process Unit				0	1297	①	10 = kg/h
								11 = m3/s
								12 = m3/min
								13 = m3/h
								14 = m/s
								15 = mbar
								16 = bar
								17 = Pa
								18 = kPa
								19 = mVS
								20 = kW
								21 = Deg. C
								22 = GPM
								23 = gal/s

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 74. PID1 settings—P10.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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
P10.2.4	PID1 Process Unit				0	1297	①	34 = in wg
								35 = ft wg
								36 = PSI
								37 = lb/in2
								38 = HP
								39 = Deg. F
								40 = PA
								41 = WC
								42 = HG
								43 = ft
								44 = m
P10.2.5	PID1 Process Unit Min	-99999.99	See Par ID 1300	Varies	0.00	1298		
P10.2.6	PID1 Process Unit Max	See Par ID 1298	99999.99	Varies	100.00	1300		
P10.2.7	PID1 Process Unit Decimal	0	4		2	1302		
P10.2.8	PID1 Error Inversion				0	1303	①	See Par ID 181
P10.2.9	PID1 Dead Band	0.00	99999.99	Varies	0.00	1304		
P10.2.10	PID1 Dead Band Delay	0.00	320.00	s	0.00	1306		
P10.2.11	PID1 Ramp Time	0.00	300.00	s	0.00	1311		
P10.2.12	PID1 Output Min	-100.00	100.00	%	0.00	4013		
P10.2.13	PID1 Output Max	-100.00	100.00	%	100.00	4014		

Table 75. PID1 standard—P10.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.3.1	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307		
P10.3.2	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309		
								0 = Below Wake Up Level
								1 = Above Wake Up Level
P10.3.3	PID1 Wake Up Action				0	2466		2 = Below Wake Up Level(PID ref.)
								3 = Above Wake Up Level(PID ref.)
P10.3.4	PID1 Sleep Boost level	-9999	9999	Varies	0	2660		
P10.3.5	PID1 Sleep Boost Max Time	1	300	s	30	2661		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 76. PID1 setpoint1—P10.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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 Process Data Input 1
								8 = FB Process Data Input 2
								9 = FB Process Data Input 3
								10 = FB Process Data Input 4
								11 = FB Process Data Input 5
P10.4.1	PID1 Set Point 1 Source				1	1312	①②	12 = FB Process Data Input 6
								13 = FB Process Data Input 7
								14 = FB Process Data Input 8
								15 = PID2 Output
								16 = Multi Drive Network
								17 = FB PID1 Set Point 1
								18 = FB PID1 Set Point 2
								19 = High Freq Pulse Input 1
								20 = High Freq Pulse Input 2
								21 = Slot C: AI1
								22 = Slot D: AI1
								23 = Preset Speed Ref
								24 = Ellen Reference
P10.4.2	PID1 Set Point 1 Sleep Enable				0	1315	①	See Par ID 3970
P10.4.3	PID1 Set Point 1 Sleep Delay	0	3000	s	0	1317		
P10.4.4	PID1 Set Point 1 Wake Up Level	-99999.99	99999.99	Varies	0.00	1318		
P10.4.5	PID1 Set Point 1 Boost	-2.0	2.0		1.0	1320		
P10.4.6	PID1 Set Point 1 Sleep Level			Varies	0.00	2450		
P10.4.9	PID1 Set Point 1 Min	-200.00	200.00	%	0.00	1313		
P10.4.10	PID1 Set Point 1 Max	-200.00	200.00	%	100.00	1314		
								0 = Output Frequency
P10.4.11	PID1 Set Point 1 Sleep Unit Sel				0	2396	①	1 = Motor Speed
								2 = Motor Current
								3 = PID1 Feedback
P10.4.12	PID1 Set Point 1 Comp Enable				0	1352		See Par ID 3970
P10.4.13	PID1 Set Point 1 Comp Max	-200.00	200.00	%	0.00	1353		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 77. PID1 setpoint2—P10.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.5.1	PID1 Set Point 2 Source				2	1321	①②	See Par ID 1312
P10.5.2	PID1 Set Point 2 Sleep Enable				0	1324	①	See Par ID 3970
P10.5.3	PID1 Set Point 2 Sleep Delay	0	3000	s	0	1326		
P10.5.4	PID1 Set Point 2 Wake Up Level	-99999.99	99999.99	Varies	0.00	1327		
P10.5.5	PID1 Set Point 2 Boost	-2.0	2.0		1.0	1329		
P10.5.6	PID1 Set Point 2 Sleep Level			Varies	0.00	2452		
P10.5.9	PID1 Set Point 2 Min	-200.00	200.00	%	0.00	1322		
P10.5.10	PID1 Set Point 2 Max	-200.00	200.00	%	100.00	1323		
P10.5.11	PID1 Set Point 2 Sleep Unit Sel				0	2397	①	See Par ID 2396
P10.5.12	PID1 Set Point 2 Comp Enable				0	1354		See Par ID 3970
P10.5.13	PID1 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1355		

Table 78. FB PID1—P10.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.6.1	FB PID1 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2542		
P10.6.2	FB PID1 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2544		
P10.6.3	FB PID1 Feedback 1			%		2550		
P10.6.4	FB PID1 Feedback 2			%		2551		
P10.6.5	FB PID1 Feedforward 1			%		2554		
P10.6.6	FB PID1 Feedforward 2			%		2555		

Table 79. PID1 feedback 1—P10.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.7.1	PID1 Feedback Gain	-1000.0	1000.0	%	100.0	1331		
P10.7.2	PID1 Feedback Function				0	1330	①	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) 9 = Source1*Source2
P10.7.3	PID1 Low Feedback Level	0.0	6000.0	Varies	0.0	2811		
P10.7.4	PID1 Low Feedback Time	0	3600	s	10	2812		
P10.7.5	PID1 Low Feedback Protection				0	2813	①	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast
P10.7.6	PID1 High Feedback Level	0.0	6000.0	Varies	150.0	2814		
P10.7.7	PID1 High Feedback Time	0	3600	s	5	2815		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 79. PID1 feedback 1—P10.7, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.7.8	PID1 High Feedback Protection				0	2816	①	See Par ID 2813
P10.7.9	PID1 Hysteresis Level	0.0	100.0	Varies	0.0	2817	①	
P10.7.10	PID1 Backup Feedback Source				0	2825		0 = Not Used
								1 = AI1
								2 = AI2
								3 = Slot A: AI1
								4 = Slot B: AI1

Table 80. PID1 feedback 2—P10.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.8.1	PID1 Feedback 1 Source				2	1332	①②	0 = Not Used
								1 = AI1
								2 = AI2
								3 = Slot A: AI1
								4 = Slot B: AI1
								5 = FB Process Data Input 1
								6 = FB Process Data Input 2
								7 = FB Process Data Input 3
								8 = FB Process Data Input 4
								9 = FB Process Data Input 5
								10 = FB Process Data Input 6
								11 = FB Process Data Input 7
								12 = FB Process Data Input 8
								13 = PT100_TEMPERTURE,PT100 Temperture
								14 = PID2 Output
								15 = SlotA PT100 Temp Channel 1
								16 = SlotA PT100 Temp Channel 2
								17 = SlotA PT100 Temp Channel 3
								18 = SlotB PT100 Temp Channel 1
								19 = SlotB PT100 Temp Channel 2
								20 = SlotB PT100 Temp Channel 3
								21 = FB PID1 Feedback 1
								22 = FB PID1 Feedback 2
								23 = High Freq Pulse Input 1
								24 = High Freq Pulse Input 2
								25 = Slot C: AI1
								26 = Slot D: AI1
								27 = SlotC PT100 Temp Channel 1
								28 = SlotC PT100 Temp Channel 2
								29 = SlotC PT100 Temp Channel 3
								30 = SlotD PT100 Temp Channel 1
								31 = SlotD PT100 Temp Channel 2
								32 = SlotD PT100 Temp Channel 3
P10.8.2	PID1 Feedback 1 Min	-200.00	200.00	%	0.00	1333		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 80. PID1 feedback 2—P10.8, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.8.3	PID1 Feedback 1 Max	-200.00	200.00	%	100.00	1334		
P10.8.4	PID1 Feedback 2 Source				0	1335	①②	See Par ID 1332
P10.8.5	PID1 Feedback 2 Min	-200.00	200.00	%	0.00	1336		
P10.8.6	PID1 Feedback 2 Max	-200.00	200.00	%	100.00	1337		

Table 81. PID1 feedforward—P10.9.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P10.9.1	PID1 Feedforward Func				0	1338	①	See Par ID 1330
P10.9.2	PID1 Feedforward Gain	-1000.0	1000.0	%	100.0	1339		
P10.9.3	PID1 Feedforward 1 Source				0	1340	①②	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID2 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID1 Feedforward 1 22 = FB PID1 Feedforward 2 23 = Slot C: AI1 24 = Slot D: AI1 25 = SlotC PT100 Temp Channel 1 26 = SlotC PT100 Temp Channel 2 27 = SlotC PT100 Temp Channel 3 28 = SlotD PT100 Temp Channel 1 29 = SlotD PT100 Temp Channel 2 30 = SlotD PT100 Temp Channel 3
P10.9.4	PID1 Feedforward 1 Min	-200.00	200.00	%	0.00	1341		
P10.9.5	PID1 Feedforward 1 Max	-200.00	200.00	%	100.00	1342		
P10.9.6	PID1 Feedforward 2 Source				0	1343	①②	See Par ID 1340
P10.9.7	PID1 Feedforward 2 Min	-200.00	200.00	%	0.00	1344		
P10.9.8	PID1 Feedforward 2 Max	-200.00	200.00	%	100.00	1345		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

PID controller 2

Table 82. PID2 control—P11.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.1.1	PID2 Control Enable				1	553	②	See Par ID 190
P11.1.2	PID2 Set Point Select				0	352	②	See Par ID 190

Table 83. PID2 settings—P11.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.2.1	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		
P11.2.3	PID2 Control D Time	0.00	100.00	s	0.00	1358		
P11.2.4	PID2 Process Unit				0	1359	①	See Par ID 1297
P11.2.5	PID2 Process Unit Min	-99999.99	See Par ID 1362	Varies	0.00	1360		
P11.2.6	PID2 Process Unit Max	See Par ID 1360	99999.99	Varies	100.00	1362		
P11.2.7	PID2 Process Unit Decimal	0	4		2	1364		
P11.2.8	PID2 Error Inversion				0	1365	①	See Par ID 181
P11.2.9	PID2 Dead Band	0.00	99999.99	Varies	0.00	1366		
P11.2.10	PID2 Dead Band Delay	0.00	320.00	s	0.00	1368		
P11.2.11	PID2 Ramp Time	0.00	300.00	s	0.00	1373		
P11.2.12	PID2 Output Min	-100.00	100.00	%	0.00	4015		
P11.2.13	PID2 Output Max	-100.00	100.00	%	100.00	4016		

Table 84. PID2 standard—P11.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.3.1	PID2 Keypad Set Point 1	See Par ID 1360	See Par ID 1362	Varies	0.00	1369		
P11.3.2	PID2 Keypad Set Point 2	See Par ID 1360	See Par ID 1362	Varies	0.00	1371		
P11.3.3	PID2 Wake Up Action				0	2467		See Par ID 2466
P11.3.4	PID2 Sleep Boost level	-9999	9999	Varies	0	2662		
P11.3.5	PID2 Sleep Boost Max Time	1	300	s	30	2663		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 85. PID2 setpoint1—P11.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Not Used
								1 = PID2 Keypad Set Point 1
								2 = PID2 Keypad Set Point 2
								3 = AI1
								4 = AI2
								5 = Slot A: AI1
								6 = Slot B: AI1
								7 = FB Process Data Input 1
								8 = FB Process Data Input 2
								9 = FB Process Data Input 3
								10 = FB Process Data Input 4
								11 = FB Process Data Input 5
P11.4.1	PID2 Set Point 1 Source				1	1374	①	12 = FB Process Data Input 6
								13 = FB Process Data Input 7
								14 = FB Process Data Input 8
								15 = PID1 Output
								16 = Multi Drive Network
								17 = FB PID2 Set Point 1
								18 = FB PID2 Set Point 2
								19 = High Freq Pulse Input 1
								20 = High Freq Pulse Input 2
								21 = Slot C: AI1
								22 = Slot D: AI1
								23 = Preset Speed Ref
								24 = Ellen Reference
P11.4.2	PID2 Set Point 1 Sleep Enable				0	1377	①	See Par ID 3970
P11.4.3	PID2 Set Point 1 Sleep Delay	0	3000	s	0	1379		
P11.4.4	PID2 Set Point 1 WakeUp Level	-99999.99	99999.99	Varies	0.00	1380		
P11.4.5	PID2 Set Point 1 Boost	-2.0	2.0		1.0	1382		
P11.4.6	PID2 Set Point 1 Sleep Level			Varies	0.00	2454		
P11.4.9	PID2 Set Point 1 Min	-200.00	200.00	%	0.00	1375		
P11.4.10	PID2 Set Point 1 Max	-200.00	200.00	%	100.00	1376		
								0 = Output Frequency
P11.4.11	PID2 Set Point 1 Sleep Unit Sel				0	2398	①	1 = Motor Speed
								2 = Motor Current
								3 = PID2 Feedback
P11.4.12	PID2 Set Point 2 Comp Enable				0	1416		See Par ID 3970
P11.4.13	PID2 Set Point 2 Comp Max	-200.00	200.00	%	0.00	1417		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 86. PID2 setpoint2—P11.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.5.1	PID2 Set Point 2 Source				2	1383	①	See Par ID 1374
P11.5.2	PID2 Set Point 2 Sleep Enable				0	1386	①	See Par ID 3970
P11.5.3	PID2 Set Point 2 Sleep Delay	0	3000	s	0	1388		
P11.5.4	PID2 Set Point 2 WakeUp Level	-99999.99	99999.99	Varies	0.00	1389		
P11.5.5	PID2 Set Point 2 Boost	-2.0	2.0		1.0	1391		
P11.5.6	PID2 Set Point 2 Sleep Level			Varies	0.00	2456		
P11.5.9	PID2 Set Point 2 Min	-200.00	200.00	%	0.00	1384		
P11.5.10	PID2 Set Point 2 Max	-200.00	200.00	%	100.00	1385		
P11.5.11	PID2 Set Point 2 Sleep Unit Sel				0	2399	①	See Par ID 2398
P11.5.12	PID2 Set Point1 Comp Enable				0	1414		See Par ID 3970
P11.5.13	PID2 Set Point1 Comp Max	-200.00	200.00	%	0.00	1415		

Table 87. FB PID2—P11.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.6.1	FB PID2 Set Point 1	See Par ID 1298	See Par ID 1300	Varies		2546		
P11.6.2	FB PID2 Set Point 2	See Par ID 1298	See Par ID 1300	Varies		2548		
P11.6.3	FB PID2 Feedback 1			%		2552		
P11.6.4	FB PID2 Feedback 2			%		2553		
P11.6.5	FB PID2 Feedforward 1			%		2556		
P11.6.6	FB PID2 Feedforward 2			%		2557		

Table 88. PID2 feedback 1—P11.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.7.1	PID2 Feedback Gain	-1000.0	1000.0	%	100.0	1393		
P11.7.2	PID2 Feedback Func				0	1392	①	See Par ID 1330
P11.7.3	PID2 Low Feedback Level	0.0	6000.0	Varies	0.0	2818		
P11.7.4	PID2 Low Feedback Time	0	3600	s	10	2819		
P11.7.5	PID2 Low Feedback Protection				0	2820	①	See Par ID 2813
P11.7.6	PID2 High Feedback Level	0.0	6000.0	Varies	150.0	2821		
P11.7.7	PID2 High Feedback Time	0	3600	s	5	2822		
P11.7.8	PID2 High Feedback Protection				0	2823	①	See Par ID 2813
P11.7.9	PID2 Hysteresis Level	0.0	100.0	Varies	0.0	2824	①	
P11.7.10	PID2 Backup Feedback Source				0	2826		See Par ID 2825

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 89. PID2 feedback 2—P11.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Not Used
								1 = AI1
								2 = AI2
								3 = Slot A: AI1
								4 = Slot B: AI1
								5 = FB Process Data Input 1
								6 = FB Process Data Input 2
								7 = FB Process Data Input 3
								8 = FB Process Data Input 4
								9 = FB Process Data Input 5
								10 = FB Process Data Input 6
								11 = FB Process Data Input 7
								12 = FB Process Data Input 8
								13 = PT100 Temperture
								14 = PID1 Output
								15 = SlotA PT100 Temp Channel 1
P11.8.1	PID2 Feedback 1 Source				2	1394	①	16 = SlotA PT100 Temp Channel 2
								17 = SlotA PT100 Temp Channel 3
								18 = SlotB PT100 Temp Channel 1
								19 = SlotB PT100 Temp Channel 2
								20 = SlotB PT100 Temp Channel 3
								21 = FB PID2 Feedback 1
								22 = FB PID2 Feedback 2
								23 = High Freq Pulse Input 1
								24 = High Freq Pulse Input 2
								25 = Slot C: AI1
								26 = Slot D: AI1
								27 = SlotC PT100 Temp Channel 1
								28 = SlotC PT100 Temp Channel 2
								29 = SlotC PT100 Temp Channel 3
								30 = SlotD PT100 Temp Channel 1
								31 = SlotD PT100 Temp Channel 2
								32 = SlotD PT100 Temp Channel 3
P11.8.2	PID2 Feedback 1 Min	-200.00	200.00	%	0.00	1395		
P11.8.3	PID2 Feedback 1 Max	-200.00	200.00	%	100.00	1396		
P11.8.4	PID2 Feedback 2 Source				0	1397	①	See Par ID 1394
P11.8.5	PID2 Feedback 2 Min	-200.00	200.00	%	0.00	1398		
P11.8.6	PID2 Feedback 2 Max	-200.00	200.00	%	100.00	1399		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 90. PID2 feedforward—P11.9.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P11.9.1	PID2 Feedforward Func				0	1400	①	See Par ID 1330
P11.9.2	PID2 Feedforward Gain	-1000.0	1000.0	%	100.0	1401		
P11.9.3	PID2 Feedforward 1 Source				0	1402	①	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5 10 = FB Process Data Input 6 11 = FB Process Data Input 7 12 = FB Process Data Input 8 13 = PT100 Temperture 14 = PID1 Output 15 = SlotA PT100 Temp Channel 1 16 = SlotA PT100 Temp Channel 2 17 = SlotA PT100 Temp Channel 3 18 = SlotB PT100 Temp Channel 1 19 = SlotB PT100 Temp Channel 2 20 = SlotB PT100 Temp Channel 3 21 = FB PID2 Feedforward 1 22 = FB PID2 Feedforward 2 23 = Slot C: AI1 24 = Slot D: AI1 25 = SlotC PT100 Temp Channel 1 26 = SlotC PT100 Temp Channel 2 27 = SlotC PT100 Temp Channel 3 28 = SlotD PT100 Temp Channel 1 29 = SlotD PT100 Temp Channel 2 30 = SlotD PT100 Temp Channel 3
P11.9.4	PID2 Feedforward 1 Min	-200.00	200.00	%	0.00	1403		
P11.9.5	PID2 Feedforward 1 Max	-200.00	200.00	%	100.00	1404		
P11.9.6	PID2 Feedforward 2 Source				0	1405	①	0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = FB Process Data Input 1 6 = FB Process Data Input 2 7 = FB Process Data Input 3 8 = FB Process Data Input 4 9 = FB Process Data Input 5

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 90. PID2 feedforward—P11.9, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								10 = FB Process Data Input 6
								11 = FB Process Data Input 7
								12 = FB Process Data Input 8
								13 = PID1 Output
								14 = SlotA PT100 Temp Channel 1
								15 = SlotA PT100 Temp Channel 2
								16 = SlotA PT100 Temp Channel 3
								17 = SlotB PT100 Temp Channel 1
P11.9.6 (cont.)	PID2 Feedforward 2 Source				0	1405	①	18 = SlotB PT100 Temp Channel 2
								19 = SlotB PT100 Temp Channel 3
								20 = FB PID2 Feedforward 1
								21 = FB PID2 Feedforward 2
								22 = Slot C: AI1
								23 = Slot D: AI1
								24 = SlotC PT100 Temp Channel 1
								25 = SlotC PT100 Temp Channel 2
								26 = SlotC PT100 Temp Channel 3
								27 = SlotD PT100 Temp Channel 1
								28 = SlotD PT100 Temp Channel 2
								29 = SlotD PT100 Temp Channel 3
P11.9.7	PID2 Feedforward 2 Min	-200.00	200.00	%	0.00	1406		
P11.9.8	PID2 Feedforward 2 Max	-200.00	200.00	%	100.00	1407		

Table 91. Master follower—P14.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Off
P14.1	Master Follower Mode				0	3506	①	1 = Master
								2 = Follower
								0 = Speed Synchronization
P14.2	Synchronization Mode				0	3510	①	1 = Torque Synchronization
								0 = Off
P14.3	Communication Link				1	3511		1 = Fiber Optic Serial
								0 = No Action
P14.4	Speed Ratio Refresh Mode				2	3509		1 = Digital Input
								2 = Continuous Change
P14.5	Speed Ratio Refresh Source				0	3513	②	See Par ID 190
P14.6	Speed Error Response				0	3514		See Par ID 2813
P14.7	Speed Error Limit	0.0	100.0	%	5.0	3512		
P14.8	Speed Fault Delay	0.0	100.0	s	0.1	3515		
P14.9	Torque Ratio				1.000	3516		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 91. Master follower—P14, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P14.10	Follower Incoming Reference				5	3517		0 = Analog Input 1 1 = Analog Input 2 2 = Fieldbus Reference 3 = SlotA:Encoder 1 4 = SlotA:Encoder 2 5 = Master Reference 6 = High Freq. DI
P14.11	Follower Start Delay	0.0	3600.0	s	0.0	3518		
P14.12	Follower Stop Delay	0.0	3600.0	s	0.0	3519		
P14.13	Master Outgoing Reference				2	3520		0 = Analog Input 1 1 = Analog Input 2 2 = Master Reference 3 = Master Ramp Out 4 = SlotA:Encoder 1 5 = SlotA:Encoder 2
P14.14	M/F COMM T-OUT	5	60000	ms	100	3521		
P14.15	M/F COMM Fault Response				2	3522		See Par ID 2813
P14.16	Follower Error Response				2	3523		See Par ID 2813
P14.17	Supervision Response				0	3524		See Par ID 2813
P14.18	Limit Reached Response				0	3525		See Par ID 2813
P14.19	Follower Stop Mode				2	3526		0 = Coasting 1 = Ramp 2 = As Master
P14.20	Speed Ratio				1	3536		
P14.21	Speed Multiplier				1.000	3538		
P14.22	Speed Ratio Ramp Time	0	1000000	ms	10	3539		

Table 92. Jog function–P15.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P15.1	Jog Enable				0	199	②	See Par ID 190
P15.2	Jog Direction				0	3527		0 = Forward 1 = Reverse
P15.3	Jog 1 Start Source				0	3528	②	See Par ID 190
P15.4	Jog1/Inch1 Ref	See Par ID 3916	400.00	Varies	MaxFreqMFG	3958		
P15.5	Jog1/Inch1 Acc time	0.0	3000.0	s	3.0	3530		
P15.6	Jog1/Inch1 Dec time	0.0	3000.0	s	3.0	3531		
P15.7	Jog 2 Start Source				0	3532	②	See Par ID 190
P15.8	Jog2/Inch2 Ref	See Par ID 3916	400.00	Varies	MaxFreqMFG	3960		
P15.9	Jog2/Inch2 Acc time	0.0	3000.0	s	3.0	3534		
P15.10	Jog2/Inch2 Dec time	0.0	3000.0	s	3.0	3535		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 93. Inch function—P16.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P16.1	Inch Enable				0	3768	②	See Par ID 190
P16.2	Inch Direction				0	3769		See Par ID 3527
P16.3	Inch 1 Start Source				0	3770	②	See Par ID 190
P16.4	Inch 2 Start Source				0	3771	②	See Par ID 190

Bypass

Table 94. Bypass control—P22.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P22.1.1	Force Bypass				0	218	②	See Par ID 190
P22.1.2	Bypass Overload				0	1246	②	See Par ID 190
P22.1.3	Bypass Enable				0	1418	①	See Par ID 3970
P22.1.4	Bypass Start Delay	1	32765	s	5	544	①	

Table 95. Bypass settings—P22.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P22.2.1	Auto Bypass				0	542	①	See Par ID 3970
P22.2.2	Auto Bypass Delay	0	32765	s	10	543	①	
P22.2.3	OverCurrent Bypass Enable				0	547	①	See Par ID 3970
P22.2.4	IGBT Fault Bypas Enable				0	546	①	See Par ID 3970
P22.2.5	4mA Fault Bypass Enable				0	548	①	See Par ID 3970
P22.2.6	UnderVoltage Bypass Enable				0	545	①	See Par ID 3970
P22.2.7	OverVoltage Bypass Enable				0	549	①	See Par ID 3970
P22.2.8	Motor OverTemp Bypass Enable				0	1698	①	See Par ID 3970
P22.2.9	UnderLoad Bypass Enable				0	1699	①	See Par ID 3970
P22.2.10	External Bypass Enable				0	1700	①	See Par ID 3970
P22.2.11	Charge Switch Fault Bypass Enable				0	1701	①	See Par ID 3970
P22.2.12	Saturation Trip Fault Bypass Enable				0	1702	①	See Par ID 3970
P22.2.13	Under Temp Fault Bypass Enable				0	1703	①	See Par ID 3970
P22.2.14	EEPROM Fault Bypass Enable				0	1704	①	See Par ID 3970
P22.2.15	Control Board EEPROM Fault Bypass Enable				0	1705	①	See Par ID 3970
P22.2.16	Watchdog Fault Bypass Enable				0	1706	①	See Par ID 3970
P22.2.17	Fan Cooling Fault Bypass Enable				0	1707	①	See Par ID 3970
P22.2.18	Keypad Com Fault Bypass Enable				0	1708	①	See Par ID 3970
P22.2.19	Option Card Fault Bypass Enable				0	1709	①	See Par ID 3970
P22.2.20	RTC Clock Fault Bypass Enable				0	1710	①	See Par ID 3970
P22.2.21	Ctrl Board OverTemp Fault Bypass Enable				0	1711	①	See Par ID 3970
P22.2.22	Fieldbus Fault Bypass Enable				0	1713	①	See Par ID 3970
P22.2.23	Op Cont Interlock Fault Bypass Enable				0	2832	①	See Par ID 3970

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Brake

Table 96. Brake chopper—P23.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P23.1.1	Brake Chopper Enable				0	1829	①	0 = Disabled 1 = Enable
P23.1.2	Brake Chopper Mode				0	251	①	0 = Disabled 1 = B(Run) T(Rdy) 2 = External 3 = B(Rdy) T(Rdy) 4 = B(Run) T(No)
P23.1.3	Brake Chopper Status					646		See Par ID 3972
P23.1.4	Brake Resistor Status					647		See Par ID 3972
P23.1.5	DC-Brake Current	DriveNomCurr CT*15/100	DriveNomCurr CT*15/10	A	DriveNomCurrCT*1/2	254	①	
P23.1.6	Start DC-Brake Time	0.00	600.00	s	0.00	263	①	
P23.1.7	Stop DC-Brake Frequency	0.10	10.00	Hz	1.50	262	①	
P23.1.8	Stop DC-Brake Time	0.00	600.00	s	0.00	255	①	
P23.1.9	Flux Brake				0	266	①	0 = Off 1 = On
P23.1.10	Flux Brake Current	ActiveMotorNom Curr*1/10	See Par ID 107	A	ActiveMotorNomCurr *1/2	265	①	

Table 97. DC-brake—P23.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P23.2.1	DC Brake Active				0	202	②	See Par ID 190

Table 98. Ext. brake—P24.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P24.1	Ext Brake Off Delay	0.0	100.0	s	0.5	163		
P24.2	Ext Brake On Delay	0.0	100.0	s	1.5	164		

Table 99. Fault functions—P25.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P25.1.1	Ext. Fault 1 NC				1	193	②	See Par ID 190
P25.1.2	Ext. Fault 1 NO				4	192	②	See Par ID 190
P25.1.3	Ext. Fault 2 NC				1	2294	②	See Par ID 190
P25.1.4	Ext. Fault 2 NO				0	2293	②	See Par ID 190
P25.1.5	Ext. Fault 3 NC				1	2296	②	See Par ID 190
P25.1.6	Ext. Fault 3 NO				0	2295	②	See Par ID 190

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 100. External fault text—P25.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P25.2.1	Ext. Fault 1 Text				0	2297		0 = External Fault 1 = Vibration Cut out 2 = High Motor temp 3 = Low Pressure 4 = High Pressure 5 = Low Water 6 = Damper Interlock 7 = Run Enable 8 = Freeeze Stat Trip 10 = Seal Leakage 11 = Rod Breakage 12 = Torque Limit
P25.2.2	Ext. Fault 2 Text				1	2298		See Par ID 2297
P25.2.3	Ext. Fault 3 Text				2	2299		See Par ID 2297

Protections

Table 101. Drive protections—P26.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.1.1	Line Start Lockout				2	750		0 = Disabled, No Change 1 = Enable, No Change 2 = Disabled, Changed 3 = Enable, Changed
P26.1.2	Input Phase Fault				2	332	①	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Single Phase Power Limit
P26.1.3	4mA Input Fault				0	306	①	0 = No Action 1 = Warning 2 = Warning: Previous Freq 3 = Warning: Preset Freq 4 = Fault 5 = Fault, Coast
P26.1.4	4mA Fault Frequency	0.00	See Par ID 3918	Hz	0.00	331	①	
P26.1.5	External Fault				2	307	①	See Par ID 2813
P26.1.6	Under Voltage Trip Level	DCLinkUnderVolt StopLimit	DCLinkOverVolt StopLimit	V	DCLinkUnderVolt ProtectLimit	2666		
P26.1.7	Uvolt Fault Response				2	330	①	See Par ID 2813
P26.1.8	Unit Under Temp Prot				2	1564	①	See Par ID 2813
P26.1.9	Safe Torque Off Response				2	2427		0 = No Indication 1 = Warning 2 = Fault

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 101. Drive protections—P26.1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.1.10	OverVoltage Controller Response				0	1840	①	0 = No Action 1 = Warning, No Store 2 = Warning, Store
P26.1.11	OverCurrent Controller Response				0	1841	①	See Par ID 1840
P26.1.12	Under Temp Fault Override					2130		See Par ID 3972
P26.1.13	RTC Fault				1	955	①	See Par ID 2813
P26.1.14	PT100 Fault Response				2	337	①	See Par ID 2813
P26.1.15	Replace Battery Fault Response				1	1256	①	See Par ID 2813
P26.1.16	Replace Fan Fault Response				1	1257	①	See Par ID 2813
P26.1.17	Preheat Output Volt	0.0	20.0	%	2.0	2163		
P26.1.18	Warning Operation Mode				1	2657		0 = No Action 1 = Warning, No Store 2 = Warning, Store
P26.1.19	Fan Protection				2	2664		See Par ID 2813
P26.1.20	AI-Fault Protection				0	4018	①	See Par ID 306
P26.1.21	AI Fault Frequency	0.00	See Par ID 3918	Hz	0.00	3841	①	
P26.1.22	CP Interlock NC				1	2894		See Par ID 190
P26.1.23	CP Interlock Run Protection				2	2895	①	See Par ID 2813
P26.1.24	CP Interlock Stop Protection				1	2896	①	0 = No Action 1 = Warning, No Store
P26.1.25	CP Interlock Attempts	0	10		1	2897		

Table 102. Motor protections—P26.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.2.1	Output Phase Fault				2	308	①	See Par ID 2813
P26.2.2	Ground Fault				2	309	①	See Par ID 2813
P26.2.3	Ground Fault Limit	0	30	%	15	2158		
P26.2.4	Motor Thermal Protection				2	310	①	See Par ID 2813
P26.2.5	Motor Thermal F0 Current	0.0	150.0	%	100.0	311		
P26.2.8	Thermistor Fault Response				2	333	①	See Par ID 2813
P26.2.9	Stall Protection				0	313	①	See Par ID 2813
P26.2.10	Stall Current Limit	0.1	ActiveMotorNom Curr*2	A	ActiveMotorNom Curr*13/10	314		
P26.2.11	Stall Time Limit	1.0	120.0	s	15.0	315		
P26.2.12	Stall Frequency Limit	1.00	See Par ID 3918	Hz	25.00	316		
P26.2.13	Underload Protection				0	317	①	See Par ID 2813
P26.2.14	Underload Fnom Torque	10.0	150.0	%	50.0	318		
P26.2.15	Underload F0 Torque	5.0	150.0	%	10.0	319		
P26.2.16	Underload Time Limit	2.00	600.00	s	20.00	320		
P26.2.17	Thermistor Check Enable				0	3965	①	See Par ID 3970

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 103. COM protections—P26.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.3.1	Fieldbus Fault Response				1	334	①	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1
P26.3.2	OPTCard Fault Response				2	335	①	See Par ID 2813
P26.3.3	IP Address Confliction Resp				1	1678	①	See Par ID 2813
P26.3.4	Card Plug Slot Error Fault Protection				2	4017	①	See Par ID 2813

Table 104. PID1 protections—P26.10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.10.1	PID Feedback AI Loss Attempts	0	10		1	2405		
P26.10.2	PID Feedback AI Loss Response				0	2401	①	0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Freq 4 = Warning: Analog->Net
P26.10.3	PID Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	2402	①	
P26.10.4	PID Feedback AI Loss Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2403		
P26.10.5	PID Feedback AI Loss PreFreq Timeout	0	6000	s	0	2404		

Table 105. PID2 protections—P26.12.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.12.1	PID2 Feedback AI Loss Attempts	0	10		1	3281		
P26.12.2	PID2 Feedback AI Loss Response				0	3277	①	See Par ID 2401
P26.12.3	PID2 Feedback AI Loss Pre Freq	0.00	400.00	Hz	0.00	3278	①	
P26.12.4	PID2 Feedback AI Loss Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	3279		
P26.12.5	PID2 Feedback AI Loss PreFreq Timeout	0	6000	s	0	3280		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 106. Prime pump protections—P26.20.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.20.1	Prime Pump Enable				0	2428		See Par ID 190
P26.20.2	Prime Pump Level	0.00	6000.00	Varies	0.00	2429		
P26.20.3	Prime Pump Frequency	See Par ID 3916	See Par ID 3918	Hz	0.00	2431		
P26.20.4	Prime Pump Delay Time	0.0	3600.0	min	0.0	2432		
P26.20.5	Prime Pump Loss Of Prime Level	0.0	1000.0	Varies	0.0	2433		
P26.20.6	Prime Pump Level 2	0.00	6000.00	Varies	0.00	2434		
P26.20.7	Prime Pump Frequency 2	See Par ID 3916	See Par ID 3918	Hz	0.00	2436		
P26.20.8	Prime Pump Delay Time 2	0.0	3600.0	min	0.0	2437		
P26.20.9	Prime Pump Loss Of Prime Level 2	0.0	1000.0	Varies	0.0	2438		

Table 107. Pipe fill loss protection—P26.21.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P26.21.1	Pipe Fill Loss Response				0	2410	①	See Par ID 3851
P26.21.2	Pipe Fill Loss Detection Method				0	2406	①	0 = Motor Current 1 = Motor Power 2 = Motor Torque
P26.21.4	Pipe Fill Loss Frequency	0.00	See Par ID 3918	Hz	0.00	2409	①	
P26.21.7	Pipe Fill Loss Time	0	600	s	0	2408		
P26.21.8	Pipe Fill Loss Attempts	0	10		1	2411		

Supervisions

Table 108. AI supervision—P27.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P27.1.1	AI Supv Select				0	170		0 = AI1 1 = AI2
P27.1.2	AI Limit Supv				0	171		0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv
P27.1.4	AI Limit Supv Val	0.00	100.00	%	0.00	172		
P27.1.5	AI Supv Hyst	1.00	10.00	%	1.00	2198		
P27.1.6	Second AI Supv Select				0	2193		See Par ID 170
P27.1.7	Second AI Limit Supv				0	2194		See Par ID 171
P27.1.9	Second AI Limit Supv Val	0.00	100.00	%	0.00	2195		
P27.1.10	Second AI Supv Hyst	1.00	10.00	%	1.00	2199		

Table 109. Device supervision—P27.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P27.7.1	Temp Limit Supv				0	165		See Par ID 171
P27.7.3	Temp Limit Supv Val	-10.0	75.0	Deg. C	40.0	166		
P27.7.4	Temp Limit Supv Hyst	1.0	10.0	Deg. C	1.0	2204		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 110. Motor supervision—P27.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P27.8.1	Power Limit Supv				0	167		See Par ID 171
P27.8.3	Power Limit Supv Val	-200.0	200.0	%	0.0	168		
P27.8.4	Power Limit Supv Hyst	0.1	10.0	%	0.1	2205		
P27.8.5	Torque Limit Supv				0	159	②	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control
P27.8.7	Torque Limit Supv Val	-1000.0	1000.0	%	100.0	160	②	
P27.8.8	Torque Limit Supv Hyst	1.0	5.0	%	1.0	2202		
P27.8.9	Motor Current 1 Supv				0	2189	②	See Par ID 159
P27.8.11	Motor Current 1 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2190		
P27.8.12	Motor Current 1 Supv Hyst	0.1	1.0	A	0.1	2196		
P27.8.13	Motor Current 2 Supv				0	2191	②	See Par ID 159
P27.8.15	Motor Current 2 Supv Value	0.0	DriveNomCurrCT*2	A	DriveNomCurrCT	2192		
P27.8.16	Motor Current 2 Supv Hyst	0.1	1.0	A	0.1	2197		
P27.8.17	Freq Limit 1 Supv				0	154	②	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-on Control
P27.8.19	Freq Limit 1 Supv Val	0.00	See Par ID 3918	Hz	0.00	155		
P27.8.20	Freq Limit 1 Supv Hyst	0.10	1.00	Hz	0.10	2200		
P27.8.21	Freq Limit 2 Supv				0	157	②	0 = No Limit 1 = Low Limit Superv 2 = High Limit Superv 3 = Brake-off Control 4 = Brake-on/off Control
P27.8.23	Freq Limit 2 Supv Val	0.00	MaxFreq	Hz	0.00	158		
P27.8.24	Freq Limit 2 Supv Hyst	0.10	1.00	Hz	0.10	2201		
P27.8.25	Ref Limit Supv				0	161		See Par ID 171
P27.8.27	Ref Limit Supv Val	0.00	See Par ID 3918	Hz	0.00	162		
P27.8.28	Ref Limit Supv Hyst	0.10	1.00	Hz	0.10	2203		
P27.8.29	Speed Limit Supervision				0	3772		See Par ID 171
P27.8.30	Speed Limit Supervised Value	0	20000	rpm	0	3773		
P27.8.31	Speed Limit Supervised Hysteresis	10	100	rpm	10	3774		

Table 111. PID1 supervision—P27.10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P27.10.1	PID1 Superv Enable				0	1346		See Par ID 3970
P27.10.3	PID1 Superv Upper Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1347		
P27.10.4	PID1 Superv Lower Limit	See Par ID 1298	See Par ID 1300	Varies	0.00	1349		
P27.10.5	PID1 Superv Delay	0	3000	s	0	1351		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 112. PID2 supervision—P27.11.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P27.11.1	PID2 Superv Enable				0	1408		See Par ID 3970
P27.11.3	PID2 Superv Upper Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1409		
P27.11.4	PID2 Superv Lower Limit	See Par ID 1360	See Par ID 1362	Varies	0.00	1411		
P27.11.5	PID2 Superv Delay	0	3000	s	0	1413		

Interval settings

Table 113. Timer control—P30.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P30.1.1	Start Timer 1				0	224		See Par ID 190
P30.1.2	Start Timer 2				0	225		See Par ID 190
P30.1.3	Start Timer 3				0	226		See Par ID 190

Table 114. Timer settings—P30.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P30.2.1	TC1, TC2, TC3					558		
P30.2.2	Timer 1			s	0	569		
P30.2.3	Timer 2			s	0	571		
P30.2.4	Timer 3			s	0	573		
P30.2.5	Timer 1 Duration	0	72000	s	0	511		
P30.2.6	Timer 1 Channel				0	532		0 = Not Used 1 = Time Channel 1 2 = Time Channel 2 3 = Time Channel 3
P30.2.7	Timer 2 Duration	0	72000	s	0	513		
P30.2.8	Timer 2 Channel				0	533		See Par ID 532
P30.2.9	Timer 3 Duration	0	72000	s	0	515		
P30.2.10	Timer 3 Channel				0	534		See Par ID 532

Table 115. Interval status—P30.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P30.3.1	Interval 1					559		0 = Inactive 1 = Active
P30.3.2	Interval 2					560		See Par ID 559
P30.3.3	Interval 3					561		See Par ID 559
P30.3.4	Interval 4					562		See Par ID 559
P30.3.5	Interval 5					563		See Par ID 559

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 116. Repeat timer—P30.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P30.4.1	Interval 1 Setting				0	2487		0 = Weekly 1 = Daily
P30.4.2	Interval 2 Setting				0	2488		See Par ID 2487
P30.4.3	Interval 3 Setting				0	2489		See Par ID 2487
P30.4.4	Interval 4 Setting				0	2490		See Par ID 2487
P30.4.5	Interval 5 Setting				0	2491		See Par ID 2487

Table 117. Time settings—P30.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P30.5.1	Interval 1 On Time				0,0,0	491		
P30.5.2	Interval 1 Off Time				0,0,0	493		
P30.5.3	Interval 1 From Day				0	517		0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday
P30.5.4	Interval 1 To Day				0	518		See Par ID 517
P30.5.5	Interval 1 Channel				0	519		See Par ID 532
P30.5.6	Interval 2 On Time				0,0,0	495		
P30.5.7	Interval 2 Off Time				0,0,0	497		
P30.5.8	Interval 2 From Day				0	520		See Par ID 517
P30.5.9	Interval 2 To Day				0	521		See Par ID 517
P30.5.10	Interval 2 Channel				0	522		See Par ID 532
P30.5.11	Interval 3 On Time				0,0,0	499		
P30.5.12	Interval 3 Off Time				0,0,0	501		
P30.5.13	Interval 3 From Day				0	523		See Par ID 517
P30.5.14	Interval 3 To Day				0	524		See Par ID 517
P30.5.15	Interval 3 Channel				0	525		See Par ID 532
P30.5.16	Interval 4 On Time				0,0,0	503		
P30.5.17	Interval 4 Off Time				0,0,0	505		
P30.5.18	Interval 4 From Day				0	526		See Par ID 517
P30.5.19	Interval 4 To Day				0	527		See Par ID 517
P30.5.20	Interval 4 Channel				0	528		See Par ID 532
P30.5.21	Interval 5 On Time				0,0,0	507		
P30.5.22	Interval 5 Off Time				0,0,0	509		
P30.5.23	Interval 5 From Day				0	529		See Par ID 517
P30.5.24	Interval 5 To Day				0	530		See Par ID 517
P30.5.25	Interval 5 Channel				0	531		See Par ID 532

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

HVAC

Table 118. HVAC belt control—P40.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P40.1.1	Underload Protection				0	317	①	See Par ID 2813
P40.1.2	Underload Fnom Torque	10.0	150.0	%	50.0	318		
P40.1.3	Underload F0 Torque	5.0	150.0	%	10.0	319		
P40.1.4	Underload Time Limit	2.00	600.00	s	20.00	320		

Table 119. Damper-P40.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P40.2.1	Damper Start				0	483	①	0 = Normal 1 = Interlock Start 2 = Interlock Tout 3 = Interlock Delay
P40.2.2	Damper Time Out	1	32500	s	5	484	①	
P40.2.3	Damper Delay	1	32500	s	5	485	①	

Pump

Table 120. Basic pump settings—P41.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.1.1	Valve Start				0	1847	①	See Par ID 483
P41.1.2	Valve Time Out	1	32500	s	5	1848	①	
P41.1.3	Valve Delay	1	32500	s	5	1849	①	
P41.1.4	Run Delay Time	0	32500	s	0	2423		
P41.1.5	Minimum Run Time	0	32500	s	0	1813	①	

Table 121. Derag—P41.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.2.1	Deragging Enable				0	2394	②	See Par ID 190
P41.2.2	Derag Cycles	0	10		3	2468		
P41.2.3	Derag At Start/Stop				0	2469		0 = Off 1 = Start 2 = Stop 3 = Start and Stop 4 = Digital Input
P41.2.4	Deragging Run Time	0	3600	s	0	2470		
P41.2.5	Derag Speed	See Par ID 3916	See Par ID 3918	Hz	5.00	2471		
P41.2.6	Derag Off Delay	1	600	s	10	2472		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 122. MPC basic settings—P41.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.3.1	Multi-pump Mode				0	2279	①	0 = Disabled 1 = Single Drive Control 2 = Multi Drive Network
P41.3.2	Multi-pump Mode 2				0	2659	①	See Par ID 2279
P41.3.3	Multi-pump Mode 1/2 Select				0	2658		See Par ID 190
P41.3.4	Number Of Drives	1	5		1	2449	①	
P41.3.5	Drive ID	0	5		0	2278	①	
P41.3.6	PID Bandwidth	0.00	6000.00	Varies	10.00	2458		
P41.3.7	Staging Frequency	See Par ID 3916	400.00		50.00	2315	①	
P41.3.8	De-Staging Frequency	0.00	See Par ID 3918		0.00	2316	①	
P41.3.9	Add/Remove Delay	0	3600	s	10	344		
P41.3.10	Interlock Enable				0	350		See Par ID 3970
P41.3.11	OP Cont Interlock Attempts	0	10		1	2803		
P41.3.12	OP Cont Interlock Protection				2	2831	①	See Par ID 2813
P41.3.13	OP Cont Interlock NC				1	2802	②	See Par ID 190
P41.3.14	OP Cont Interlock NO				0	2801	②	See Par ID 190
P41.3.15	Motor Interlock 1				0	210	②	See Par ID 190
P41.3.16	Motor Interlock 2				0	211	②	See Par ID 190
P41.3.17	Motor Interlock 3				0	212	②	See Par ID 190
P41.3.18	Motor Interlock 4				0	213	②	See Par ID 190
P41.3.19	Motor Interlock 5				0	214	②	See Par ID 190

Table 123. MPC multi drive—P41.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.4.1	Regulation Source				0	2284	①	0 = Network Only 1 = PID Controller 1
P41.4.2	Recovery Method				0	2285	①	0 = Automatic 1 = Stop
P41.4.3	Add/Remove Drive Selection				0	2311		0 = Drive ID 1 = Run Time
P41.4.4	Run Time Enable				0	2280		See Par ID 3970
P41.4.5	Run Time Limit	0.0	300000.0	h	0.0	2281		
P41.4.6	Run Time Reset					2283		0 = No Action 1 = Reset
P41.4.7	Master Drive Mode				0	2473		0 = Follow PID 1 = Fixed Speed 2 = Turn Off
P41.4.8	Master Fixed Speed	See Par ID 3916	See Par ID 3918	Hz	50.00	2474		
P41.4.9	Master Fixed Speed Delay	0	1000	s	5	2475		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 124. Redundant drive—P41.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.5.1	Redundant Drive Enable				0	2476	①	See Par ID 3970
P41.5.2	Redundant Run Time Enable				0	2477		See Par ID 1679
P41.5.3	Redundant Run Time Reset					2478		See Par ID 635
P41.5.4	Redundant RunTime Limit	0.00	30000.00	h	0.00	2479		

Table 125. Auto change—P41.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.6.1	Number Of Pumps	1	5		1	342	①	
P41.6.2	Include Freq Converter				1	346		See Par ID 3970
P41.6.3	Auto-Change Enable				0	345		See Par ID 3970
P41.6.4	Auto-Change Interval	0.0	3000.0	h	48.0	347		
P41.6.5	Auto-Change Freq Limit	See Par ID 3916	See Par ID 3918	Hz	25.00	349		
P41.6.6	Auto-Change Pump Limit	0	5		1	348		

Table 126. Pipe fill—P41.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.7.1	Pipe Fill Aux Pump Select				0	2439	①	0 = Disabled 1 = Aux Motor 1 2 = Aux Motor 2 3 = Aux Motor 3 4 = Aux Motor 4
P41.7.2	Pipe Fill Aux Pump Run Time	0.0	3600.0	min	0.0	2440	①	
P41.7.3	Pipe Fill Aux Pump Operation				0	2441	①	See Par ID 2285
P41.7.4	Pipe Fill Aux Pump Delay	0.0	600.0	min	2.0	2442	①	
P41.7.5	Callback Source				0	2286	①	0 = No Action 1 = Safe Torque Off
P41.7.6	Pipe Fill Loss Level	0.0	1000.0	Varies	0.0	2407		

Table 127. Jockey pump—P41.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.8.1	Jockey Pump Enable				0	2804		0 = Not Used 1 = PID Sleep 2 = PID Sleep(Level)
P41.8.2	Jockey Start Level	-99999.99	See Par ID 2807	Varies	0.00	2805		
P41.8.3	Jockey Stop Level	See Par ID 2805	99999.99	Varies	0.00	2807		

Table 128. Lube pump—P41.9.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.9.1	Lube Pump Enable				0	2809		See Par ID 3970
P41.9.2	Lube Pump Time	0.0	300.0	s	0.0	2810		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 129. Broken pipe—P41.10.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P41.10.1	Broken Pipe Fault Response				0	1853	①	See Par ID 2813
P41.10.2	Broken Pipe Level	0.0	6000.0	Varies	15.0	1854		
P41.10.3	Broken Pipe Delay	1.0	120.0	s	15.0	1855		
P41.10.4	Broken Pipe Frequency	1.00	See Par ID 3918	Hz	25.00	1856		

Logic

Table 130. Simple logic—P80.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P80.1.1	Logic Function Select				0	751		0 = AND 1 = OR 2 = XOR
P80.1.2	Logic Operation Input A				0	752	②	0 = Not Used 1 = Ready 2 = Run 3 = Fault 6 = Reversed 7 = Warning 8 = Zero Frequency 9 = Control from I/O 14 = Run Bypass/Drive 15 = Ext Brake Control 16 = In Bypass Mode 17 = At Speed 18 = Remote Control 19 = Freq Limit 1 Superv 20 = Freq Limit 2 Superv 22 = PID1 Superv 23 = PID2 Superv 24 = Drive Over Temperature Fault 28 = Analog Input Less Then 4mA 29 = OverCurrent Regular 30 = OverVoltage Regular 31 = UnderVoltage Regular 32 = Torq Limit Superv 33 = Ref Limit Superv 34 = Direction Dis-match Set Direction 35 = Thermal Fault/Warning 36 = Bypass Enable 37 = Jog Speed Select 38 = Motor Overload 39 = FB Digital Input 1 40 = FB Digital Input 2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 130. Simple logic—P80.1, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								41 = FB Digital Input 3
								42 = FB Digital Input 4
								43 = Damper Control
								44 = TC1 Status
								45 = TC2 Status
								46 = TC3 Status
								47 = Emergency Stop
P80.1.2	Logic Operation Input A				0	752	②	48 = Power Limit Superv
(cont.)								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
P80.1.3	Logic Operation Input B				0	753	②	See Par ID 752

Table 131. Logic Engine—P81

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = Stop
P81.1	Logic Engine Control				0	5005	①	1 = Hot Start
								2 = Warm Start
								3 = Cold Start
P81.2	Logic Engine Status				0	5006		0 = Stopped
								1 = Running

Keypad

Table 132. Keypad settings—P95.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P95.1.1	Multimonitor Set				0	627		0 = Change Enable
								1 = Change Disable
P95.1.3	Keypad Direction				0	116		See Par ID 3527
P95.1.4	Keypad Stop				1	114		0 = Enabled-Keypad Operation
								1 = Always Enabled
								0 = None
								1 = Main Menu
P95.1.7	Default Page				2	628		2 = Multi-Monitor
								3 = Favorite Menu
								4 = Keypad Reference
P95.1.8	Keypad Comm Fault Response				2	2157	①	See Par ID 2813
P95.1.9	Timeout Time	0	65535	s	30	629		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 132. Keypad settings—P9, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P95.1.10	Contrast Adjust	5	18		12	630		
P95.1.11	Backlight Time	1	65535	min	10	631		
P95.1.12	Fan Control				1	632		0 = Continuous 1 = Temperature 2 = Run Follow
P95.1.13	Keypad ACK Timeout	200	5000	ms	200	633		
P95.1.14	Keypad Retry Number	1	10		5	634		
P95.1.15	Keypad Lock Password	0	9999		0	75		
P95.1.17	Jog Softkey Hidden				0	2412		See Par ID 3970
P95.1.18	Reverse Softkey Hidden				0	2413		See Par ID 3970

Table 133. Dispaly scaling—P95.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P95.2.1	Output Display Unit				45	2424		0 = % 1 = 1/min 2 = rpm 3 = ppm 4 = pps 5 = l/s 6 = l/min 7 = l/h 8 = kg/s 9 = kg/min 10 = kg/h 11 = m3/s 12 = m3/min 13 = m3/h 14 = m/s 15 = mbar 16 = bar 17 = Pa 18 = kPa 19 = mVS 20 = kW 21 = Deg. C 22 = GPM 23 = gal/s 24 = gal/min 25 = gal/h 26 = lb/s 27 = lb/min 28 = lb/h 29 = CFM 30 = ft3/s

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 133. Dispaly scaling—P95.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								31 = ft3/min
								32 = ft3/h
								33 = ft/s
								34 = in wg
								35 = ft wg
								36 = PSI
								37 = lb/in2
P95.2.1	Output Display Unit				45	2424		38 = HP
								39 = Deg. F
								40 = PA
								41 = WC
								42 = HG
								43 = ft
								44 = m
								45 = Hz
								46 = strokes/min
P95.2.2	Output Display Unit Min	-60000.00	See Par ID 2425	Varies	0.00	2460		
P95.2.3	Output Display Unit Max	See Par ID 2460	60000.00	Varies	MotorNomFreqMFG	2425		

Table 134. Touch keypad settings—P95.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P95.3.1	Touch Screen Backlight Time	0.0	10.0	min	1.0	3833		
P95.3.2	Backlight Brightness	0	100	%	100	3834		

Communication

Table 135. FB process data input sel—P96.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.1.1	FB Process Data Input 1 Sel	0	3990		0	2533		
P96.1.2	FB Process Data Input 2 Sel	0	See Par ID 2533		0	2534		
P96.1.3	FB Process Data Input 3 Sel	0	See Par ID 2533		0	2535		
P96.1.4	FB Process Data Input 4 Sel	0	See Par ID 2533		0	2536		
P96.1.5	FB Process Data Input 5 Sel	0	See Par ID 2533		0	2537		
P96.1.6	FB Process Data Input 6 Sel	0	See Par ID 2533		0	2538		
P96.1.7	FB Process Data Input 7 Sel	0	See Par ID 2533		0	2539		
P96.1.8	FB Process Data Input 8 Sel	0	See Par ID 2533		0	2540		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 136. FB process data output sel—P96.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.2.1	FB Process Data Output 1 Sel				1	1556		
P96.2.2	FB Process Data Output 2 Sel				3915	1557		
P96.2.3	FB Process Data Output 3 Sel				3	1558		
P96.2.4	FB Process Data Output 4 Sel				4	1559		
P96.2.5	FB Process Data Output 5 Sel				5	1560		
P96.2.6	FB Process Data Output 6 Sel				6	1561		
P96.2.7	FB Process Data Output 7 Sel				7	1562		
P96.2.8	FB Process Data Output 8 Sel				28	1563		

Table 137. Standard status word—P96.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.3.1	Standard Status Word Bit0 Function Select				1	2415	②	See Par ID 152
P96.3.2	Standard Status Word Bit1 Function Select				2	2416	②	See Par ID 152
P96.3.3	Standard Status Word Bit2 Function Select				3	2417	②	See Par ID 152
P96.3.4	Standard Status Word Bit3 Function Select				4	2418	②	See Par ID 152
P96.3.5	Standard Status Word Bit4 Function Select				5	2419	②	See Par ID 152
P96.3.6	Standard Status Word Bit5 Function Select				6	2420	②	See Par ID 152
P96.3.7	Standard Status Word Bit6 Function Select				7	2421	②	See Par ID 152
P96.3.8	Standard Status Word Bit7 Function Select				8	2422	②	See Par ID 152

Table 138. RS485 basic settings—P96.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.4.1	RS485 Comm Set				0	586	①⑥	0 = Modbus RTU
P96.4.2	Modbus RTU Protocol Status					588		0 = Initial 1 = Stopped 2 = Operational 3 = Faulted
P96.4.3	RS485 Terminal Resistance Connect				0	3969	①	See Par ID 3972

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 139. Basic Ethernet settings—P96.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.5.1	IP Address Mode				0	1500	①⑥	0 = Static IP 1 = DHCP with AutoIP
P96.5.2	Active IP Address					1507		
P96.5.3	Active Subnet Mask					1509		
P96.5.4	Active Default Gateway					1511		
P96.5.5	MAC Address					1513		
P96.5.6	Static IP Address				192.168.1.254	1501	①⑥	
P96.5.7	Static Subnet Mask				255.255.255.0	1503	①⑥	
P96.5.8	Static Default Gateway				192.168.1.1	1505	①⑥	

Table 140. IP security—P96.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.6.1	WebUI Enable				1	2921	①⑥	See Par ID 3970
P96.6.2	Trusted IP White List				0xC0.0xA8.0x01. 0xFF.0x00.0x00.0x00. 0x00.0x00.0x00. 0x00.0x00	68		
P96.6.3	Web Service Enable				0	1894	①⑥	See Par ID 3970
P96.6.4	Modbus TCP Trusted IP Enable				1	74		See Par ID 3970
P96.6.5	Modbus TCP Enable				0	1942	①⑥	0 = Disabled 1 = Enable

Table 141. Bluetooth—P96.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.7.1	Bluetooth Enable				0	1895		See Par ID 3970
P96.7.2	Bluetooth Broadcast Mode				0	2920		See Par ID 266
P96.7.3	Bluetooth Pairing Reset					2935		See Par ID 635
P96.7.4	Bluetooth Connect Stauts					3974		0 = Disconnected 1 = Connected

Table 142. IOT—P96.8.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.8.1	IOT Enable				0	3001		See Par ID 3970
M96.8.2	IOT Connection Status				0	3002		See Par ID 3974
M96.8.3	SNTP Server Status	0	3		0	3188		0 = Disconnected 1 = Connected To Server 1 2 = Connected To Server 2 3 = Connected To Server 3
P96.8.4	Proxy Enable				0	3003		See Par ID 3970
P96.8.5	SNTP Enable	0	2	0		3178		0 = Disabled 1 = Enable
P96.8.6	SNTP Server 1				0x97. 0x6E. 0xE8.0x64	3179	⑥	
P96.8.7	SNTP Server 2				0x97. 0x6E. 0xE8.0x64	3181	⑥	
P96.8.8	SNTP Server 3				0x97. 0x6E. 0xE8.0x64	3183	⑥	

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 142. IOT—P96.8, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.8.9	Sntp Update Time	15000	86400000		86400000	3185		
P96.8.10	Sntp Retry Time	3000	20000		3000	3187		

Table 143. Modbus RTU—P96.9.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.9.1	Baud Rate				1	584	①⑥	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200
P96.9.2	Parity Type And Stop Bit				2	585	①⑥	0 = None and 2 stop bits 1 = Odd and 1 stop bit 2 = Even and 1 stop bit 3 = None and 1 stop bit
P96.9.3	Comm Timeout Modbus RTU	0	60000	ms	10000	593		
P96.9.4	Slave Address	1	247		1	587	①⑥	
P96.9.5	Modbus RTU Fault Response				0	2516		0 = in Fieldbus Control 1 = in all Control

Table 144. Modbus TCP—P96.13.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.13.1	Connection Limit				5	609		
P96.13.2	Modbus TCP Unit ID				1	610		
P96.13.3	Comm Timeout Modbus TCP	0	60000	ms	10000	611		
P96.13.4	Modbus TCP Protocol Status					612		0 = Stopped 1 = Operational 2 = Faulted
P96.13.5	Modbus TCP Fault Response				0	2517		See Par ID 2516
P96.13.6	TCP Fieldbus Fault Response				1	3978	①	See Par ID 334

Table 145. WebUI—P96.16.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P96.16.1	WebUI Protocol Status					2915		0 = Off 1 = Operational 2 = Faulted
P96.16.2	WebUI Fault Response				0	2916		See Par ID 2516
P96.16.3	WebUI Communication Timeout	30000	60000	ms	60000	2919		
P96.16.4	WebUI Fieldbus Fault Response				1	3979	①	See Par ID 334

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 146. User access level operation—P98.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P98.1	User Access Level				0	3801		0 = Observer 1 = Operator 2 = Installer
P98.2	Operator Level Password				""	3802		
P98.3	Installer Level Password				""	3810		
P98.5	User Access Level Password Timeout				0	3826		0 = After each change 1 = After 10 minute 2 = After 30 minute 3 = After power down
P98.6	User Access Level Logout				0	3827		See Par ID 3972

System

Table 147. Basic system settings—P99.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.1.1	Language				0	340		0 = English 1 = 中文 2 = Deutsch
P99.1.3	Password	0	9999		0	624		
P99.1.4	Parameter Lock				0	625		See Par ID 627
P99.1.5	Startup Wizard				0	626		0 = Yes 1 = No

Table 148. Parameter handling—P99.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.2.1	Parameter Set1/2 Sel				0	2312	②	See Par ID 190
P99.2.2	No Access To Param				0	215	②	See Par ID 190
P99.2.3	Parameter Sets					619	①	0 = No 1 = Reload Defaults 2 = Reload Set 1 3 = Reload Set 2 4 = Store Set 1 5 = Store Set 2 6 = Reset 7 = Reload Defaults VM
P99.2.4	Up To Keypad					620		See Par ID 3972
P99.2.5	Down From Keypad					621	①	0 = No 1 = All Parameters 2 = All, except motor parameters
P99.2.6	Parameter Comparison					623		0 = No 1 = Compare with Keypad 2 = Compare with Default 3 = Compare with Set 1 4 = Compare with Set 2

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 149. Real time clock—P99.3.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.3.1	Real Time Clock				0.0.0.1:1:13	566		
P99.3.2	Daylight Saving				0	582		0 = Off 1 = EU 2 = US
P99.3.3	RTC Battery Status				0	583		0 = Not Installed 1 = Installed 2 = Change Battery 3 = OverVoltage
P99.3.4	Drive Time Offset				0	5581		0 = GMT/UTC 1 = GMT-11:00 2 = GMT-10:00 3 = GMT-09:00 4 = GMT-08:00 5 = GMT-07:00 6 = GMT-06:00 7 = GMT-05:00 8 = GMT-04:30 9 = GMT-04:00 10 = GMT-03:30 11 = GMT-03:00 12 = GMT-02:00 13 = GMT-01:00 14 = GMT+01:00 15 = GMT+02:00 16 = GMT+03:00 17 = GMT+03:30 18 = GMT+04:00 19 = GMT+05:00 20 = GMT+05:30 21 = GMT+05:45 22 = GMT+06:00 23 = GMT+06:30 24 = GMT+07:00 25 = GMT+08:00 26 = GMT+09:00 27 = GMT+09:30 28 = GMT+10:00 29 = GMT+11:00 30 = GMT+12:00 31 = GMT+13:00

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 150. Version info—P99.4.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.4.1	Keypad Software Version					640		
P99.4.2	Motor Control Software Version					642		
P99.4.3	Application Software Version					644		
P99.4.4	Software Bundle Version					1714		

Table 151. Hardware info—P99.5.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.5.1	Serial Number					648		
P99.5.2	Power Unit Serial Number					1270		
P99.5.3	Control Unit Serial Number					1276		

Table 152. Energy savings calc—P99.6.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.6.1	Currency				0	2122		0 = $ 1 = £ 2 = € 3 = ¥ 4 = Rs 5 = R$ 6 = Fr 7 = kr
P99.6.2	Energy Cost			Varies	0.00	2123		
P99.6.3	Data Type				0	2124		0 = Cumulative 1 = Daily Avg 2 = Weekly Avg 3 = Monthly Avg 4 = Yearly Avg
P99.6.4	Energy Savings Reset					2125		See Par ID 635

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 153. SD card operation—P99.7.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
P99.7.1	SD Card Copy Operation				0	3832		0 = Disable 1 = Copy Drive Parameter 2 = Copy parameter change log 3 = Copy fault log
P99.7.2	SD Card Download Operation				0	3911	①	0 = Disable 1 = Download Parameter
P99.7.3	SD Card Firmware Upgrade Select				0	3966	①	0 = No Action 1 = Drive Firmware Upgrade 2 = Touch Keypad Firmware Upgrade
P99.7.4	SD Upgrade language 1 selection				0	5587	①	0 = Chinese 1 = German 2 = French 3 = Portuguese 4 = Spanish 5 = Italian 6 = Polish 7 = Czech 8 = Romanian 9 = Turkey
P99.7.5	SD Upgrade language 2 selection				1	5588	①	See Par ID 5587

Table 154. Operate mode—O.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
O1	Output Frequency			Hz		1		
O2	Speed Reference			Varies		3912		
O3	Motor Speed			rpm		3975		
O4	Motor Current			A		3		
O5	Motor Torque			%		4		
O6	Motor Power			%		5		
O7	Motor Voltage			V		6		
O8	DC-link Voltage			V		7		
O9	Unit Temperature			Deg. C		8		
O10	Motor Temperature			Deg. C		9		
R11	Keypad Torque Ref	-300.0	300.0	%	0.0	782		
R12	Keypad Reference	See Par ID 3916	See Par ID 3918	Varies	0.00	3914		
R13	PID1 Keypad Set Point 1	See Par ID 1298	See Par ID 1300	Varies	0.00	1307		
R14	PID1 Keypad Set Point 2	See Par ID 1298	See Par ID 1300	Varies	0.00	1309		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Optional boards

Slot A: No board

Slot A: DXX-EXT-3DI3DO1T (IO1)

Table 155. Monitor—B2.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B2.1.1	Board Status					883		
B2.1.2	Slot A: FW Version					1064		
B2.1.3	DI101-103 Status	0	7			889		
B2.1.4	DO101-103 Status	0	7			888		
B2.1.5	Thermistor101 Resistance			ohm		891		
B2.1.6	Thermistor State				3	887		0 = Normal 1 = Open 2 = Short 3 = Not Configured

Table 156. Parameters—B2.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B2.2.1	DO101 Function				0	241	②	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 = Drive Over Temperature Fault 14 = Over Current Fault 15 = Over Voltage Fault 16 = Under Voltage Fault 17 = Analog Input Less Then 4mA 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Direction Dis-match Set Direction 24 = Thermistor Input Fault 26 = In Bypass Mode

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 156. Parameters—B2.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								27 = Ext Fault/Warning
								28 = Remote Control
								29 = Jog Speed Select
								30 = Motor Overload
								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 = Emergency Stop
								40 = Power Limit Superv
								41 = Temp Limit Superv
								42 = Analog Input Superv
								43 = Motor 1 Control
B2.2.1 (cont.)	DO101 Function				0	241	②	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
								51 = Motor Current 1 Supv
								52 = Motor Current 2 Supv
								53 = Second AI Limit Supv
								54 = DC Charge Switch Close
								55 = Preheat Active
								56 = Cold Weather Active
								57 = Prime Pump Active
								58 = 2nd Stage Ramp Frequency Active
								59 = STO Fault
								60 = Run Bypass/Drive
								61 = Bypass Overload Fault
								62 = Bypass Run
								63 = Auto Change To Local On COM Fault
								64 = Modbus RTU Comm Fault
								65 = Modbus TCP Comm Fault
								71 = Jockey Pump Active
								72 = Lube Pump Active
								73 = PID1 Low Feedback
								74 = PID1 High Feedback

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 156. Parameters—B2.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B2.2.1 (cont.)	DO101 Function				0	241	②	75 = PID2 Low Feedback 76 = PID2 High Feedback 77 = Master in MPFC 78 = Clean Power Interlock Fault 79 = Valve Control 80 = Inch Speed Select 81 = AI Fault 83 = SlotD Fieldbus Com Fault 84 = Speed Limit Superv
B2.2.2	DO102 Function				0	242	②	See Par ID 241
B2.2.3	DO103 Function				0	243	②	See Par ID 241
B2.2.4	Thermistor101 Mode				0	890		0 = Digital Input 1 = Thermistor Input

Slot A: DXX-EXT-1AI2AO (IO2)

Table 157. Monitor—B3.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B3.1.1	Board Status					883		
B3.1.2	Slot A: FW Version					1064		
B3.1.3	AI101 (1AI/2AO)			Varies		894		
B3.1.4	AO101 (1AI/2AO)			Varies		897		
B3.1.5	AO102 (1AI/2AO)			Varies		899		

Table 158. Parameters—B3.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B3.2.1	AI101 Mode				1	893		0 = 0 - 20 mA 1 = 0 -10 V 2 = -10 - +10 V
B3.2.2	AI101 Signal Range				0	124		0 = 0-100%/0-20mA/0-10V 1 = 20-100%/4-20mA/2-10V 2 = Customized
B3.2.3	AI101 Custom Min	0.00	See Par ID 126	%	0.00	125		
B3.2.4	AI101 Custom Max	See Par ID 125	100.00	%	100.00	126		
B3.2.5	AI101 Filter Time	0.00	10.00	s	0.10	123		
B3.2.6	AI101 Signal Invert				0	127		0 = Not Inverted 1 = Inverted
B3.2.7	AO101 Mode				0	896		0 = 0 - 20 mA 1 = 0 -10 V
								0 = Not Used 1 = Output Frequency 2 = Speed Reference 3 = Motor Speed 4 = Motor Current

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 158. Parameters—B3.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								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-+2N)
B3.2.8	AO101 Function				0	235	②	22 = Motor Torque (-2-+2N)
								23 = Motor Power (-2-+2N)
								25 = FB Process Data Input 1
								26 = FB Process Data Input 2
								27 = FB Process Data Input 3
								28 = FB Process Data Input 4
								29 = FB Process Data Input 5
								30 = FB Process Data Input 6
								31 = FB Process Data Input 7
								32 = FB Process Data Input 8
								33 = SlotA PT100 Temp Channel 1
								34 = SlotA PT100 Temp Channel 2
								35 = SlotA PT100 Temp Channel 3
								36 = SlotB PT100 Temp Channel 1
								37 = SlotB PT100 Temp Channel 2
								38 = SlotB PT100 Temp Channel 3
								39 = User Defined Output
								40 = Motor Current (-2-+2N)
								41 = SlotC PT100 Temp Channel 1
								42 = SlotC PT100 Temp Channel 2
								43 = SlotC PT100 Temp Channel 3
								44 = SlotD PT100 Temp Channel 1
B3.2.8 (cont.)	AO101 Function				0	235	②	45 = SlotD PT100 Temp Channel 2
								46 = SlotD PT100 Temp Channel 3
B3.2.9	AO101 Minimum				0	238		0 = 0V / 0 mA
								1 = 2V / 4 mA
B3.2.10	AO101 Filter Time	0.00	10.00	s	1.00	236		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 158. Parameters—B3.2, continued.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B3.2.11	AO101 Scale	10	1000	%	100	239		
B3.2.12	AO101 Inversion				0	237		See Par ID 127
B3.2.13	AO101 Offset	-100.00	100.00	%	0.00	240		
B3.2.14	AO102 Mode				0	898		See Par ID 896
B3.2.15	AO102 Function				0	269	②	See Par ID 235
B3.2.16	AO102 Minimum				0	270		See Par ID 238
B3.2.17	AO102 Filter Time	0.00	10.00	s	1.00	271		
B3.2.18	AO102 Scale	10	1000	%	100	272		
B3.2.19	AO102 Inversion				0	273		See Par ID 127
B3.2.20	AO102 Offset	-100.00	100.00	%	0.00	274		

Slot A: DXX-EXT-3RO (IO3)

Table 159. Monitor—B4.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B4.1.1	Board Status					883		
B4.1.2	Slot A: FW Version					1064		
B4.1.3	RO101-103 Status	0	7			900		

Table 160. Parameters—B4.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B4.2.1	RO101 Function				0	540	②	See Par ID 241
B4.2.2	RO102 Function				0	541	②	See Par ID 241
B4.2.3	RO103 Function				0	551	②	See Par ID 241

Slot A: DXX-EXT-THER1 (IO4)

Table 161. Monitor—B5.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B5.1.1	Board Status					883		
B5.1.2	Slot A: FW Version					1064		
B5.1.3	PT100-100 Status				3,3,3	905		0 = Normal 1 = Short 2 = Open 3 = Not Configured
B5.1.4	PT100 Values				10000, 10000, 10000	902		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 162. Parameters—B5.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
								0 = No PT100
								1 = 0,0,1
								2 = 0,1,0
								3 = 0,1,1
B5.2.1	PT100-3,2,1				0	901		4 = 1,0,0
								5 = 1,0,1
								6 = 1,1,0
								7 = 1,1,1
B5.2.2	PT100-100 WarnLevel	-30.0	200.0	Deg. C	120.0	338		
B5.2.3	PT100-100 FaultLevel	-30.0	200.0	Deg. C	130.0	339		

Slot A: DXX-EXT-6DI (IO5)

Table 163. Monitor—B6.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B6.1.1	Board Status					883		
B6.1.2	Slot A: FW Version					1064		
B6.1.3	AC1, AC2, AC3	0	7			908		
B6.1.4	AC4, AC5, AC6	0	7			1696		

Slot A: ABZ

Table 164. Monitor—B7.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B7.1.1	Board Status					883		
B7.1.2	Slot A: FW Version					1064		
B7.1.3	n-Encoder 1 speed			rpm		3502		
B7.1.4	n-Encoder 2 speed			rpm		3504		
B7.1.5	Encoder Power Supply			V		3973		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 165. Parameters—B7.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B7.2.1	Encoder 1 Pulse Count	1	60000	ppr	1024	3503	①	
B7.2.2	Encoder 1 Rotation Reverse				0	3505	①	0 = No
								1 = Yes
B7.2.3	Encoder 2 Pulse Count	1	60000	ppr	1024	3507	①	
B7.2.4	Encoder 2 Rotation Reverse				0	3508	①	See Par ID 3505
B7.2.5	Encoder 1 Type				0	3835	①	0 = A/B/Z differential output
								1 = A/B/Z Single end output
								2 = Not Used
B7.2.6	Encoder 2 Type				2	3836	①	See Par ID 3835
B7.2.7	Encoder Output Select				0	3780		0 = Off
								1 = SlotA:Encoder 1
								2 = SlotA:Encoder 2
B7.2.8	Encoder Output Divider				0	3781		0 = /1
								1 = /2
								2 = /4
								3 = /8
								4 = /16
								5 = /32
								6 = /64
								7 = /128
								8 = /256
								9 = /512
								10 = /1024
								11 = /2048
B7.2.9	Encoder 1 Speed filter Time	See Par ID 3916	32000	ms	MaxFreqMFG	3967		
B7.2.10	Encoder 2 Speed Filter Time	See Par ID 3916	32000	ms	MaxFreqMFG	3968		

Slot A: SABZ

Table 166. Monitor—B8.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B8.1.1	Board Status					883		
B8.1.2	Slot A: FW Version					1064		
B8.1.3	n-Encoder 1 speed			rpm		3502		
B8.1.4	n-Encoder 2 speed			rpm		3504		
B8.1.5	Encoder Power Supply			V		3973		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 167. Parameters—B8.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B8.2.1	Encoder 1 Pulse Count	1	60000	ppr	1024	3503	①	
B8.2.2	Encoder 1 Rotation Reverse				0	3505	①	See Par ID 3505
B8.2.3	Encoder 2 Pulse Count	1	60000	ppr	1024	3507	①	
B8.2.4	Encoder 2 Rotation Reverse				0	3508	①	See Par ID 3505
B8.2.5	Encoder 1 Type				0	3835	①	See Par ID 3835
B8.2.6	Encoder 2 Type				2	3836	①	See Par ID 3835
B8.2.7	Encode1 Speed filter Time	See Par ID 3916	32000	ms	MaxFreqMFG	3967		
B8.2.8	Encode2 Speed Filter Time	See Par ID 3916	32000	ms	MaxFreqMFG	3968		

Slot B: No board

Slot B: DXX-EXT-3DI3DO1T (IO1)

Table 168. Monitor_B10.1

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B10.1.1	Board Status					910		
B10.1.2	Slot B: FW Version					1067		
B10.1.3	DI201-203 Status	0	7			915		
B10.1.4	DO201-203 Status	0	7			914		
B10.1.5	Thermistor Resistor			ohm		917		
B10.1.6	Thermistor State					913		See Par ID 887

Table 169. Parameters—B10.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B10.2.1	DO201 Function				0	244	②	See Par ID 241
B10.2.2	DO202 Function				0	245	②	See Par ID 241
B10.2.3	DO203 Function				0	246	②	See Par ID 241
B10.2.4	Thermistor Config				0	916		See Par ID 890

Slot B: DXX-EXT-1AI2AO (IO2)

Table 170. Monitor—B11.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B11.1.1	Board Status					910		
B11.1.2	Slot B: FW Version					1067		
B11.1.3	AI201 (1AI/2AO)			Varies		920		
B11.1.4	AO201 (1AI/2AO)			Varies		923		
B11.1.5	AO202 (1AI/2AO)			Varies		925		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 171. Parameters—B11.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B11.2.1	AI201 Mode				1	919		See Par ID 893
B11.2.2	AI201 Signal Range				0	129		See Par ID 124
B11.2.3	AI201 Custom Min	0.00	See Par ID 131	%	0.00	130		
B11.2.4	AI201 Custom Max	See Par ID 130	100.00	%	100.00	131		
B11.2.5	AI201 Filter Time	0.00	10.00	s	0.10	128		
B11.2.6	AI201 Signal Invert				0	132		See Par ID 127
B11.2.7	AO201 Mode				0	922		See Par ID 896
B11.2.8	AO201 Function				0	275	②	See Par ID 235
B11.2.9	AO201 Minimum				0	276		See Par ID 238
B11.2.10	AO201 Filter Time	0.00	10.00	s	1.00	277		
B11.2.11	AO201 Scale	10	1000	%	100	278		
B11.2.12	AO201 Inversion				0	279		See Par ID 127
B11.2.13	AO201 Offset	-100.00	100.00	%	0.00	280		
B11.2.14	AO202 Mode				0	924		See Par ID 896
B11.2.15	AO202 Function				0	281	②	See Par ID 235
B11.2.16	AO202 Minimum				0	282		See Par ID 238
B11.2.17	AO202 Filter Time	0.00	10.00	s	1.00	283		
B11.2.18	AO202 Scale	10	1000	%	100	284		
B11.2.19	AO202 Inversion				0	285		See Par ID 127
B11.2.20	AO202 Offset	-100.00	100.00	%	0.00	286		

Slot B: DXX-EXT-3RO (IO3)

Table 172. Monitor—B12.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B12.1.1	Board Status					910		
B12.1.2	Slot B: FW Version					1067		
B12.1.3	RO201-203 Status	0	7			926		

Table 173. Parameters—B12.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B12.2.1	RO201 Function				0	552	②	See Par ID 241
B12.2.2	RO202 Function				0	555	②	See Par ID 241
B12.2.3	RO203 Function				0	556	②	See Par ID 241

Slot B: DXX-EXT-THER1 (IO4)

Table 174. Monitor—B13.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B13.1.1	Board Status					910		
B13.1.2	Slot B: FW Version					1067		
B13.1.3	PT100-200 State				3,3,3	931		See Par ID 905
B13.1.4	PT100-200 Temperature				10000, 10000, 10000	928		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 175. Parameters—B13.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B13.2.1	PT100-3,2,1				0	927		See Par ID 901
B13.2.2	PT100 Warning Limit	-30.0	200.0	Deg. C	120.0	937		
B13.2.3	PT100 Fault Limit	-30.0	200.0	Deg. C	130.0	938		

Slot B: DXX-EXT-6DI (IO5)

Table 176. Monitor—B14.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B14.1.1	Board Status					910		
B14.1.2	Slot B: FW Version					1067		
B14.1.3	DI201-203 Status (6DI-240V)	0	7			934		
B14.1.4	AC4, AC5, AC6	0	7			1697		

Slot C: No board

Slot C: DXX-EXT-3DI3DO1T (IO1)

Table 177. Monitor—B16.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B16.1.1	Slot C: Board Status					3544		
B16.1.2	Slot C: FW Version					3548		
B16.1.3	DI301-303 Status (3DI/3DO/1Th)	0	7			3555		
B16.1.4	DO301-303 Status (3DI/3DO/1Th)	0	7			3554		
B16.1.5	Thermistor301 Resistance			ohm		3557		
B16.1.6	Thermistor301 Status				3	3553		See Par ID 887

Table 178. Parameters—B16.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B16.2.1	DO301 Function				0	3550	②	See Par ID 241
B16.2.2	DO302 Function				0	3551	②	See Par ID 241
B16.2.3	DO303 Function				0	3552	②	See Par ID 241
B16.2.4	Thermistor301 Mode				0	3556		See Par ID 890

Slot C: DXX-EXT-1AI2AO (IO2)

Table 179. Monitor—B17.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B17.1.1	Slot C: Board Status					3544		
B17.1.2	Slot C: FW Version					3548		
B17.1.3	AI301 (1I1AI/2AO)			Varies		3577		
B17.1.4	AO301 (1AI/2AO)			Varies		3580		
B17.1.5	AO302 (1AI/2AO)			Varies		3582		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 180. Parameters—B17.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B17.2.1	AI301 Mode				1	3576		See Par ID 893
B17.2.2	AI301 Signal Range				0	3560		See Par ID 124
B17.2.3	AI301 Min	0.00	See Par ID 126	%	0.00	3561		
B17.2.4	AI301 Max	See Par ID 125	100.00	%	100.00	3562		
B17.2.5	AI301 t-Filter	0.00	10.00	s	0.10	3575		
B17.2.6	AI301 Invert				0	3559		See Par ID 127
B17.2.7	AO301 Mode				0	3579		See Par ID 896
B17.2.8	AO301 Function				0	3563	②	See Par ID 235
B17.2.9	AO301 Min				0	3564		See Par ID 238
B17.2.10	AO301 t-Filter	0.00	10.00	s	1.00	3565		
B17.2.11	AO301 Scale	10	1000	%	100	3566		
B17.2.12	AO301 Invert				0	3567		See Par ID 127
B17.2.13	AO301 Offset	-100.00	100.00	%	0.00	3568		
B17.2.14	AO302 Mode				0	3581		See Par ID 896
B17.2.15	AO302 Function				0	3569	②	See Par ID 235
B17.2.16	AO302 Min				0	3570		See Par ID 238
B17.2.17	AO302 t-Filter	0.00	10.00	s	1.00	3571		
B17.2.18	AO302 Scale	10	1000	%	100	3572		
B17.2.19	AO302 Invert				0	3573		See Par ID 127
B17.2.20	AO302 Offset	-100.00	100.00	%	0.00	3574		

Slot C: DXX-EXT-3RO (IO3)

Table 181. Monitor—B18.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B18.1.1	Slot C: Board Status					3544		
B18.1.2	Slot C: FW Version					3548		
B18.1.3	RO301-303 Status	0	7			3586		

Table 182. Parameters—B18.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B18.2.1	RO301 Function				0	3583	②	See Par ID 241
B18.2.2	RO302 Function				0	3584	②	See Par ID 241
B18.2.3	RO303 Function				0	3585	②	See Par ID 241

Slot C: DXX-EXT-THER1 (IO4)

Table 183. Monitor—B19.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B19.1.1	Slot C: Board Status					3544		
B19.1.2	Slot C: FW Version					3548		
B19.1.3	PT100-300 Status				3,3,3	3593		See Par ID 905
B19.1.4	PT100-300 Temperature				10000, 10000, 10000	3590		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 184. Parameters—B19.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B19.2.1	PT100-300 Select				0	3587		See Par ID 901
B19.2.2	PT100-300 WarnLevel	-30.0	200.0	Deg. C	120.0	3588		
B19.2.3	PT100-300 FaultLevel	-30.0	200.0	Deg. C	130.0	3589		

Slot C: DXX-EXT-6DI (IO5)

Table 185. Monitor-B20.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B20.1.1	Slot C: Board Status					3544		
B20.1.2	Slot C: FW Version					3548		
B20.1.3	DI301-303 Status (6DI-240V)	0	7			3596		
B20.1.4	AC4, AC5, AC6	0	7			3597		

Slot D: No board

Slot D: DXX-EXT-3DI3DO1T (IO1)

Table 186. Monitor—B22.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B22.1.1	Slot D: Board Status					3657		
B22.1.2	Slot D: FW Version					3661		
B22.1.3	DI401-403 Status (3DI/3DO/1Th)	0	7			3668		
B22.1.4	DO401-403 Status (3DI/3DO/1Th)	0	7			3667		
B22.1.5	Thermistor401 Resistance			ohm		3670		
B22.1.6	Thermistor401 Status				3	3666		See Par ID 887

Table 187. Parameters—B22.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B22.2.1	DO401 Function				0	3663	②	See Par ID 241
B22.2.2	DO402 Function				0	3664	②	See Par ID 241
B22.2.3	DO403 Function				0	3665	②	See Par ID 241
B22.2.4	Thermistor401 Mode				0	3669		See Par ID 890

Slot D: DXX-EXT-1AI2AO (IO2)

Table 188. Monitor—B23.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B23.1.1	Slot D: Board Status					3657		
B23.1.2	Slot D: FW Version					3661		
B23.1.3	AI401 (DXX-EXT-1AI2AO (IO2) - 1AI/2AO)			Varies		3690		
B23.1.4	AO401 (1AI/2AO)			Varies		3693		
B23.1.5	AO402 (1AI/2AO)			Varies		3695		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 189. Parameters—B23.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B23.2.1	AI401 Mode				1	3689		See Par ID 893
B23.2.2	AI401 Signal Range				0	3673		See Par ID 124
B23.2.3	AI401 Min	0.00	See Par ID 126	%	0.00	3674		
B23.2.4	AI401 Max	See Par ID 125	100.00	%	100.00	3675		
B23.2.5	AI401 t-Filter	0.00	10.00	s	0.10	3688		
B23.2.6	AI401 Invert				0	3672		See Par ID 127
B23.2.7	AO401 Mode				0	3692		See Par ID 896
B23.2.8	AO401 Function				0	3676	②	See Par ID 235
B23.2.9	AO401 Min				0	3677		See Par ID 238
B23.2.10	AO401 t-Filter	0.00	10.00	s	1.00	3678		
B23.2.11	AO401 Scale	10	1000	%	100	3679		
B23.2.12	AO401 Invert				0	3680		See Par ID 127
B23.2.13	AO401 Offset	-100.00	100.00	%	0.00	3681		
B23.2.14	AO402 Mode				0	3694		See Par ID 896
B23.2.15	AO402 Function				0	3682	②	See Par ID 235
B23.2.16	AO402 Minimum				0	3683		See Par ID 238
B23.2.17	AO402 t-Filter	0.00	10.00	s	1.00	3684		
B23.2.18	AO402 Scale	10	1000	%	100	3685		
B23.2.19	AO402 Invert				0	3686		See Par ID 127
B23.2.20	AO402 Offset	-100.00	100.00	%	0.00	3687		

Slot D: DXX-EXT-3RO (IO3)

Table 190. Monitor—B24.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B24.1.1	Slot D: Board Status					3657		
B24.1.2	Slot D: FW Version					3661		
B24.1.3	RO401-403 Status	0	7			3699		

Table 191. Parameters—B24.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B24.2.1	RO401 Function				0	3696	②	See Par ID 241
B24.2.2	RO402 Function				0	3697	②	See Par ID 241
B24.2.3	RO403 Function				0	3698	②	See Par ID 241

Slot D: DXX-EXT-THER1 (IO4)

Table 192. Monitor—B25.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B25.1.1	Slot D: Board Status					3657		
B25.1.2	Slot D: FW Version					3661		
B25.1.3	PT100-400 Status				3,3,3	3706		See Par ID 905
B25.1.4	PT100-300 Temperature				10000, 10000, 10000	3703		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 193. Parameters—B25.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B25.2.1	PT100-400 Select				0	3700		See Par ID 901
B25.2.2	PT100-300 WarnLevel	-30.0	200.0	Deg. C	120.0	3701		
B25.2.3	PT100-300 FaultLevel	-30.0	200.0	Deg. C	130.0	3702		

Slot D: DXX-EXT-6DI (IO5)

Table 194. Monitor—B26.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B26.1.1	Slot D: Board Status					3657		
B26.1.2	Slot D: FW Version					3661		
B26.1.3	DI401-403 Status (6DI-240V)	0	7			3709		
B26.1.4	DI404-406 Status (I6DI-240V)	0	7			3710		

Slot D: ProfiNet

ProfiNet

Table 195. Monitor—B27.1.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B27.1.1.1	Slot D: Board Status					3657		
B27.1.1.2	Slot D: FW Version					3661		
B27.1.1.3	DeviceNet400 ProtocolStatus				0	3799		0 = Waiting for Connection 1 = Connection In Progress 2 = Data Exchange 3 = Connection Lost
B27.1.1.4	PB400 Telegram				1	3731		0 = Telegram 0 1 = Standard Telegram 1 2 = Telegram 999 3 = Telegram 1000 4 = Process Data Module 1 5 = Process Data Module 2 6 = Process Data Module 3 7 = Process Data Module 4
B27.1.1.5	PB400 MAC Address					3784		
B27.1.1.6	PB400 Active IP Address					3793		
B27.1.1.7	PB400 Active Subnet Mask					3795		
B27.1.1.8	PB400 Active Default Gateway					3797		

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

Table 196. Parameters—B27.1.2.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B27.1.2.1	PB400 COM Mode				0	3977	①	0 = EatonDrive 1 = Echo 2 = Bypass
B27.1.2.2	IP Address Mode				1	2852	①⑥	0 = Static IP B27.1.2.2
B27.1.2.3	Static IP Address				192.168.1.253	2853	①⑥	
B27.1.2.4	Static Subnet Mask				255.255.255.0	2855	①⑥	
B27.1.2.5	Static Default Gateway				192.168.1.1	2857	①⑥	
B27.1.2.6	Station Name				""	3202		
B27.1.2.7	SlotD Fieldbus Fault Response				1	3983	①	0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast 4 = Warning, Coast 5 = Warning, Auto Switch To Local 6 = Warning, Auto Switch To Preset Speed 1

Slot D: EIP

Table 197. Monitor—B28.1.

Code	Parameter	Min.	Max.	Unit	Default	ID	Special note	Note
B28.1.1	PB400 Active IP Address					3793		
B28.1.2	PB400 Active Subnet Mask					3795		
B28.1.3	PB400 Active Default Gateway					3797		
B28.1.4	PB400 MAC Address					3784		
B28.1.5	Slot D: Board Status					3657		
P28.1.6	Ethernet IP Protocol Status					608		0 = Off 1 = Operational 2 = Faulted
B28.1.7	Slot D: FW Version					3661		
B28.2.1	EIP CtrB IP Address Mode				0	3779	①⑥	0 = Static IP 1 = DHCP with AutoIP
B28.2.2	Static IP Address				192.168.1.253	2853	①⑥	
B28.2.3	Static Subnet Mask				255.255.255.0	2855	①⑥	
B28.2.4	Static Default Gateway				192.168.1.1	2857	①⑥	
B28.2.5	EIP CtrB COM Timeout	0	60000	ms	10000	4010		
B28.2.6	SlotD Fieldbus Fault Response				1	3983	①	See Par ID 3983

Note: ① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.
③ Input function is level sensed.
④ Input function is edge sensed.
⑤ Input function is edge sensed when using StartP/StopP start logic.
⑥ Reset after modification.

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.

Modbus ID	Code	Parameters	RO/RW
1753	**M1.1**	**Multi-Monitoring** Displays any 9 monitoring values in a screen. The values are selectable via the keypad menu.	RW
1	**M2.1**	**Output Frequency** Drive Output frequency going to the motor. This value should match reference frequency when in frequency control mode.	RO
3912	**M2.2**	**Speed Reference** Speed Reference, value given as real speed in rpm. Internally the inverter calculates this value into a frequency out of the motor data that is required for this value	RO
3975	**M2.3**	**Motor Speed** Motorspeed (calculated or measured)	RO
3	**M2.4**	**Motor Current** Instantaneous output current	RO
4	**M2.5**	**Motor Torque** Motor-Torque	RO
15	**M2.6**	**Torque Reference** Torque reference percentage used when in torque control mode.	RO
5	**M2.7**	**Motor Power** Percentage of motor output, calculated from the values on the type plate and the measured motor current (%).	RO
6	**M2.8**	**Motor Voltage** Output voltage to motor (VAC).	RO
7	**M2.9**	**DC-link Voltage** Direct current DC link voltage (VDC).	RO
8	**M2.10**	**Unit Temperature** Heat sink temperature (deg C)	RO
9	**M2.11**	**Motor Temperature** Calculated motor temperature value in percent. This value is based on motor nameplate data and the motor status information noted on power up.	RO
28	**M2.12**	**Latest Fault Code** Last active fault code value. See fault codes for the value shown here.	RO
1686	**M2.13**	**Instant Motor Power** Current motor output (kW).	RO
1056	**M2.14**	**v- L1/L2** Input Voltage L1/L2	RO
1057	**M2.15**	**v- L2/L3** Input Voltage L2/L3	RO
1058	**M2.16**	**v- L3/L1** Input Voltage L3/L1	RO
3828	**M2.17**	**I-L1** I-In-L1	RO
3829	**M2.18**	**I-L2** I-In-L2	RO

Modbus ID	Code	Parameters	RO/RW
3830	M2.19	**I-L3** I-In-L3	RO
2445	M3.1	**Output** User defined output value that can be seen in the desired unit and scale, this value will be displayed in the format selected by 'Output Display Unit' parameter with a scale value from 'Output Display Unit Min' parameter.	RO
2447	M3.2	**Reference** User defined reference value that can be seen in the desired unit and scale, this value will be displayed in the format selected by 'Output Display Unit' parameter with a scale value from 'Output Display Unit Min' parameter.	RO
12	M4.1	**DI1, DI2, DI3** Digital Input status of DI 1/2/3.	RO
13	M4.2	**DI4, DI5, DI6** Digital Input 4/5/6 status.	RO
14	M4.4	**DO1,Virtual RO1,Virtual RO2** Status of the digital outputs. The status of virtual relays VDO1 and VDO2 describes internal relays in the control card that cannot be used physically.	RO
557	M4.7	**RO1, RO2** Relay output 1/2 status.	RO
3848	M4.8	**High Freq Pulse Input 1 Value** The acture value of high pulse input channel one	RO
3861	M4.9	**High Freq Pulse Input 2 Value** The acture value of high pulse input channel two	RO
3874	M4.10	**High Freq Pulse Output Value** The acture value of high pulse output	RO
3214	M4.11	**Control board DI Status** Displays the status of the digital inputs on the control card.	RW
10	M5.1	**Analog Input 1** Analog input 1 measured value (Vdc or Amps) selectable with dipswitch	RO
11	M5.2	**Analog Input 2** Analog input 2 measured value (Vdc or Amps) selectable with dipswitch	RO
25	M6.1	**Analog Output 1** Analog output 1 measured value (VDC or milliampere), selection via parameters.	RO
16	M10.1	**PID1 Set Point** Reference PID Controller 1	RO
18	M10.2	**PID1 Feedback** PID1 actual value feedback level.	RO
20	M10.3	**PID1 Error Value** Control deviation of PID1 in process units.	RO
22	M10.4	**PID1 Output** PID1 output percentage to the motor.	RO
23	M10.5	**PID1 Status** PID status indicator. Indicates whether the drive has been stopped, is running in PID mode, or is in PID sleep mode.	RO
32	M11.1	**PID2 Set Point** PID2 reference value level.	RO
34	M11.2	**PID2 Feedback** PID2 actual value feedback level.	RO
36	M11.3	**PID2 Error Value** Control deviation of PID2 in process units.	RO
38	M11.4	**PID2 Output** PID2 output percentage to the motor.	RO
39	M11.5	**PID2 Status** PID2 status indication, indicates if drive is stopped, running in PID mode, or in PID sleep mode.	RO

Modbus ID	Code	Parameters	RO/RW
3972	M14.1	**SD Card Plug In** SD Card Plug In: 0:No, SD card not plug in 1:Yes, SD card plug in	RO
26	M41.1.1	**Running Motors** Number of auxiliary motors currently running.	RO
2218	M41.2.1	**MPC Drive1 Operate Mode** Provides the operating mode of drive 1 while using Multi-Pump mode.	RO
2230	M41.2.2	**MPC Drive2 Operate Mode** Provides the operating mode of drive 2 while using Multi-Pump mode.	RO
2242	M41.2.3	**MPC Drive3 Operate Mode** Provides the operating mode of drive 3 while using Multi-Pump mode.	RO
2254	M41.2.4	**MPC Drive4 Operate Mode** Provides the operating mode of drive 4 while using Multi-Pump mode.	RO
2266	M41.2.5	**MPC Drive5 Operate Mode** Provides the operating mode of drive 5 while using Multi-Pump mode.	RO
2219	M41.3.1	**MPC Drive1 Status** Provides the run status of drive 1 while using the Multi-Pump mode.	RO
2231	M41.3.2	**MPC Drive2 Status** Provides the run status of drive 2 while using the Multi-Pump mode.	RO
2243	M41.3.3	**MPC Drive3 Status** Provides the run status of drive 3 while using the Multi-Pump mode.	RO
2255	M41.3.4	**MPC Drive4 Status** Provides the run status of drive 4 while using the Multi-Pump mode.	RO
2267	M41.3.5	**MPC Drive5 Status** Provides the run status of drive 5 while using the Multi-Pump mode.	RO
2220	M41.4.1	**MPC Drive1 Network Status** Provides the network status of drive 1 while using the Multi-Pump mode	RO
2232	M41.4.2	**MPC Drive2 Network Status** Provides the network status of drive 2 while using the Multi-Pump mode.	RO
2244	M41.4.3	**MPC Drive3 Network Status** Provides the network status of drive 3 while using the Multi-Pump mode.	RO
2256	M41.4.4	**MPC Drive4 Network Status** Provides the network status of drive 4 while using the Multi-Pump mode.	RO
2268	M41.4.5	**MPC Drive5 Network Status** Provides the network status of drive 5 while using the Multi-Pump mode.	RO
2221	M41.5.1	**MPC Drive1 Last Fault Code** Provides the latest fault code of drive 1 while using the Multi-Pump mode.	RO
2233	M41.5.2	**MPC Drive2 Last Fault Code** Provides the latest fault code of drive 2 while using the Multi-Pump mode.	RO
2245	M41.5.3	**MPC Drive3 Last Fault Code** Provides the latest fault code of drive 3 while using the Multi-Pump mode.	RO
2257	M41.5.4	**MPC Drive4 Last Fault Code** Provides the latest fault code of drive 4 while using the Multi-Pump mode.	RO
2269	M41.5.5	**MPC Drive5 Last Fault Code** Provides the latest fault code of drive 5 while using the Multi-Pump mode.	RO
2222	M41.6.1	**MPC Drive1 f-Out** Provides the output frequency (Hz) of drive 1 while using the Multi-Pump mode.	RO
2234	M41.6.2	**MPC Drive2 f-Out** Provides the output frequency (Hz) of drive 2 while using the Multi-Pump mode.	RO
2246	M41.6.3	**MPC Drive3 f-Out** Provides the output frequency (Hz) of drive 3 while using the Multi-Pump modes.	RO
2258	M41.6.4	**MPC Drive4 f-Out** Provides the output frequency (Hz) of drive 4 while using the Multi-Pump mode.	RO

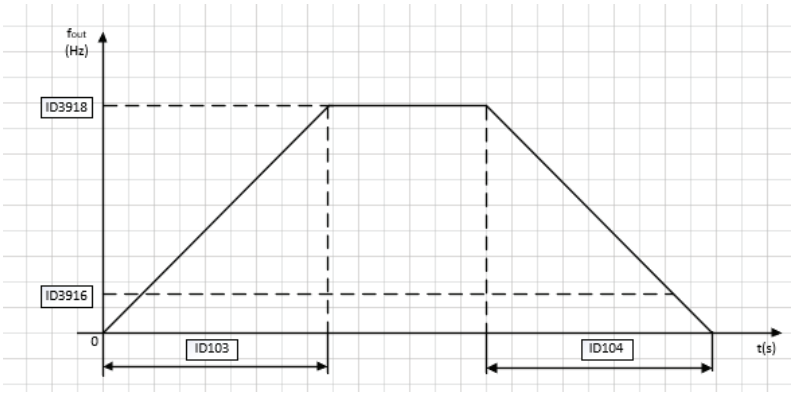
Modbus ID	Code	Parameters	RO/RW
2270	M41.6.5	**MPC Drive5 f-Out** Provides the output frequency (Hz) of drive 5 while using the Multi-Pump mode.	RO
2223	M41.7.1	**MPC Drive1 V-Out** Provides the motor voltage (Vac) of drive 1 while using the Multi-Pump mode.	RO
2235	M41.7.2	**MPC Drive2 V-Out** Provides the motor voltage (Vac) of drive 2 while using the Multi-Pump mode.	RO
2247	M41.7.3	**MPC Drive3 V-Out** Provides the motor voltage (Vac) of drive 3 while using the Multi-Pump mode.	RO
2259	M41.7.4	**MPC Drive4 V-Out** Provides the motor voltage (Vac) of drive 4 while using the Multi-Pump mode.	RO
2271	M41.7.5	**MPC Drive5 V-Out** Provides the motor voltage (Vac) of drive 5 while using the Multi-Pump mode.	RO
2224	M41.8.1	**MPC Drive1 I-Out** Provides the motor current (Amps) of drive 1 while using the Multi-Pump mode.	RO
2236	M41.8.2	**MPC Drive2 I-Out** Provides the motor current (Amps) of drive 2 while using the Multi-Pump mode.	RO
2248	M41.8.3	**MPC Drive3 I-Out** Provides the motor current (Amps) of drive 3 while using the Multi-Pump mode.	RO
2260	M41.8.4	**MPC Drive4 I-Out** Provides the motor current (Amps) of drive 4 while using the Multi-Pump mode.	RO
2272	M41.8.5	**MPC Drive5 I-Out** Provides the motor current (Amps) of drive 5 while using the Multi-Pump mode.	RO
2225	M41.9.1	**MPC Drive1 M-Out** Provides the motor torque (%) of drive 1 while using the Multi-Pump mode.	RO
2237	M41.9.2	**MPC Drive2 M-Out** Provides the motor torque (%) of drive 2 while using the Multi-Pump mode.	RO
2249	M41.9.3	**MPC Drive3 M-Out** Provides the motor torque (%) of drive 3 while using the Multi-Pump modes.	RO
2261	M41.9.4	**MPC Drive4 M-Out** Provides the motor torque (%) of drive 4 while using the Multi-Pump mode.	RO
2273	M41.9.5	**MPC Drive5 M-Out** Provides the motor torque (%) of drive 5 while using the Multi-Pump mode.	RO
2226	M41.10.1	**MPC Drive1 P-Out** Provides the motor power (%) of drive 1 while using the Multi-Pump mode.	RO
2238	M41.10.2	**MPC Drive2 P-Out** Provides the motor power (%) of drive 2 while using the Multi-Pump mode.	RO
2250	M41.10.3	**MPC Drive3 P-Out** Provides the motor power (%) of drive 3 while using the Multi-Pump mode.	RO
2262	M41.10.4	**MPC Drive4 P-Out** Provides the motor power (%) of drive 4 while using the Multi-Pump mode.	RO
2274	M41.10.5	**MPC Drive5 P-Out** Provides the motor power (%) of drive 5 while using the Multi-Pump mode.	RO
2227	M41.11.1	**MPC Drive1 n-Out** Provides the motor speed (RPM) of drive 1 while using the Multi-Pump mode.	RO
2239	M41.11.2	**MPC Drive2 n-Out** Provides the motor speed (RPM) of drive 2 while using the Multi-Pump mode.	RO
2251	M41.11.3	**MPC Drive3 n-Out** Provides the motor speed (RPM) of drive 3 while using the Multi-Pump mode.	RO
2263	M41.11.4	**MPC Drive4 n-Out** Provides the motor speed (RPM) of drive 4 while using the Multi-Pump mode.	RO

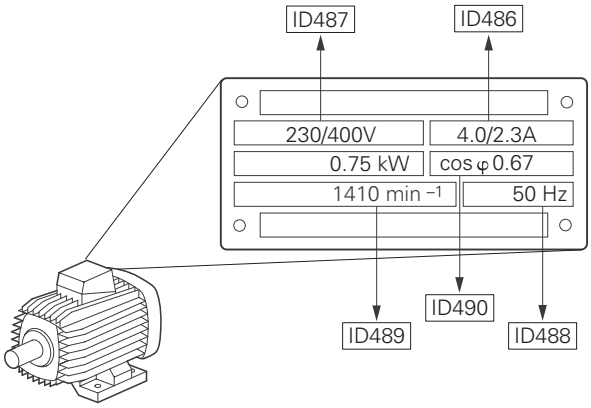
Modbus ID	Code	Parameters	RO/RW
2275	**M41.11.5**	**MPC Drive5 n-Out** Provides the motor speed (RPM) of drive 5 while using the Multi-Pump mode.	RO
2228	**M41.12.1**	**MPC Drive1 t-Run** Provides the motor run time of drive 1 while using the Multi-Pump mode.	RO
2240	**M41.12.2**	**MPC Drive2 t-Run** Provides the motor run time of drive 2 while using the Multi-Pump mode.	RO
2252	**M41.12.3**	**MPC Drive3 t-Run** Provides the motor run time of drive 3 while using the Multi-Pump mode.	RO
2264	**M41.12.4**	**MPC Drive4 t-Run** Provides the motor run time of drive 4 while using the Multi-Pump mode.	RO
2276	**M41.12.5**	**MPC Drive5 t-Run** Provides the motor run time of drive 5 while using the Multi-Pump mode.	RO
27	**M42.1**	**PT100 Temperture** PT100 thermistor temperature value in deg C.	RO
3248	**M43.1**	**SlotA DI Status** Slot DI status. If slot is IO1, it will be IO1 DI1/2/3 status. If slot is IO5, it will be IO5 DI 1/2/3/4/5/6 status. If no cards, it will be 0.	RO
3249	**M43.2**	**SlotB DI Status** Slot DI status. If slot is IO1, it will be IO1 DI1/2/3 status. If slot is IO5, it will be IO5 DI 1/2/3/4/5/6 status. If no cards, it will be 0.	RO
3653	**M43.3**	**SlotC DI Status** Slot DI status. If slot is IO1, it will be IO1 DI1/2/3 status. If slot is IO5, it will be IO5 DI 1/2/3/4/5/6 status. If no cards, it will be 0.	RO
3766	**M43.4**	**SlotD DI Status** Slot DI status. If slot is IO1, it will be IO1 DI1/2/3 status. If slot is IO5, it will be IO5 DI 1/2/3/4/5/6 status. If no cards, it will be 0.	RO
2209	**M96.1**	**Control Board DIDO Status** Control Board DIDO Status provides the status of inputs and outputs on the control board. It is looking at DIN1 - Terminal 8, DIN2 - Terminal 9, DIN3 - Terminal 10, DIN4 - Terminal 12, DIN5 - Terminal 13, DIN6 - Terminal 14.	RO
29	**M96.2**	**Application Status Word** Application Status word will provide additional status indication of the health of the drive. Bit 0 = MC Ready Bit 1 = MC_Run Bit 2 = MC_Fault Bit 3 = FB_Ref_Active Bit 4 = MC_Stopping Bit 5 = MC_Reverse Bit 6 = MC_Warning/AR-Fault Bit 7 = MC_Zero_Speed Bit 8 = IO Control Indicator Bit 9 = Panel Control Indicator Bit 10 = Panel Fieldbus Control Indicator Bit 11 = MC_DC_Brake Bit 12 = Run Enable Bit 13 = Run Bypass Bit 14 = External Brake Control Bit 15 = In Bypass Mode	RO
2414	**M96.3**	**Standard Status Word** Standard Status Word is defined based of the parameter setting in the Fieldbus Process Data Output(P96.1) group, P96.3.1 through P96.3.8 define the first 8 bits of this status word. The options for these bits are based off the standard Relay functions.	RO

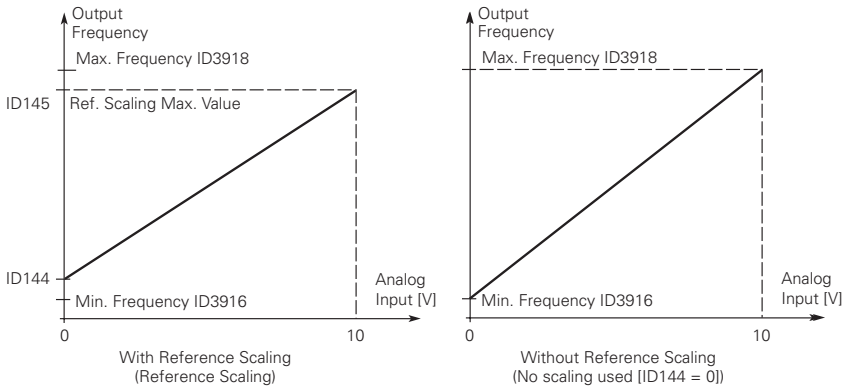
Modbus ID	Code	Parameters	RO/RW
2101	**M96.4**	**FB Status Word** The network status word is the drive status according to the active network protocol.	RO
2001	**M96.5**	**FB Ctrol Word** command word net	RW
2003	**M96.6**	**FB Speed Reference** Freq Reference from the network.	RW
2541	**M96.7**	**FB Torque Ref** This parameter shows the current torque reference from the field bus.	RW
2120	**M97.1**	**Energy Savings** Shows the energy savings of the drive compared to the linear V/Hz Ratio.	RO
601	**M98.1**	**Total MWh Count** Display parameters for the total energy consumption of the through-drive capability in megawatt hours.	RO
603	**M98.2**	**Total Power Day Count** Display parameter for the number of days during which the drive was supplied with mains voltage at the power terminals.	RO
606	**M98.3**	**Total Power Hr Count** Display parameter for the number of hours during which the drive was supplied with mains voltage at the power terminals.	RO
604	**M98.4**	**Trip MWh Count** Display parameter for the energy consumption in megawatt hours since the last reset via 'Reset Total MWh count since FCR' (ID635).	RO
635	**M98.5**	**Clear Trip MWh Count** This parameter resets the energy meter "Trip MWh Count" (ID604).	RW
636	**M98.6**	**Trip Power Day Count** Display parameter for the number of days since the last reset via 'Reset-t-PowerOn@Fault' (ID639) in which the drive was supplied with mains voltage at the power terminals.	RO
637	**M98.7**	**Trip Power Hr Count** Display parameter for the number of hours since the last reset via 'Reset-t-PowerOn@Fault' (ID639) in which the drive was supplied with mains voltage at the power terminals.	RO
639	**M98.8**	**Clear Trip Power Count** This parameter resets the two counters "Trip Power Day Count" (ID636) and "Trip Power Hr Count" (ID637).	RW
2827	**M99.1**	**Total Run Time Count** The entire runtime of the drive.	RO
2829	**M99.2**	**Trip Run Time Count** The runtime since the last start signal.	RO
2830	**M99.3**	**Numbers Of Start** The number of times the drive has been started.	RO
3916	**P1.1**	**Min Speed** Defines the lowest frequency the drive will operate at, this setting will limit other frequency parameter settings: 1 = Derag 2 = MPFC staging frequency 3 = MPFC master fixed frequency 4 = Prime pump frequency 5 = Prime pump frequency2	RW

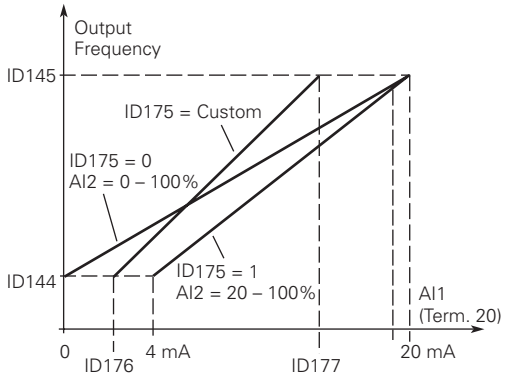
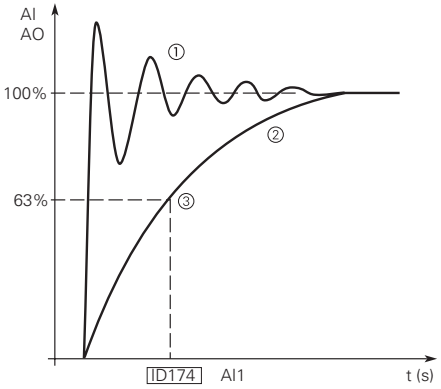
Modbus ID	Code	Parameters	RO/RW
3918	**P1.2**	**Max Speed** Defines the highest frequency the drive will operate at, this will limit other frequency parameters: 1 = Keypad reference 2 = Motor potentiometer 3 = Jog speed 4 = 2nd stage ramp frequency 5 = Derag 6 = MPFC staging frequency 7 = MPFC master fixed frequency 8 = Prime pump frequency 9= Prime pump frequency2 10 = Preset speed frequency 11 = Frequency limit value 12 = Reference limit value 13 = SpeedControl_fs2 14 = Stall frequency limit 15 = 4mA fault frequency 16 = MPFC De-Staging Frequency 17 = Pipe Fill Loss Frequency Low 18 = Pipe Fill Loss Frequency high 19 = Broken Pipe frequency limit	RW
103	**P1.3**	**Accel Time 1** The time required for the output frequency to accelerate from zero frequency to Max frequency (P1.2). When accelerating from different frequency levels the accel time will be a fraction of the total ramp time.	RW
104	**P1.4**	**Decel Time 1** Defines the ramp time required to decelerate from the max frequency 'f-max' (ID3918) to the zero frequency. If the output frequency is below the maximum frequency, the ramp time is shortened accordingly. Minimum speed parameter ID3916 will not impact the accel or decel time.	RW

Figure 30. Acceleration and deceleration time.



Modbus ID	Code	Parameters	RO/RW
1820	**P1.5**	**Motor Type Selection** Defines the type of Motor connected to the drive, Standard Induction motor, Internally mounted permanent magnet (IPM), or Surface mount permanent magnet (SPM) 0 = Inverter Duty 1 = IPM 2 = SPM **Figure 31. Motor parameters from ratings plate.** 	RW
486	**P1.6**	**Motor Nom Current** Motor nominal nameplate full load current. Find this value on the rating plate of the motor.	RW
489	**P1.7**	**Motor Nom Speed** Motor rated speed	RW
490	**P1.8**	**Motor PF** Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.	RW
487	**P1.9**	**Motor Nom Voltage** Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.	RW
488	**P1.10**	**Motor Nom Frequency** The rated frequency of the motor. This value can be found on the type plate of the motor.	RW
1695	**P1.11**	**Local Control Place** Defines the source for the start command in local mode. Start terminals are the hard-wired digital inputs and Keypad are the 'Start and Stop' buttons on the control unit. The keypad will display which mode is selected.	RW
136	**P1.12**	**Local Reference** This parameter determines the reference for Local control location, this value can be fed from a analog input, keypad, or fieldbus reference signal.	RW
135	**P1.13**	**Remote 1 Control Place** Defines the source for the start command in local mode. Start terminals are the hard-wired digital inputs and Keypad are the 'Start and Stop' buttons on the control unit. The keypad will display which mode is selected.	RW
137	**P1.14**	**Remote 1 Reference** This parameter determines the reference for Remote 1 control mode this value can be fed from a analog input, keypad, or fieldbus reference signal.	RW
2840	**P1.15**	**Frequency Reference Upper Limit** The max value of Frequency reference, it is used to limit the value of Frequency reference.	RW
2841	**P1.16**	**Frequency Reference Upper Limit Source** "Frequency reference upper limit source select 0 = Not Used; 1 = Freq Ref upper; 2 = AI1; 3 = AI2"	RW

Modbus ID	Code	Parameters	RO/RW
144	**P2.1.1**	**AI Ref Scale Min Value** Defines the minimum frequency used at 0% of the analog input. If AI TargetMin and AI TargetMax are set to zero, the analog input is scaled to the minimum and maximum frequencies.	RW
145	**P2.1.2**	**AI Ref Scale Max Value** Defines the maximum frequency used at 100% of the analog input. If AI TargetMin and AI TargetMax are set to zero, the analog input is scaled to the minimum and maximum frequencies. With and without reference scaling. **Figure 32. With and without reference scaling.**  	RW
2484	**P2.1.6**	**Fine Tuning Input** Selects the Analog input used for Fine adjustment tuning of a reference signal. 0 = Not Used 1 = AI1 2 = AI2 3 = Slot A: AI1 4 = Slot B: AI1 5 = Slot C: AI1 6 = Slot D: AI1 7 = Fieldbus	RW
2485	**P2.1.7**	**Fine Tuning Min** This parameter defines a percentage to be subtracted from the minimum value of the analog input selected in “Fine Tuning Input” (ID2484).	RW
2486	**P2.1.8**	**Fine Tuning Max** This parameter defines a percentage to be added to the maximum value of the analog input selected in “Fine Tuning Input” (ID2484).	RW
222	**P2.2.1**	**AI1 Mode** Selects the analog input mode(current or voltage) for AI1.	RW

Modbus ID	Code	Parameters	RO/RW
175	**P2.2.2**	**AI1 Signal Range** "With this parameter you can select the AI1 signal range, the options available are as follows 0 = 0-100%/0-20mA/0-10V/-10-10V 1= 20-100%/4-20mA/2-10V/-6-10V 2 = CUSTOMIZED,Customized" **Figure 33. Analog input AI scaling.**  	RW
176	**P2.2.3**	**AI1 Custom Min** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI1 Custom Min <= AI1 Custom Max.	RW
177	**P2.2.4**	**AI1 Custom Max** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI1 Custom Min <= AI1 Custom Max.	RW
174	**P2.2.5**	**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 34. AI1 signal filtering.**  ① Unfiltered analog signal. ② Filtered analog signal. ③ Filter time constant at 63% of the set value.	RW

Modbus ID	Code	Parameters	RO/RW
181	**P2.2.6**	**AI1 Signal Invert**	RW

Setting this parameter to 1 inverts the logic of the analog input. 0: 0 V / 0(4) mA = min reference, 10 V / 20 mA = max reference 1: 0 V / 0(4) mA = max reference, 10 V / 20 mA = min reference.

Figure 35. AI1 - No signal inversion.

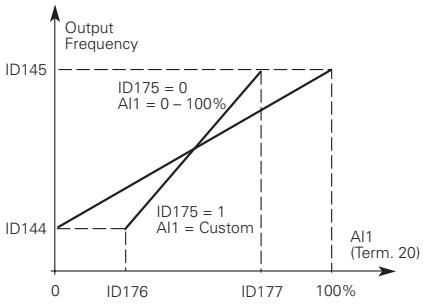
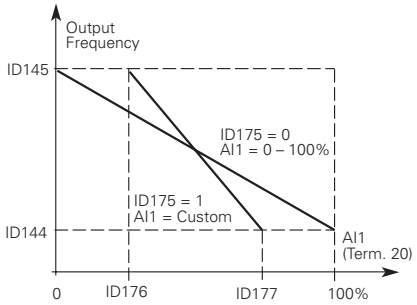


Figure 36. AI1 Signal Inversion



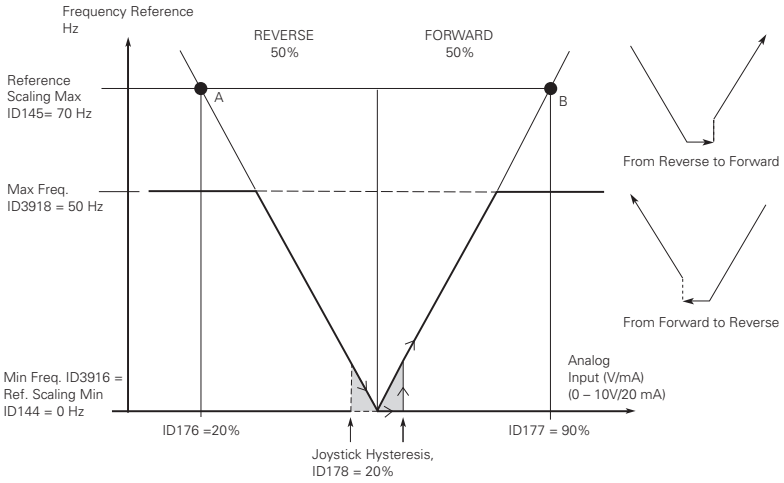
Maximum AI1 signal = minimum set speed.

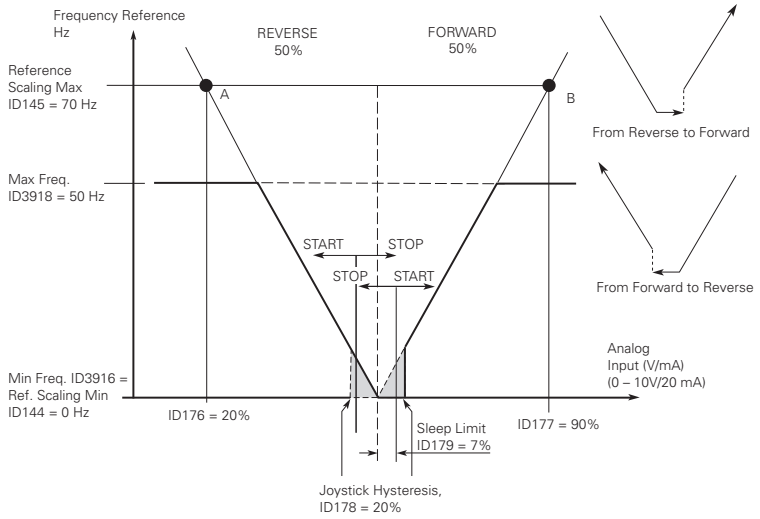
Minimum AI1 signal = maximum set speed.

178	**P2.2.7**	**AI1 Joystick Hyst**	RW

Defines the joystick hysteresis, when the analog input is within this range the drive will interpret this as a zero speed reference

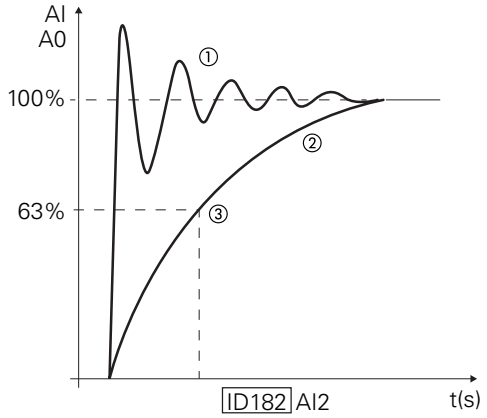
Figure 37. Example of joystick hysteresis.



Modbus ID	Code	Parameters	RO/RW
179	**P2.2.8**	**AI1 Sleep Limit** Defines the sleep level of the analog input, if the analog input signal is below this level for a time greater than the Analog Sleep Delay the drive will transition to a sleep state and restart when the analog input increases above this level **Figure 38. Example of sleep limit function.** 	RW
180	**P2.2.9**	**AI1 Sleep Delay** This parameter defines the delay for the sleep mode of the joystick function 'AI1 JS Sleep limit' (ID179).	RW
133	**P2.2.10**	**AI1 Joystick Offset** On delivery, the neutral position of the joystick function is in the middle of the selected range, e.g. at 5 V if the signal range 0-10 V is selected. This parameter can be used to move the neutral position. It is entered as a percentage of the maximum value of the setpoint signal.	RW
3775	**P2.2.11**	**Analog Input 1 Scale** Scaling of the Analog Input 2	RW
3776	**P2.2.12**	**Analog Input 1 Offset** Offset Analog Input 1	RW
223	**P2.3.1**	**AI2 Mode** Selects the analog input mode(current or voltage) for AI2	RW
183	**P2.3.2**	**AI2 Signal Range** With this parameter you can select the analog input 2 signal range. 0-100% is equal to 0 to 10V/ 0-20mA 20-100% is equal to 2 to 10V, 4-20mA. For selection 'Customized', see AI 'Custom Min' and 'AI Custom Max', this enables a customized signal range.	RW
184	**P2.3.3**	**AI2 Custom Min** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI2 Custom Min <= AI2 Custom Max.	RW
185	**P2.3.4**	**AI2 Custom Max** These parameters set the analog input signal range when custom Range is selected for AI1 signal. AI2 Custom Min <= AI2 Custom Max.	RW

Modbus ID	Code	Parameters	RO/RW
182	**P2.3.5**	**AI2 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.	RW

Figure 39. AI2 filter time.



Notes: ① Unfiltered analog signal.
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

Modbus ID	Code	Parameters	RO/RW
189	P2.3.6	**AI2 Signal Invert** inverts the reference signal maximum reference becomes minimum frequency and minimum reference becomes maximum frequency. If this parameter = 0, no inversion of analog Vin signal takes place. If this parameter = 1, inversion of analog signal takes place.	RW

Figure 40. AI2 - No signal inversion.

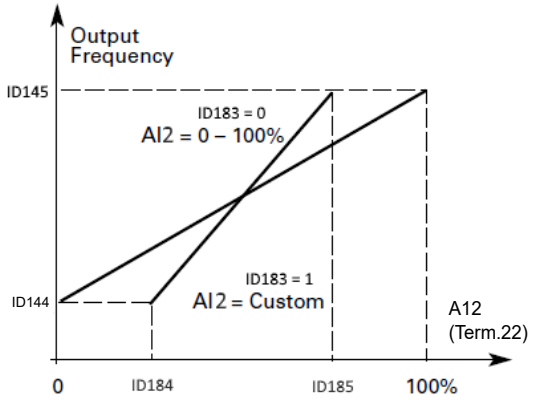
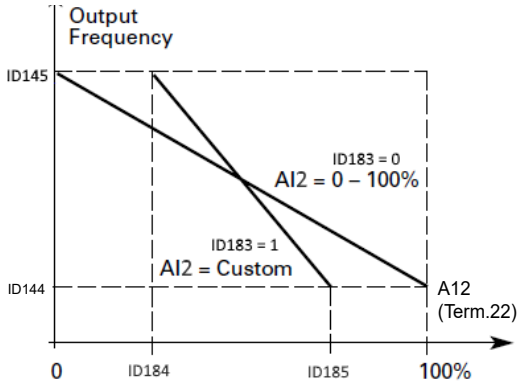


Figure 41. AI2 signal inversion.

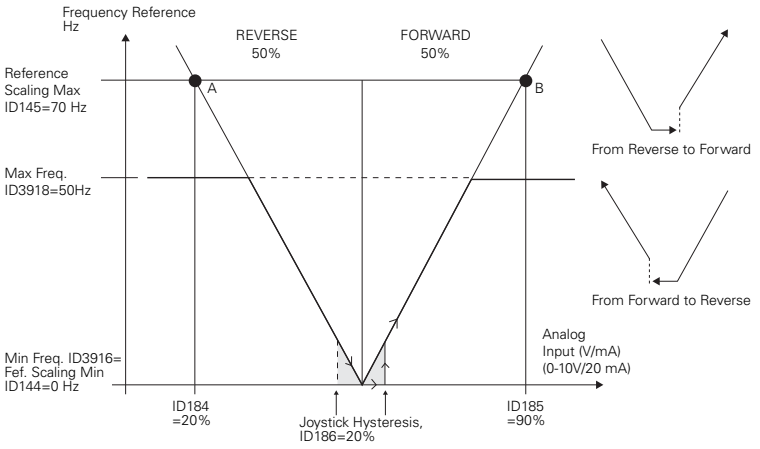


Maximum AI2 signal = minimum set speed.

Minimum AI2 signal = maximum set speed.

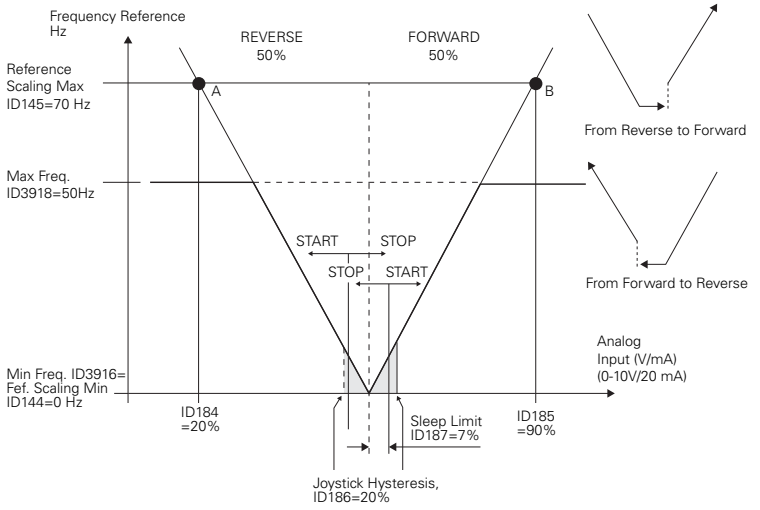
Modbus ID	Code	Parameters	RO/RW
186	**P2.3.7**	**AI2 Joystick Hyst** Defines the joystick hysteresis, when the analog input is within this range the drive will interpret this as a zero speed reference	RW

Figure 42. Example of joystick hysteresis.



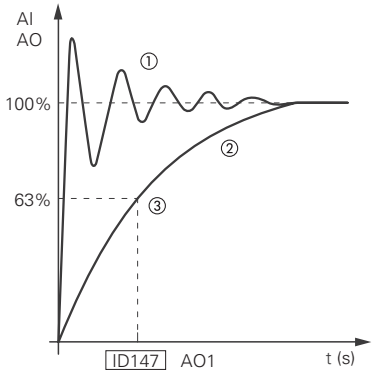
187	**P2.3.8**	**AI2 Sleep Limit** Defines the sleep level of the analog input, if the analog input signal is below this level for a time greater than the Analog Sleep Delay the drive will transition to a sleep state and restart when the analog input increases above this level	RW

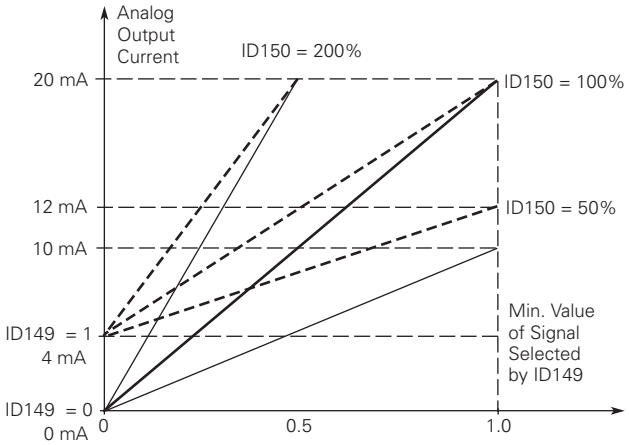
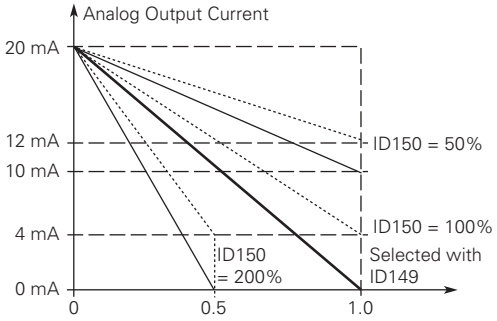
Figure 43. Example of sleep limit function.



188	**P2.3.9**	**AI2 Sleep Delay** This parameter defines the delay time for the sleep mode of the joystick function 'AI2 JS Sleep limit' (ID187).	RW
134	**P2.3.10**	**AI2 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.	RW
3777	**P2.3.11**	**Analog Input 2 Scale** Scaling of the Analog Input 2	RW
3778	**P2.3.12**	**Analog Input 2 Offset** Offset Analog Input 1	RW

Modbus ID	Code	Parameters	RO/RW
3970	P3.3.1	**CMA To GND Enable** CMA and GND Connect Enable Select: 0:Not connect CMA and GND 1:Connect CMA and GND	RW
3971	P3.3.2	**CMB To GND Enable** CMB and GND Connect Enable Select: 0:Not connect CMB and GND 1:Connect CMB and GND	RW
3843	P3.4.1.1	**High Freq Pulse Input 1 Type** Used to select high speed pulse input DI5 (DI5-HFP) type 0 = Normal DI; 1 = Pulse Input; 2 = PWM Input	RW
3844	P3.4.2.1	**High Freq Pulse Input 1 Func** Used to selecte the functions of high speed pulse input DI5 (DI5-HFP) 0:Speed Reference 1:PID1 Setpoint 2:PID1 Feedback 1 3:Motor Torque	RW
3845	P3.4.2.2	**High Freq Pulse Input 1 Scale** Scaling factor for high freq pulse input value from 10% to 1000%.	RW
3846	P3.4.2.3	**High Freq Pulse Input 1 Offset** Add –100.0 to 100.0% to the high speed pulse input DI5 (DI5-HFP) value to add in an additional offset scale factor.	RW
3847	P3.4.2.4	**High Freq Pulse Input 1 Filter Time** Defines the filtering time for the high speed pulse input DI5 (DI5-HFP) value, with a higher number the less filtering time is added on the high speed pulse input DI5 (DI5-HFP). Setting this parameter value to 0 will deactivate filtering.	RW
3849	P3.4.2.5	**High Freq Pulse Input 1 Min** Can use this parameters to set the min value of the high speed pulse input DI5 (DI5-HFP)	RW
3850	P3.4.2.6	**High Freq Pulse Input 1 Max** Can use this parameters to set the max value of the high speed pulse input DI5 (DI5-HFP)	RW
3851	P3.4.2.7	**High Freq Pulse Input 1 Fault** Action@DI5-HFP fault	RW
3852	P3.4.2.8	**High Freq Pulse Input 1 Low Limit** Set the high pulse DI fault detect low limit	RW
3853	P3.4.2.9	**High Freq Pulse Input 1 High Limit** Set the high pulse DI fault detect high limit	RW
3854	P3.4.2.10	**High Freq Pulse Input 1 Check Delay** Set the high pulse DI fault detect deleay time	RW
3855	P3.4.2.11	**High Freq Pulse Input 1 Hyst Level** Set the high pulse DI fault detect hystersis level value	RW
3856	P3.5.1.1	**High Freq Pulse Input 2 Type** Used to selecte the functions of high speed pulse input DI6 (DI6-HFP) 0 = Frequency reference 1 = PID setpoint source 2 = PID feedback source 3 = Torque reference	RW
3857	P3.5.2.1	**High Freq Pulse Input 2 Func** Used to selecte the functions of high speed pulse input DI6 (DI6-HFP) 0 = Frequency reference 1 = PID setpoint source 2 = PID feedback source 3 = Torque reference	RW
3858	P3.5.2.2	**High Freq Pulse Input 2 Scale** Scaling factor for high speed pulse input DI6 (DI6-HFP) value from 10% to 1000%.	RW

Modbus ID	Code	Parameters	RO/RW
3859	P3.5.2.3	**High Freq Pulse Input 2 Offset** Add –100.0 to 100.0% to the high speed pulse input DI6 (DI6-HFP) value to add in an additional offset scale factor.	RW
3860	P3.5.2.4	**High Freq Pulse Input 2 Filter Time** Defines the filtering time for the high speed pulse input DI6 (DI6-HFP) value, with a higher number the less filtering time is added on the high speed pulse input DI6 (DI6-HFP). Setting this parameter value to 0 will deactivate filtering.	RW
3862	P3.5.2.5	**High Freq Pulse Input 2 Min** Can use this parameters to set the min value of the high speed pulse input DI6 (DI6-HFP)	RW
3863	P3.5.2.6	**High Freq Pulse Input 2 Max** Can use this parameters to set the max value of the high speed pulse input DI6 (DI6-HFP)	RW
3864	P3.5.2.7	**High Freq Pulse Input 2 Fault** Action at DI6-HFP fault	RW
3865	P3.5.2.8	**High Freq Pulse Input 2 Low Limit** Set the high speed pulse input DI6 (DI6-HFP) fault detect low limit	RW
3866	P3.5.2.9	**High Freq Pulse Input 2 High Limit** Set the high speed pulse input DI6 (DI6-HFP) fault detect high limit	RW
3867	P3.5.2.10	**High Freq Pulse Input 2 Check Delay** Set the high speed pulse input DI6 (DI6-HFP) fault detect deleay time	RW
3868	P3.5.2.11	**High Freq Pulse Input 2 Hyst level** Set the high speed pulse input DI6 (DI6-HFP) fault detect hystersis level value	RW
227	P4.2.1	**AO1 Mode** Selects the analog output mode for AO1 current or voltage. There are internal relays to perform the switching of the signal between mA or V.	RW
146	P4.2.2	**AO1 Function** Selects the desired function for analog output 1 at terminal 22.	RW
147	P4.2.3	**AO1 Filter Time** Selects the desired function for analog output 1 at terminal 22. **Figure 44. Analog output filtering.**  **Notes** ① Unfiltered analog signal. ② Filtered analog signal. ③ Filter time constant at 63% of the set value.	RW
149	P4.2.8	**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).	RW

Modbus ID	Code	Parameters	RO/RW
150	**P4.2.9**	**A01 Scale** Scaling of the Analog Output 1 Scaling factor from 10% to 1000% by which the output signal is multiplied. By defining this value, the scale of the analog signal is increased or decreased within the limits of 0-10 V/0-20 mA or 2-10 V/4-20 mA. **Figure 45. Analog output scaling.**  	RW
148	**P4.2.10**	**A01 Inversion** Inverts the analog output signal, normally 0V/0mA/2V/4mA = 0% and 10V/20mA = 100%, when inverted 0V/0mA/2V/4mA = 100% and 10V/20mA = 0%: Maximum output signal = Minimum set value. Minimum output signal = Maximum set value. **Figure 46. Analog output invert.**  	RW
173	**P4.2.11**	**A01 Offset** Adds -100.0 to 100.0 % to the minimum value of analog output 1 to enable an additional compensation factor.	RW

Modbus ID	Code	Parameters	RO/RW
152	**P5.1.1**	**RO1 Function**	RW
		Setting Value Signal Content	
		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 = Drive Over Temperature Fault	
		14 = Over Current Fault	
		15 = Over Voltage Fault	
		16 = Under Voltage Fault	
		17 = Analog Input Less Then 4mA	
		18 = Ext Brake Control	
		19 = Ext Brake Inverted	
		20 = Torq Limit Superv	
		21 = Ref Limit Superv	
		22 = Control from I/O	
		23 = Direction Dis-match Set Direction	
		24 = Thermistor Input Fault	
		26 = In Bypass Mode	
		27 = Ext Fault/Warning	
		28 = Remote Control	
		29 = Jog Speed Select	
		30 = Motor Overload	
		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 = Emergency Stop	
		40 = Power Limit Superv	
		41 = emp 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	

Modbus ID	Code	Parameters	RO/RW
152(cont.)		51 = Motor Current 1 Supv	RW
		52 = Motor Current 2 Supv	
		53 = Second AI Limit Supv	
		54 = DC Charge Switch Close	
		55 = Preheat Active	
		56 = Cold Weather Active	
		57 = Prime Pump Active	
		58 = 2nd Stage Ramp Frequency Active	
		59 = STO Fault	
		60 = Run Bypass or run Drive	
		61 = Bypass Overload Fault	
		62 = Bypass Run	
		63 = Auto Change To Local On COM Fault	
		64 = Modbus RTU Comm Fault	
		65 = Modbus TCP Comm Fault	
		71 = Jockey Pump Active	
		72 = Lube Pump Active	
		73 = PID1 Low Feedback	
		74 = PID1 High Feedback	
		75 = PID2 Low Feedback	
		76 = PID2 High Feedback	
		77 = Master in MPFC	
		78 = Clean Power Interlock Fault	
		79 = Valve Control	
		80 = Inch Speed Select	
		81 = AI Fault	
		83 = SlotD Fieldbus Com Fault	
		84 = Speed Limit Superv	
2112	**P5.1.2**	**RO1 On Delay**	RW
		Delay time to switch on the RO1 relay upon activation.	
2113	**P5.1.3**	**RO1 Off Delay**	RW
		Delay time for turning off the RO1 relay after it is deactivated.	
153	**P5.1.4**	**RO2 Function**	RW
		Setting Value Signal Content	
		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 = Drive Over Temperature Fault	
		14 = Over Current Fault	
		15 = Over Voltage Fault	
		16 = Under Voltage Fault	
		17 = Analog Input Less Then 4mA	
		18 = Ext Brake Control	

Modbus ID	Code	Parameters	RO/RW
153(cont.)	**P5.1.4**	**RO2 Function (cont.)** 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Direction Dis-match Set Direction 24 = Thermistor Input Fault 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Overload 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 = Emergency Stop 40 = Power Limit Superv 41 = emp 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 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2nd Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass or run Drive 61 = Bypass Overload Fault 62 = Bypass Run 63 = Auto Change To Local On COM Fault 64 = Modbus RTU Comm Fault 65 = Modbus TCP Comm Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback	RW

Modbus ID	Code	Parameters	RO/RW
153 (cont.)	**P5.1.4**	**RO2 Function (cont.)** 76 = PID2 High Feedback 77 = Master in MPFC 78 = Clean Power Interlock Fault 79 = Valve Control 80 = Inch Speed Select 81 = AI Fault 83 = SlotD Fieldbus Com Fault 84 = Speed Limit Superv	RW
2114	**P5.1.5**	**RO2 On Delay** Delay time to switch on the RO2 relay upon activation.	RW
2115	**P5.1.6**	**RO2 Off Delay** Delay time for turning off the RO2 relay after it is deactivated.	RW
151	**P5.2.1**	**D01 Function** Setting Value Signal Content 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 = Drive Over Temperature Fault 14 = Over Current Fault 15 = Over Voltage Fault 16 = Under Voltage Fault 17 = Analog Input Less Then 4mA 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Direction Dis-match Set Direction 24 = Thermistor Input Fault 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Overload 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 = Emergency Stop 40 = Power Limit Superv	RW

Modbus ID	Code	Parameters	RO/RW
151 (cont.)	**P5.2.1**	**D01 Function (Cont.)**	RW
		41 = emp 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	
		51 = Motor Current 1 Supv	
		52 = Motor Current 2 Supv	
		53 = Second AI Limit Supv	
		54 = DC Charge Switch Close	
		55 = Preheat Active	
		56 = Cold Weather Active	
		57 = Prime Pump Active	
		58 = 2nd Stage Ramp Frequency Active	
		59 = STO Fault	
		60 = Run Bypass or run Drive	
		61 = Bypass Overload Fault	
		62 = Bypass Run	
		63 = Auto Change To Local On COM Fault	
		64 = Modbus RTU Comm Fault	
		65 = Modbus TCP Comm Fault	
		71 = Jockey Pump Active	
		72 = Lube Pump Active	
		73 = PID1 Low Feedback	
		74 = PID1 High Feedback	
		75 = PID2 Low Feedback	
		76 = PID2 High Feedback	
		77 = Master in MPFC	
		78 = Clean Power Interlock Fault	
		79 = Valve Control	
		80 = Inch Speed Select	
		81 = AI Fault	
		83 = SlotD Fieldbus Com Fault	
		84 = Speed Limit Superv	

Modbus ID	Code	Parameters	RO/RW
2463	**P5.3.1**	**Virtual RO1 Function** Setting Value Signal Content 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 = Drive Over Temperature Fault 14 = Over Current Fault 15 = Over Voltage Fault 16 = Under Voltage Fault 17 = Analog Input Less Then 4mA 18 = Ext Brake Control 19 = Ext Brake Inverted 20 = Torq Limit Superv 21 = Ref Limit Superv 22 = Control from I/O 23 = Direction Dis-matc 24 = Thermistor Input Fault 26 = In Bypass Mode 27 = Ext Fault/Warning 28 = Remote Control 29 = Jog Speed Select 30 = Motor Overload 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 = Emergency Stop 40 = Power Limit Superv 41 = emp 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	RW

Modbus ID	Code	Parameters	RO/RW
2463 (cont.)	**P5.3.1**	**Virtual RO1 Function (cont.)** 51 = Motor Current 1 Supv 52 = Motor Current 2 Supv 53 = Second AI Limit Supv 54 = DC Charge Switch Close 55 = Preheat Active 56 = Cold Weather Active 57 = Prime Pump Active 58 = 2nd Stage Ramp Frequency Active 59 = STO Fault 60 = Run Bypass or run Drive 61 = Bypass Overload Fault 62 = Bypass Run 63 = Auto Change To Local On COM Fault 64 = Modbus RTU Comm Fault 65 = Modbus TCP Comm Fault 71 = Jockey Pump Active 72 = Lube Pump Active 73 = PID1 Low Feedback 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback 77 = Master in MPFC 78 = Clean Power Interlock Fault 79 = Valve Control 80 = Inch Speed Select 81 = AI Fault 83 = SlotD Fieldbus Com Fault 84 = Speed Limit Superv	RW
2848	**P5.3.2**	**Virtual RO1 On Delay** Delay time before the Vitrual Output switches from logic 0 to logic 1.	RW
2849	**P5.3.3**	**Virtual RO1 Off Delay** Delay time before the Virtual Output switches from o to off.	RW
2464	**P5.3.4**	**Virtual RO2 Function** Selection of the function of virtual relay VDO2 Setting Value Signal Content 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 = Drive Over Temperature Fault 14 = Over Current Fault 15 = Over Voltage Fault	RW

Modbus ID	Code	Parameters	RO/RW
2464 (cont.)	**P5.3.4**	**Virtual RO2 Function (cont.)**	RW
		16 = Under Voltage Fault	
		17 = Analog Input Less Then 4mA	
		18 = Ext Brake Control	
		19 = Ext Brake Inverted	
		20 = Torq Limit Superv	
		21 = Ref Limit Superv	
		22 = Control from I/O	
		23 = Direction Dis-match Set Direction	
		24 = Thermistor Input Fault	
		26 = In Bypass Mode	
		27 = Ext Fault/Warning	
		28 = Remote Control	
		29 = Jog Speed Select	
		30 = Motor Overload	
		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 = Emergency Stop	
		40 = Power Limit Superv	
		41 = emp 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	
		51 = Motor Current 1 Supv	
		52 = Motor Current 2 Supv	
		53 = Second AI Limit Supv	
		54 = DC Charge Switch Close	
		55 = Preheat Active	
		56 = Cold Weather Active	
		57 = Prime Pump Active	
		58 = 2nd Stage Ramp Frequency Active	
		59 = STO Fault	
		60 = Run Bypass or run Drive	
		61 = Bypass Overload Fault	
		62 = Bypass Run	
		63 = Auto Change To Local On COM Fault	
		64 = Modbus RTU Comm Fault	
		65 = Modbus TCP Comm Fault	
		71 = Jockey Pump Active	
		72 = Lube Pump Active	
		73 = PID1 Low Feedback	

Modbus ID	Code	Parameters	RO/RW
2464 (cont.)	P5.3.4	**Virtual RO2 Function (cont.)** 74 = PID1 High Feedback 75 = PID2 Low Feedback 76 = PID2 High Feedback 77 = Master in MPFC 78 = Clean Power Interlock Fault 79 = Valve Control 80 = Inch Speed Select 81 = AI Fault 83 = SlotD Fieldbus Com Fault 84 = Speed Limit Superv	RW
2850	P5.3.5	**Virtual RO2 On Delay** Delay time for switching on the virtual output VDO2 after activation.	RW
2851	P5.3.6	**Virtual RO2 Off Delay** Delay time for switching off the virtual output VDO2 after deactivation.	RW
3869	P5.4.1.1	**High Freq Pulse Output Type** Used to selecte high freq pulse output type 0 = Normal DO 1 = General Pulse Output 2 = PWM Output	RW
3870	P5.4.2.1	**High Freq Pulse Output Source** Used to selecte the destination of the high freq pulse output	RW
3871	P5.4.2.2	**High Freq Pulse Output Scale** Scaling factor for high freq pulse output value from 10% to 1000%.	RW
3872	P5.4.2.3	**High Freq Pulse Output Offset** Add –100.0 to 100.0% to the high freq pulse output value to add in an additional offset scale factor.	RW
3873	P5.4.2.4	**High Freq Pulse Output Filter Time** Defines the filtering time for the high freq pulse output value, with a higher number the less filtering time is added on the high pulse DO. Setting this parameter value to 0 will deactivate filtering.	RW
3875	P5.4.2.5	**High Freq Pulse Output Min** Can use this parameters to set the min value of the high freq pulse output	RW
3876	P5.4.2.6	**High Freq Pulse Output Max** Can use this parameters to set the max value of the high freq pulse output	RW
3877	P5.4.2.7	**High Freq Pulse Output Fault** Action at DO1-HFP fault	RW
3878	P5.4.2.8	**High Freq Pulse Output Low Limit** Set the high freq pulse output fault detect low limit	RW
3879	P5.4.2.9	**High Freq Pulse Output High Limit** Set the high freq pulse output fault detect high limit	RW
3880	P5.4.2.10	**High Freq Pulse Output Check Delay** Set the high freq pulse output fault detect deleay time	RW
3881	P5.4.2.11	**High Freq Pulse Output Hyst Level** Set the high freq pulse output fault detect hystersis level value	RW

Modbus ID	Code	Parameters	RO/RW
143	P7.1.1	**IO Terminal 1 Start Stop Logic**	RW

For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output for which you define a certain function.

0 = DI closed contact = start forward : DI closed contact = start reverse - This would be considered 2-wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.

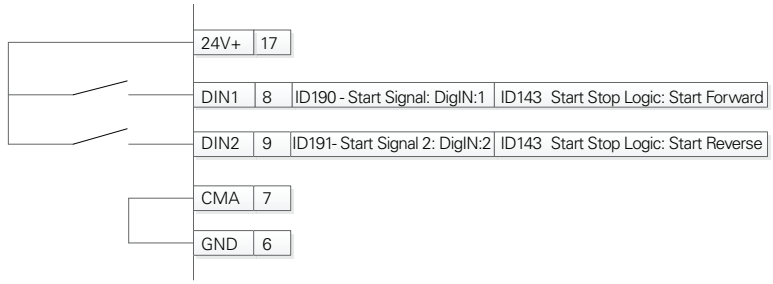
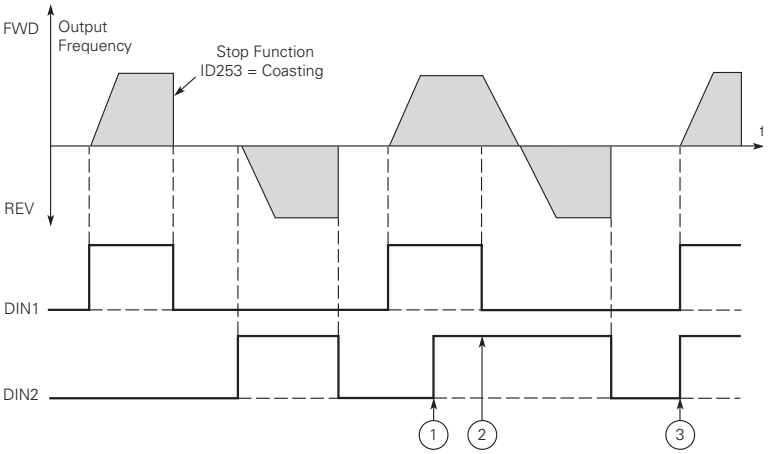


Figure 47. Start forward/start reverse.



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.

Modbus ID	Code	Parameters	RO/RW
143	**P7.1.1**	**IO Terminal 1 Start Stop Logic, continued.**	RW

1 = DI closed contact = start /open contact = stop: DI closed contact = reverse / open contact = forward - This would be considered 2 wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.

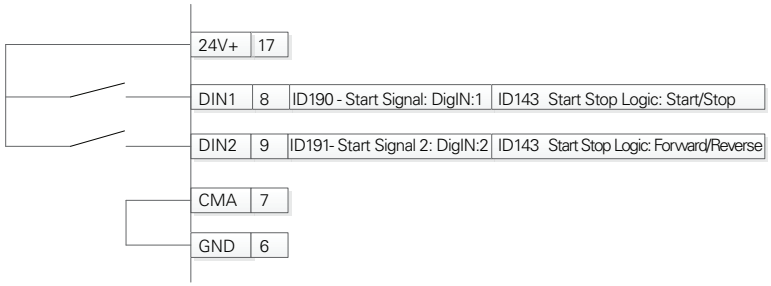
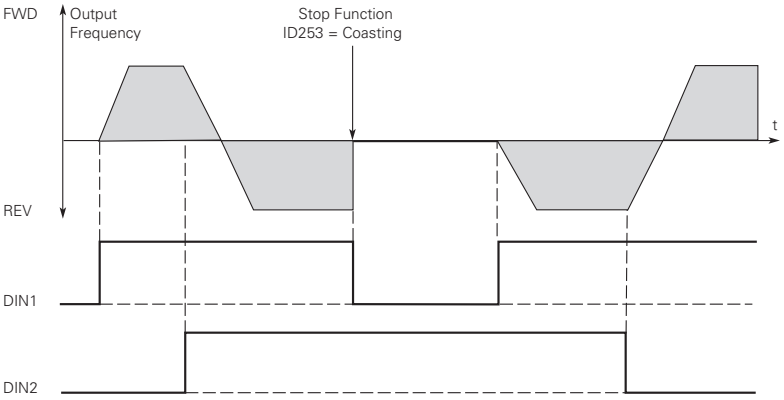
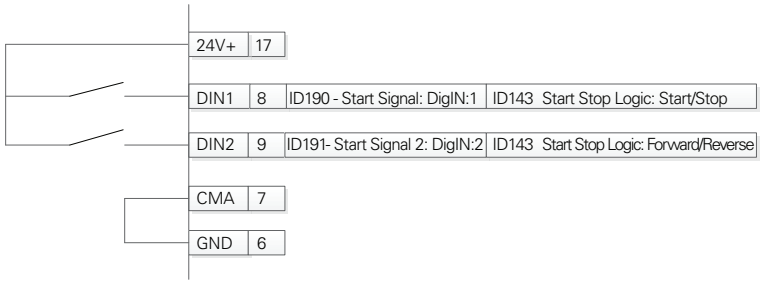


Figure 48. Start, stop, and reverse.



2 = DI closed contact = start / open contact = stop : DI closed contact = start enabled / open contact = start disabled and drive stopped if running motor direction keeps forward - This would be considered 3-wire control with Start signal 2 required to be closed to enable Start on Start signal 1.



Modbus ID	Code	Parameters	RO/RW
143	**P7.1.1**	**IO Terminal 1 Start Stop Logic, continued** 3 = Three-wire connection (pulse control): DI changes from open to closed = start pulse : DI changes from closed to open = stop pulse DI closed contact = reverse/ open contact = forward - This would be considered 3-wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.	RW

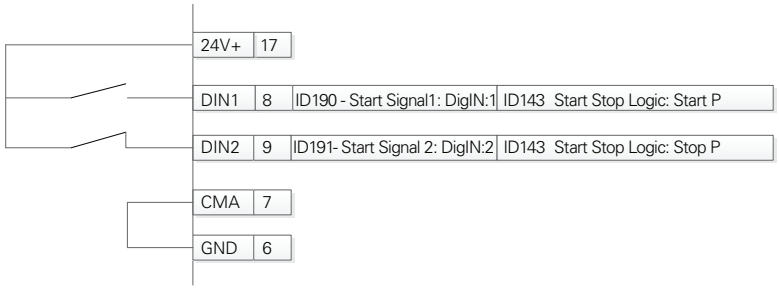
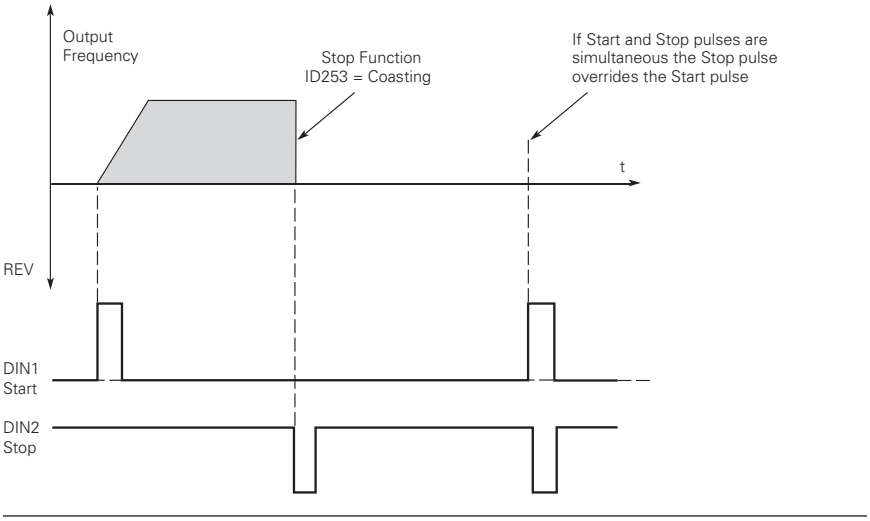


Figure 49. Start pulse/stop pulse.

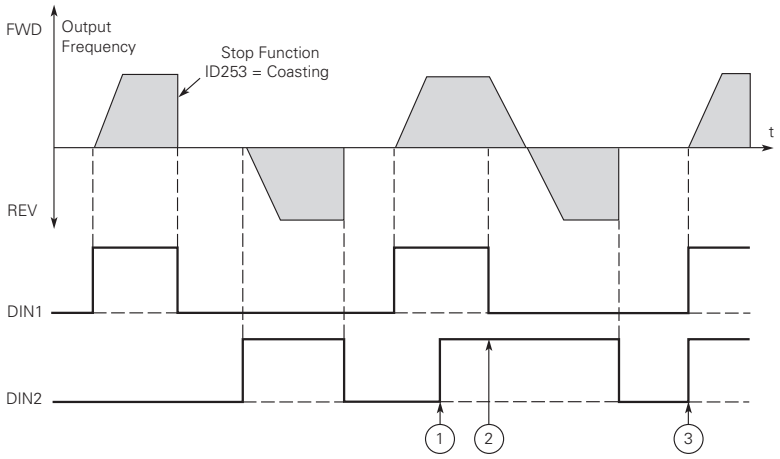


190	**P7.1.2**	**IO Terminal 1 Start Signal 1** Signal selection 1 for the start/stop logic. This parameter would correspond to the function listed for DIN1. When the parameter is set to DigIN: 1 it references DIN1 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigIN:X indicates on board terminal inputs, DigIN:A:IOX:X indicates optional board inputs in A slot, DigIN:B:IOX:X indicates optional board inputs in B slot, DigIN:C:IOX:X indicates optional board inputs in C slot, DigIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X.	RW
191	**P7.1.3**	**IO Terminal 1 Start Signal 2** Signal selection 2 for the start/stop logic listed. This parameter would correspond to the function listed for DIN2. When the parameter is set to DigIN: 2 it references DIN2 on the control board, selecting different DIGIN values will assign it to a different input on the control board or option card. When set to Normally Open this function would be always tied low or 0 when using I/O terminal 1 as the control place. When value is set to Normally Closed this will cause the function to be always on and activate the output if I/O Terminal 1 is the current control place. Can be set to DigIN:X indicates on board terminal inputs, DigIN:A:IOX:X indicates optional board inputs in A slot, DigIN:B:IOX:X indicates optional board inputs in B slot, DigIN:C:IOX:X indicates optional board inputs in C slot, DigIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X.	RW

Modbus ID	Code	Parameters	RO/RW
2206	P7.1.4	**IO Terminal 2 Start Stop Logic**	RW

For the DI function, we use Terminal programming method to function (TTF), you have a fixed input or output that you define a certain function for.
0 = DI closed contact = start forward : DI closed contact = start reverse - This would be considered 2 wire control with either a contact used on the Start FWD or Start REV commands. Contacts Open the motor stops.

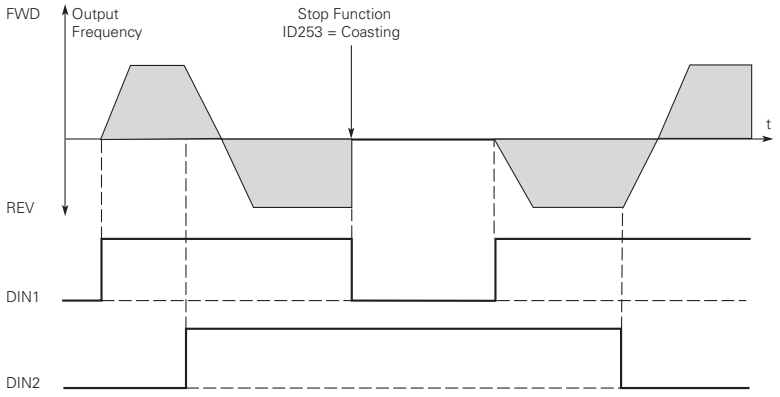
Figure 50. Start forward/start reverse.



1 = DI closed contact = start /open contact = stop : DI closed contact = reverse / open contact = forward - This would be considered 2-wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.

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.

Figure 51. Start, stop, and reverse.

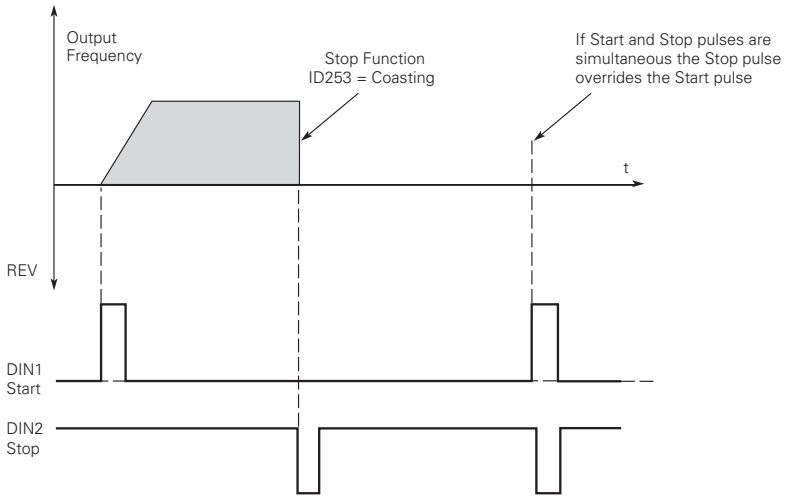


2= DI closed contact = start / open contact = stop : DI closed contact = start enabled / open contact = start disabled and drive stopped if running motor direction keeps forward - This would be considered 3-wire control with Start signal 2 required to be closed to enable Start on Start signal 1.

3 = Three-wire connection (pulse control): DI changes from open to closed = start pulse: DI changes from closed to open = stop pulse: DI closed contact = reverse/ open contact = forward - This would be considered 3-wire control with Start Signal 1 being the Start Pulse and Start Signal 2 being the NC Stop.

Modbus ID	Code	Parameters	RO/RW
2206	**P7.1.4**	**IO Terminal 2 Start Stop Logic, continued.**	RW

Figure 52. Start pulse/stop pulse.



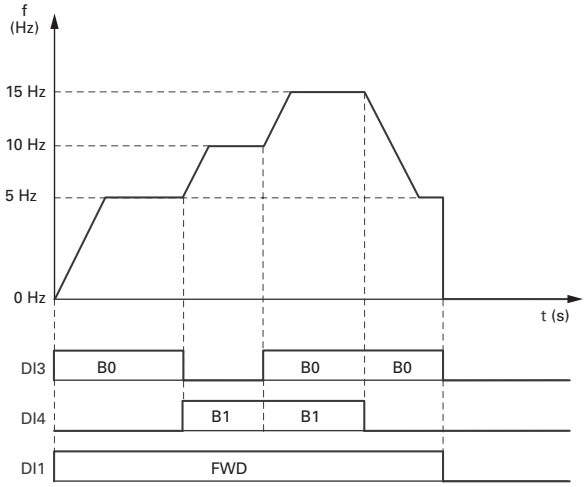
2207	**P7.1.5**	**IO Terminal 2 Start Signal 1** The 2nd Signal selection 1 for the start/stop logic listed . Can be set to DigiIN:X indicates on board terminal inputs, DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
2208	**P7.1.6**	**IO Terminal 2 Start Signal 2** The 2nd Signal selection 2 for the start/stop logic listed. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
198	**P7.1.7**	**Reverse** Source for the REV command	RW
1679	**P7.1.8**	**Reverse Enable** Enables or disables anticlockwise operation of the motor.	RW
194	**P7.1.9**	**Run Enable** Allows start to be released, which is required with the start command so that the variable frequency drive switches on the outlet. If the function is set to DI = OFF, the drive will regard this as an open input and will never allow the drive to start, as release start is missing. The factory setting is DI = ON, so that the drive always has an active start release and accepts the start command. If assigned to one of the DIX or time channels, the corresponding input must be closed in order to activate the start release. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2, DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact = start release enabled Open contact = start release disabled	RW
2667	**P7.1.10**	**Run Remove Stop Mode** Drive will use this stop mode setting if Run Enable (Par ID 594) signal is removed. Default value should be coast stop.	RW

Modbus ID	Code	Parameters	RO/RW
200	**P7.1.12**	**Fault Reset** Allows for external fault reset input. This function is looking for a rising edge to reset a fault. If this function is set for Normally Open, the drive will not do a reset via the control terminals. When set for Normally Closed, the fault condition will always be trying to reset on the rising edge. When it is tied to an input on the control board or option card the function would be set to DIGIN: and the input desired. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. DI change from open contact to closed contact: reset fault.	RW
252	**P7.1.13**	**Start Mode** Defines the behaviour of the drive relating to the enable digital input and also configures the automatic restart function.	RW
253	**P7.1.14**	**Stop Mode**	RW
2483	**P7.1.15**	**Fault Reset Start** "Defines how the drive functions after a Fault Reset is given if the run command has to be cycled or if still present it will start again. 0 - Follow Run Command - Follow Start/Stop input after fault reset. 1 - Rising Edge After Fault Reset - Toggle of Run input required to start after fault reset."	RW
267	**P7.1.16**	**Power Loss Function** "This enables the drive to reduce output voltage to the motor to keep the drive powered up as long as it can before power is lost. The motor is used as a generator to feed the DC bus. This mode is engaged at the following levels - 230V - 156.8Vdc, 480V - 303Vdc, and 575 - 426.65Vdc. 1 = Enable power loss function 0 = Disable power loss function"	RW
268	**P7.1.17**	**Power Loss Time** Maximum permitted duration of a voltage interruption for the 'Power loss function' (ID267) before the drive switches off with a fault. If the power supply is restored within this time setting, the drive remains operational.	RW
2462	**P7.1.18**	**Bumpless Enable** If enabled, when switching between local and remote control, the outlet of the inverter is not switched to the new setpoint source until the setpoint is changed at the new setpoint source.	RW
2522	**P7.1.19**	**Switching Frequency** Power stage switching frequency. Higher frequency reduces the audible 'ringing' noise from the motor, and improves the output current waveform, at the expense of increased heat losses within the drive. When Sine filter enable(ID1665) is enabled, this parameter's maximum value will be limit to as follow : 1) 230V/480V FR1-FR5 Limit to 8KHz 2) 230V/480/575V FR6 Limit to 4KHz 3) 575 FR1-FR5 No special limitation	RW
1665	**P7.1.20**	**Sine Filter Enable** This parameter enables the drive to have a set switching frequency(Par ID 2522) which is required by sine filters. The drive no longer automatically adjusts the switching frequency based on the unit temperature.	RW
747	**P7.1.21**	**Ext Fault-AR** Device reaction after occuring of 'Emergency Stop'. Possibilities device dependent	RW
2465	**P7.1.22**	**HOA Source** Enables the HOA control function. If enabled it selectes the desired location for switching between Hand, Off, and Auto control locations. 0 - Disabled - Off is disable and the standard Loc/Rem is used. 1 - HOA Source:I/O Terminal - Drive is looking for control source selection via I/O terminals. Have to use the HOA On/Off digital input along with Force Hand or Remote to function. 2 - HOA Source:Keypad - Keypad Loc/Rem button will function as the switch between Hand/Off/Auto.	RW

Modbus ID	Code	Parameters	RO/RW
3916	**P7.2.1**	**Min Speed** Defines the lowest frequency the drive will operate at, this setting will limit other frequency parameter settings: 1 = Derag 2 = MPFC staging frequency 3 = MPFC master fixed frequency 4 = Prime pump frequency 5 = Prime pump frequency2	RW
3918	**P7.2.2**	**Max Speed** Defines the highest frequency the drive will operate at, this will limit other frequency parameters: 1 = Keypad reference 2 = Motor potentiometer 3 = Jog speed 4 = 2nd stage ramp frequency 5 = Derag 6 = MPFC staging frequency 7 = MPFC master fixed frequency 8 = Prime pump frequency 9= Prime pump frequency2 10 = Preset speed frequency 11 = Frequency limit value 12 = Reference limit value 13 = SpeedControl_fs2 14 = Stall frequency limit 15 = 4mA fault frequency 16 = MPFC De-Staging Frequency 17 = Pipe Fill Loss Frequency Low 18 = Pipe Fill Loss Frequency high 19 = Broken Pipe frequency limit	RW
3914	**P7.2.3**	**Keypad Reference** Keypad Reference value.	RW
782	**P7.2.4**	**Keypad Torque Ref** Keypad Torque speed reference.	RW
208	**P7.2.5**	**AI Ref Source Select** Selection switches between AI1 and AI2 reference signals that are located on the control board. When this function is set for Normally Open the drive will follow the AI1 input. If the function is set for Normally Close the AI2 input would then be active. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: AI2 is selected for reference source. Open contact: AI1 is selected for reference source.	RW
205	**P7.2.6**	**Preset Speed B0** Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW

Modbus ID	Code	Parameters	RO/RW
206	**P7.2.7**	**Preset Speed B1** Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
207	**P7.2.8**	**Preset Speed B2** Preset bit select inputs to select preset speed reference values. Validating 3 digital inputs will allow for 7 preset speeds to be obtained. When switching between inputs it will follow the acceleration and deceleration time. When all the inputs are set to Normally Open none of the preset speeds will be enabled and the output will follow the control place reference command. If the function is set for Normally Closed the drive will follow the preset speed assigned to the inputs enabled. When assigned to one of the DIGIN on the control board or an installed option card it is looking for a high input to enable that preset. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW

Figure 53. Activation of fixed frequencies.



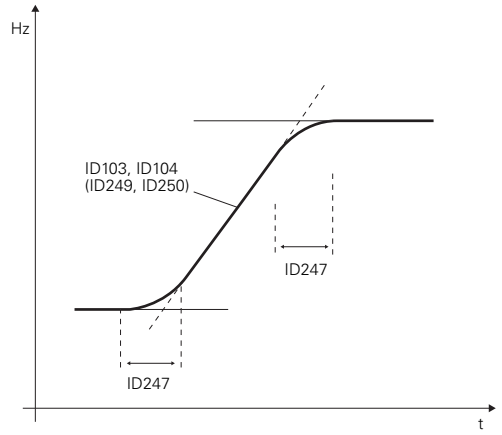
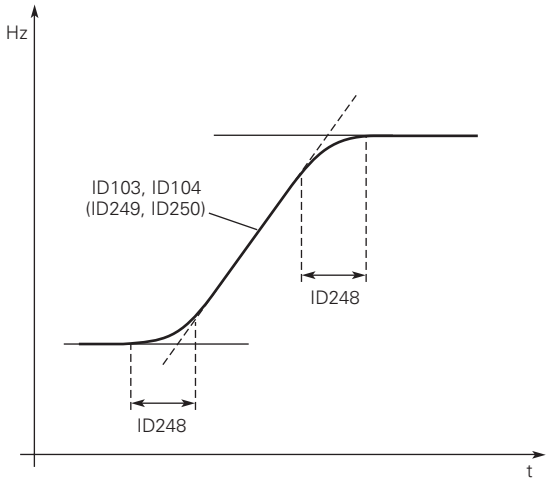
Fixed frequency

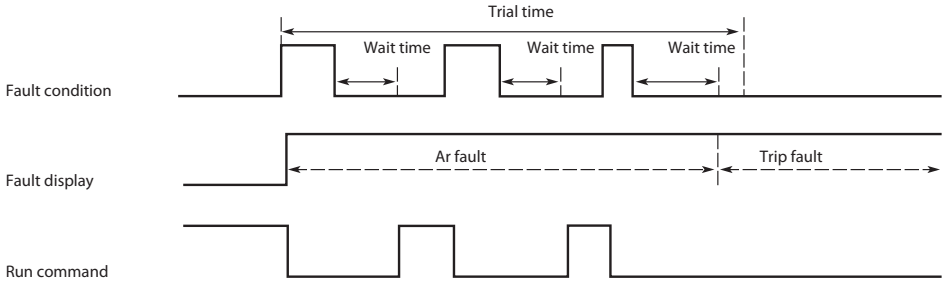
Input (Binary)			Fixed frequency
B0	B1	B2	(Factory setting)
X	—	—	Preset Speed 1, ID3932 = 5 Hz
—	X	—	Preset Speed 2, ID3934 = 10 Hz
X	X	—	Preset Speed 3, ID3936 = 15 Hz
—	—	X	Preset Speed 4, ID3938 = 20 Hz
X	—	X	Preset Speed 5, ID3940 = 25 Hz
—	X	X	Preset Speed 6, ID3942 = 30 Hz
X	X	X	Preset Speed 7, ID3944 = 35 Hz

156	**P7.2.10**	**Motor Pot Ramp Time** This parameter defines the rate of change of the motor potentiometer setpoint.	RW

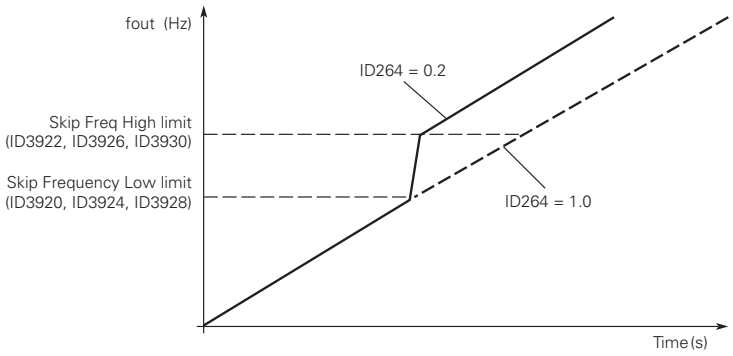
Modbus ID	Code	Parameters	RO/RW
169	P7.2.11	**Motor Pot Ref Reset** Defines how the motor pot reference signal is handled on shutting down frequency converter output or powering down the frequency converter. 0 = No reset - reference stays at last setting 1 = Memory reset in stop and power down - reference resets to 0 when drive is stopped or the power is cycled to the drive 2 = Memory reset in power down - reference resets to 0 when drive is powered down only	RW
2515	P7.2.12	**Change PhaseSequence Motor** This parameter allows the motor phase sequence to be modified from U, V, W to U, W, V.	RW
203	P7.2.13	**Accel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it will increase reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to increase, when this is set for Normally Closed it will cause the Motor pot reference to increase till it reaches max frequency. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on rising.	RW
204	P7.2.14	**Decel Pot Value** Motor Potentiometer is set for a reference, when this input is enabled it decrease reference value till contact opens. When this function is set for Normally Open it will not cause the Motor Pot reference to decrease, when this is set for Normally Closed it will cause the Motor pot reference to decrease till the min frequency is reached.Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value keeps on falling.	RW
216	P7.2.15	**Reset Pot Zero** Sets Motor Potentiometer reference value to zero when using the Motor Potentiometer as a Reference signal when contact closes. When this is set for Normally Open it will not cause the Motor Pot reference to not reset to 0 speed, when this is set for Normally Closed it will cause the Motor pot reference to reset to 0 speed and stay there till the opens. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: Potentiometer value reset to zero.	RW
4011	P7.2.16	**Speed Trim Setting** If this parameter's value is not 0, add the PID1 output or PID2 outpue value to speed reference	RW
4012	P7.2.17	**Torque Trim Setting** If this parameter's value is not 0, add the PID1 output or PID2 outpue value to torque reference	RW
1685	P7.3.1	**Power Up Local Remote Select** Selects on power up what control place the drive goes into. By default it will hold the last state that the drive was in when powered down or selecting Local or Remote it will power up in that mode no matter the position it was powered down in.	RW
209	P7.3.2	**Remote 1/2 Select** Selection allows for switching between Remote control 1 (ID135) and control 2 (ID138), this switches control and reference locations. When this function is set for Normally Open the drive will not go into the Remote 2 control place and will stay in Remote 1. When it is set for Normally Closed the drive will always be in the Remote 2 Control Place. When a DIGIN is used it will allow cycling between the 2 based off high/low state. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: remote2 is selected as control source. Open contact: remote1 is selected as control.	RW

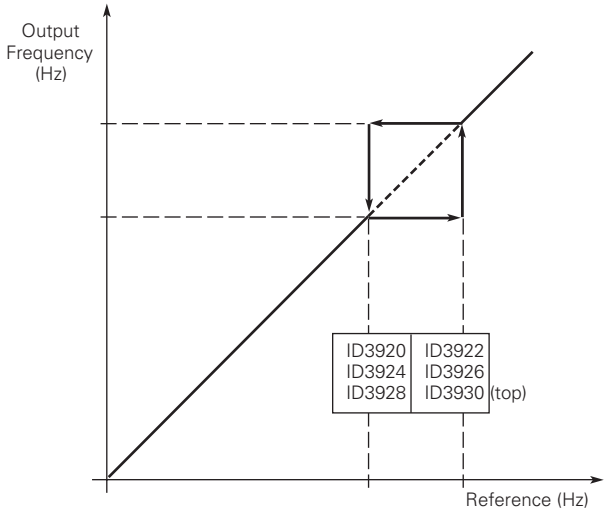
Modbus ID	Code	Parameters	RO/RW
2395	**P7.3.5**	**HOA On/Off** HOA off control allows for disabling any control signal when the input is the off/open posisiton, when closed drive will follow the desired control signal. If the function is set for Normally Open this will cause the drive to operate, if the function i set for Normally Closed then the drive will e in the off location and not allow operation. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slot, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X function allows for having an input trun on without having to hard wire it to the physical relay output.	RW
197	**P7.3.6**	**Local Control** Selects where the drive will look for the start command in the local location, I/O terminals would be from the Digital hardwired inputs or keypad Start/Stop buttons. Keypad display will indicate what mode is selected.	RW
196	**P7.3.7**	**Remote Control** Selection allows for external control panel to control frequency converters control place. When this function is set for Normally Open the drive will not go into the remote control unless the keypad input is pressed. When set for Normally Closed the drive will always be in the remote location no matter the keypad loc/rem is pressed.Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed Contact: force to remote control.	RW
1695	**P7.3.8**	**Local Control Place** Defines the source for the start command in local mode. Start terminals are the hard-wired digital inputs and Keypad are the 'Start and Stop' buttons on the control unit. The keypad will display which mode is selected.	RW
136	**P7.3.9**	**Local Reference** This parameter determines the reference for Local control location, this value can be fed from a analog input, keypad, or fieldbus reference signal.	RW
135	**P7.3.10**	**Remote 1 Control Place** Defines the source for the start command in remote control mode. Start terminals are the hard-wired digital inputs and Keypad are the 'Start and Stop' buttons on the control unit. The keypad will display which mode is selected.	RW
137	**P7.3.11**	**Remote 1 Reference** Defines the source for the speed reference value in remote control mode.	RW
138	**P7.3.12**	**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.	RW
139	**P7.3.13**	**Remote 2 Reference** Defines the source for the speed reference value in remote control mode 2.	RW
195	**P7.4.1**	**Accel/Decel Time Set** Selects between accel/decel time 1 and accel/decel time 2. When this function is set for Normally Open the Accel/Decel time set will follow time 1 always, when set for Normally Closed it will follow the 2nd Accel/Decel time always. Assigning it to an input will allow for the input to control this. Can be set to 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 , DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = 2nd set of acc/dec time applied. Open contact = 1st set of acc/dec time applied.	RW
201	**P7.4.4**	**Accel/Decel Prohibit** Disables the ability to change speed, even if the reference signal changes if this input is enabled the output stays at the value it was at before the input was enabled. When this functions is set for Normally Open the Accel/Decel will be allowed via the	RW
103	**P7.4.5**	**Accel Time 1** The time required for the output frequency to accelerate from zero frequency to Max frequency 'f-max' (ID3918). When accelerating from different frequency levels the accel time will be a fraction of the total ramp time.	RW

Modbus ID	Code	Parameters	RO/RW
104	**P7.4.6**	**Decel Time 1** Defines the ramp time required to decelerate from the max frequency 'f-max' (ID3918) to the zero frequency. If the output frequency is below the maximum frequency, the ramp time is shortened accordingly.	RW
247	**P7.4.7**	**Ramp 1 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 at the start and stop of the slope. **Figure 54. Acceleration/deceleration (S-shaped).**  	RW
249	**P7.4.8**	**Accel Time 2** Sets the acceleration ramp time 2 in seconds.	RW
250	**P7.4.9**	**Decel Time 2** Sets the deceleration ramp time 2 in seconds.	RW
248	**P7.4.10**	**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 at the start and stop of the slope. **Figure 55. Acceleration/deceleration (S-shaped).**  	RW

Modbus ID	Code	Parameters	RO/RW
2444	P7.4.11	**2nd Stage Ramp Frequency** When 2nd Stage Ramp Frequency is the frequency level at which the drive will enable the 2nd Stage Ramp Frequency output function. This then can be used for other inputs or devices to signal a frequency level.	RW
3932	P7.5.1	**Preset Speed 1** Preset Fixed Frequency 1 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3934	P7.5.2	**Preset Speed 2** Preset Fixed Frequency 2 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3936	P7.5.3	**Preset Speed 3** Preset Fixed Frequency 3 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3938	P7.5.4	**Preset Speed 4** Preset Fixed Frequency 4 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3940	P7.5.5	**Preset Speed 5** Preset Fixed Frequency 5 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3942	P7.5.6	**Preset Speed 6** Preset Fixed Frequency 6 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
3944	P7.5.7	**Preset Speed 7** Preset Fixed Frequency 7 Value can be adjusted between f-min and f-max. Selection via a digital control signal.	RW
321	P7.6.1	**AR Wait Time** Defines the time before the frequency converter tries to automatically restart the motor after a specific fault condition has been received	RW
322	P7.6.2	**AR Trail Time** Amount of time after fault set that drive uses the restart attempts to reset the fault and restart the motor, after this time has run out without resetting the alarm, drive will fault. Attemps parameter determines the maximum number of automatic restarts during the trial time set . If the number of faults occurring during the trial time exceeds the attemps values, the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed. **Figure 56. Auto restart fail (try number >2).**  	RW
323	P7.6.3	**AR Start Function** The Start function for Automatic restart is selected with this parameter. The parameter defines the start mode upon a auto restart condition: 0 = Flying Start From Stop Frequency 1 = Start according to parameter Par ID 252 Start Mode 2 = Flying Start From Max Frequency	RW

Modbus ID	Code	Parameters	RO/RW
324	P7.6.4	**Undervoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time 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.	RW
325	P7.6.5	**OverVoltage Attempts** This parameter determines how many automatic restarts can be made during the trial time 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.	RW
326	P7.6.6	**OverCurrent Attempts** This parameter determines how many automatic restarts can be made during the trial time. 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.	RW
327	P7.6.7	**4mA Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 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)	RW
329	P7.6.8	**Motor Temp Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after Motor temperature fault trip >0 = Number of automatic restarts after the motor temperature has returned to its normal level	RW
328	P7.6.9	**External Fault Attempts** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after External fault trip >0 = Number of automatic restarts after External fault trip	RW
336	P7.6.10	**Underload Attempts** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after an Underload fault trip >0 = Number of automatic restarts after an Underload fault trip	RW
3842	P7.6.11	**Number Of Tries After AI Trip** This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after an AI fault >0 = Number of automatic restarts after an AI fault trip	RW
2126	P7.7.1	**Cold Weather Mode** With this parameter, you are able to enable the cold weather function of the causing the frequency converter's under temp limit to drop from –10°C to –30°C.drive. This then enables a warmup feature when the frequency converter is between –30°C and –20°C.	RW
2127	P7.7.2	**Cold Weather Volt. Level** Voltage as a percentage of the rated motor voltage that is output to the motor winding during active cold weather mode.	RW
2128	P7.7.3	**Cold Weather Time Out** This parameter defines the maximum duration of the warm-up function of the cold weather mode until it is switched off with 'Insufficient temperature device'.	RW
2129	P7.7.4	**Cold Weather Password** This password allows access to override the under temperature fault protection, this parameter is seen by pressing the left and right soft keys on the keypad. Password should be set to 32866, this value gets reset on cycle of power.	RW
287	P8.1.1	**Motor Control Mode** Motor Control Mode	RW

Modbus ID	Code	Parameters	RO/RW
107	**P8.1.2**	**Current Limit** This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level it goes into the current limiter controller and trys to limit the output current.	RW
217	**P8.1.3**	**Second Motor Para Select** Selection allows for switching between motor parameter set 1 and set 2. When this function is set for Normally Open the drive will follow the first set of motor parameters and when the input is set for Normally Closed it will used the Second Motor Parameter set. If an input is used the function will follow the logic of the input being high/low. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: the 2nd motor parameters is applied.	RW
3767	**P8.1.4**	**Encoder Signal Selection** Encoder signal selection on Slot A	RW
3837	**P8.1.5**	**Encoder 1 Scale** Scaling factor for encoder 1 frequency in Slot A	RW
3838	**P8.1.6**	**Encoder 2 Scale** Scaling factor for encoder 1 frequency in Slot B	RW
264	**P8.2.1**	**Skip Range Ramp Factor** 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. 	RW
3920	**P8.2.2**	**Skip F1 Low Limit** 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.	RW
3922	**P8.2.3**	**Skip F1 High Limit** 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.	RW
3924	**P8.2.4**	**Skip F2 Low Limit** 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.	RW

Modbus ID	Code	Parameters	RO/RW
3926	P8.2.5	**Skip F2 High Limit** 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.	RW
3928	P8.2.6	**Skip F3 Low Limit** 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.	RW
3930	P8.2.7	**Skip F3 High Limit** 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 57. Example of skip frequency area setting.**  	RW
2159	P8.3.1	**Preheat Mode** "This parameter enables/disables the preheat function where this is used in the case depending on where the temperature is being read from the drive will turn on the output to allow current to flow to the motor if the temperature of the drive drops, this is typically used when the motor is not running. 0 = Disable 1 = Enable"	RW
2160	P8.3.2	**Preheat Control Source** Selects the source of where the temperature is coming from, either the drive heat sink temperature which potentially could be at a different temperature or the PT100 sensor temperature.	RW
2161	P8.3.3	**Preheat Enter Temp** If a temperature-dependent function has been selected under "Preheat Control Source" (setting = 31 - 40), Preheat Mode is started when the temperature level set here is reached.	RW
2162	P8.3.4	**Preheat Quit Temp** Temperature when the preheat is disabled, drive goes into a stop state if the temperature is above this rating.	RW
1820	P8.10.1	**Motor Type Selection** Defines the type of Motor connected to the drive, Standard Induction motor, Internally mounted permanent magnet (IPM), or Surface mount permanent magnet (SPM) 0 = Inverter Duty 1 = IPM 2 = SPM	RW
486	P8.10.2	**Motor Nom Current** Motor nominal nameplate full load current. Find this value on the rating plate of the motor.	RW

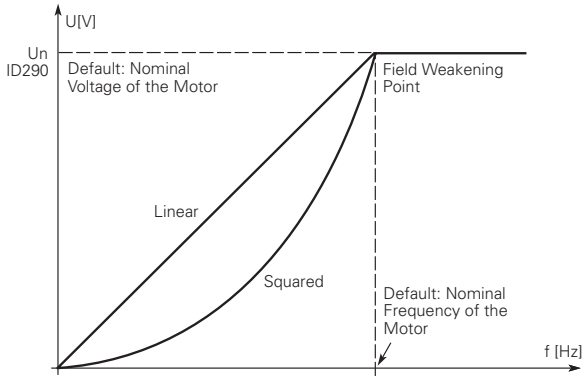
Modbus ID	Code	Parameters	RO/RW
489	P8.10.3	**Motor Nom Speed** Motor rated speed	RW
490	P8.10.4	**Motor PF** Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.	RW
487	P8.10.5	**Motor Nom Voltage** Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.	RW
488	P8.10.6	**Motor Nom Frequency** The rated frequency of the motor. This value can be found on the type plate of the motor.	RW
299	P8.10.8	**Identification** With this parameter, the drive will identify the motor and adjust tuning parameters to improve starting torque and open loop current control on an unloaded motor.	RW
771	P8.10.9	**Stator Resistor** Actual value of the motor stator resistance. Indicates the resistance value of the windings in the motor stator. This value is determined during "Motor identification" (ID299).	RW
772	P8.10.10	**Rotor Resistor** Actual value of the rotor resistance. Indicates the resistance value of the windings in the motor rotor. This value is determined during "Motor identification" (ID299).	RW
773	P8.10.11	**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 (ID299).	RW
774	P8.10.14	**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 (ID299).	RW
775	P8.10.15	**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 (299).	RW
1882	P8.10.16	**PM BEMF Voltage** Counter-induction voltage (counter-EMF) on the PM motor. This value is determined during "Motor identification" (ID299).	RW
1883	P8.10.17	**PM q-axis stator inductance** Stator inductance of the motor, magnetizing	RW
1884	P8.10.18	**PM d-axis stator inductance** Voltage at the d-axis stator inductance of the PM motor at rated motor current and frequency, displayed as the RMS value of the phase-to-phase voltage. This value is determined during "Motor identification" (ID299).	RW
2837	P8.10.19	**Motor Inertia** Mass moment of inertia of the rotation system, for tuning the speed control parameters. This value is determined during "Motor identification" (ID299).	RW
2901	P8.10.20	**Observer Kp** Linear amplification of the observer for sensorless speed control of PM and three-phase asynchronous motors.	RW
3276	P8.11.1	**Motor 2 Type Selection** "Motor 2 Type Selection, selection value as following: 0,Inverter duty; 1,IPM; 2,SPM"	RW
577	P8.11.2	**Motor Nom Current 2** Full load rated current for the 2nd motor set. This value can be found on the type plate of the motor.	RW
578	P8.11.3	**Motor Nom Speed 2** The second motor set name plate RPM. Selected based off of a digital input.	RW
579	P8.11.4	**Motor PF 2** The second motor set name plate Power Factor. Selected based off of a digital input.	RW
580	P8.11.5	**Motor Nom Volt 2** The second motor set name plate Voltage. Selected based off of a digital input.	RW
581	P8.11.6	**Motor Nom Freq 2** The second motor set name plate Frequency. Selected based off of a digital input.	RW

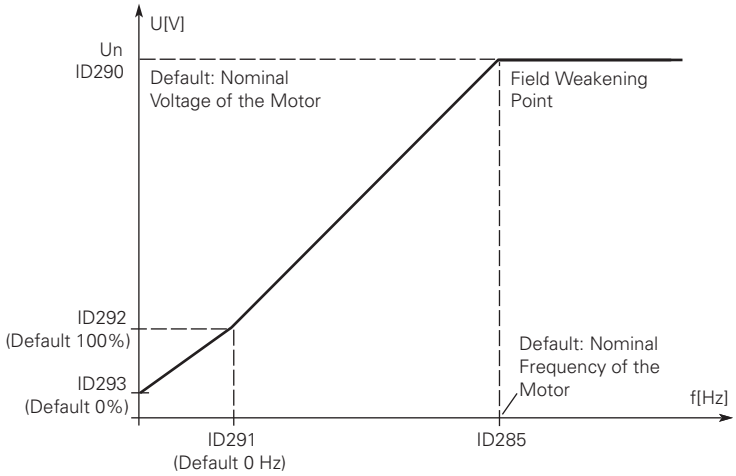
Modbus ID	Code	Parameters	RO/RW
1419	**P8.11.9**	**Stator Resistor 2** Actual value of the motor stator resistance for the 2nd motor set. Indicates the resistance value of the windings in the motor stator. This value is determined during “Motor identification” (ID299) with active 2nd motor set (see “Second Motor Para Select” ID217).	RW
1420	**P8.11.10**	**Rotor Resistor 2** TActual value of the rotor resistance for the 2nd motor set. Indicates the resistance value of the windings in the motor rotor. This value is determined during “Motor identification” (ID299) with active 2nd motor set (see “Second Motor Para Select” ID217).	RW
1421	**P8.11.11**	**Leak Inductance 2** Actual value of the stray inductance for the 2nd motor set. This value is the amount of magnetic inductance not connected to a winding in the motor. It is determined during “Motor identification” (ID299) with active 2nd motor set (see “Second Motor Para Select” ID217).	RW
1422	**P8.11.14**	**Mutual Inductance 2** Actual value of the counter-inductance for the 2nd motor set. This value is the amount of inductance between the stator and rotor windings in the motor. It is determined during “Motor identification” (ID299) with active 2nd motor set (see “Second Motor Para Select” ID217).	RW
1423	**P8.11.15**	**Excitation Current 2** Actual value of the no-load current for the 2nd motor set. This value is the amount of electrical current required to generate a rotating magnetic field in the motor. It is determined during “Motor identification” (ID299) with active 2nd motor set (see “Second Motor Para Select” ID217).	RW
2842	**P8.11.16**	**Second PM BEMF Voltage** The second back electromotive force(EMF) voltage. Value is measured when performing Identification.	RW
2843	**P8.11.17**	**Second PM q-axis Stator Inductance** The second voltage across the d-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. Value is measured when performing Identification.	RW
2844	**P8.11.18**	**Second PM d-axis Stator Inductance** The second voltage across the q-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. Value is measured when performing Identification.	RW
2838	**P8.11.19**	**Motor Inertia2** The second system rotation inertia real value for speed loop parameter tuning. Value is measured when performing Identification.	RW
109	**P8.20.1**	**V/Hz Optimization** "Automatic torque boost The voltage to the motor increases automatically, which assits the motor to produce sufficient torque to start and run at low frequencies with high loads. 0 = Disable torque boost function 1 = Enable torque boost function"	RW

Modbus ID	Code	Parameters	RO/RW
108	**P8.20.2**	**V/Hz Ratio**	RW

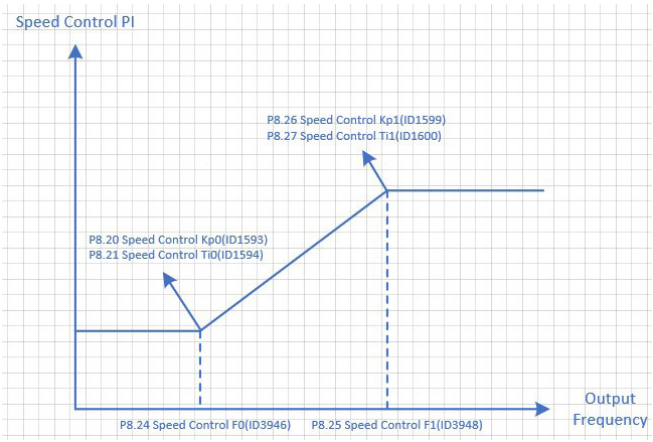
"0 = Linear - The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied. A linear V/Hz ratio should be used in constant torque applications.
1 = Squared - The voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. 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.

Figure 58. Linear and squared change of motor voltage.



Modbus ID	Code	Parameters	RO/RW
108	**P8.20.2**	**V/Hz Ratio, continued.** 2 = Programmable V/Hz curve - The V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. Linear with flux optimization **Figure 59. Programmable V/Hz curve.**  **Manual Motor Tuning - in Multi-purpose App** 1. Setting the motor magnetizing current: - Run the motor at 2/3 of the motor nominal frequency as the frequency reference. - Read the motor current in the Monitor menu or via the InControl PC tool. - Set the current as the motor excitation current (ID775) 2. Set the V/Hz optimization parameter (ID108) to value 2 “Programmable V/Hz curve”. 3. Run the motor with zero frequency reference and increase the motor zero point voltage (ID293) until the motor current is approximately same as the motor excitation current. If the Motor is in a low frequency area for only short periods, 65% of the motor nominal current is possible. 4. Set the midpoint voltage (ID292) to 1.4142*(ID293) and midpoint frequency (ID291) to value (ID291)/100%*P1.9. 5. If required, activate the speed control or V/Hz optimization (torque boost). 6. If required, activate the speed control and V/Hz optimization (torque boost). **Linear with flux optimization** 3 = Linear with flux optimization - The drive starts to search for the minimum motor current in order to save energy, This mode is called Active Energy Control which will reduce the voltage and current but still maintain the desired speed.”	RW
289	**P8.20.3**	**Field Weakening Point** The field weakening point is the frequency at which the output voltage reaches the set (ID290) maximum value. This value is usually determined by the motor nameplate value or if motor specs were supplied it can be further adjusted.	RW
290	**P8.20.4**	**Voltage At FWP** Defines the voltage at the field weaking point, when the oupptut frequency exceeds the field weeking point the voltage will remain constant.	RW
291	**P8.20.5**	**V/Hz Mid Frequency** Frequency to shape V/f curve	RW
292	**P8.20.6**	**V/Hz Mid Voltage** When using the programmable V/f characteristic (ID108 = 2), this parameter determines the midpoint voltage of the characteristic. This value can be set between the Zero Frequency Voltage (ID293) and the Field Weakening Point (ID289).	RW
293	**P8.20.7**	**Zero Frequency Voltage** If the programmable V/Hz curve has been selected this parameter defines the zero frequency voltage of the curve.	RW

Modbus ID	Code	Parameters	RO/RW
294	P8.20.8	**OverVoltage Control** The overvoltage control is used to limit the DC link voltage below the preset limit value. If over voltage control is enabled the drive will control the DC link voltage below the preset limit value by increasing the output frequency to allow the motor to use the energy. 0 = Disbale over voltage controller 1 = The max controller output frequency is the (Ramp frequency +8Hz) 2 = The max controller output frequency is the max frequency 3 = The max controller output frequency is the (max frequency+8Hz)	RW
1874	P8.20.9	**Over Voltage Controller Reference** The over voltage reference defines the preset limit value used in the overvoltage controller.)	RW
298	P8.20.10	**Load Drooping** max. Speed Droop Value This parameter is used to share the load between motors equally. The speed reference is changed depending on the load.	RW
1630	P8.20.11	**Droop Control Filter Time Constant** Filter time when using the droop function.	RW
1664	P8.20.12	**Slip Compensation Coefficient** The linear coefficient of the shadow compensation frequency used in speed control mode.	RW
1656	P8.20.13	**V/F Stable Kd** The compensation coefficient of the d-axis, which is used to suppress oscillation.	RW
1657	P8.20.14	**V/F Stable Kq** The compensation coefficient of the q-axis, which is used to suppress oscillation.	RW
2835	P8.20.15	**Overmodulation Enable** Voltage drop of rectifier circuit may impact the required maximum motor output voltage, Enabling the over modulation allows for compensating the rectifier drop and helps increase the output voltage (roughly 0-10%). The side effect of over modulation results in increase in harmonic, impacting the stability, so it should be used per application requirement. Over modulation control is only available for V/Hz control.	RW
1762	P8.20.16	**Pulse Off Frequency** High frequency injection cutoff frequency. It will active if Motor Control Mode(Par ID 287) select value 'PM Control2'. PM_Control2 requires high frequency pulse signal to inject to motor to support identify rotor position at the lower speed area which is less than Pules off Frequency. Customer do not need to modify this parameter by default.	RW
1591	P8.21.1	**Speed Error Filter Time Constant** Filter time constant for speed reference and actual speed error.	RW
1593	P8.21.2	**Speed Control Kp0** This parameter is the gain for the speed controller in open loop control mode given in % per Hz. Gain Value of 100% means that the nominal torque reference is produced at the speed controller output fro a frequency error of 1Hz.	RW
1594	P8.21.3	**Speed Control Ti0** Sets the integral time constant for the speed controller.	RW
3946	P8.21.4	**Speed Control F0** Defines the f0 point for setting the parameters for the speed controller gain "Speed Control Kp Below F0 (ID1593) and "MSC Ti" (ID1594) (see Figure 84 in ID1598).	RW

Modbus ID	Code	Parameters	RO/RW
3948	P8.21.5	**Speed Control F1** Defines the f1 point for setting the parameters for the speed controller gain "Speed Control Kp" (ID1599) and "MSC Ti" (ID1600). In the range between f0 and f1 the speed controller gain is calculated in a linear manner (see the figure below). **Figure 60. Speed control F1.**  	RW
1599	P8.21.6	**Speed Control Kp1** (((SpeedControl-P>f1)))	RW
1600	P8.21.7	**Speed Control Ti1** The level of torque reference below which the speed controller gain is changed from the Speed Control Gainto Speed Control T0. This is a percentage of nominal Torque.	RW
1607	P8.21.8	**Motoring Power Limit** Setting for the maximum (relative) motor output for motor operation.	RW
1608	P8.21.9	**Generator Power Limit** Setting for the maximum (relative) motor output for generator operation.	RW
1620	P8.21.10	**Flux Reference** This parameter establishes the amount of magnetic flux output to the motor. This is only valid in vector mode with an open control loop.	RW
1574	P8.21.12	**Neg Speed Limit** Frequency limit in the reverse direction in Open Loop Control mode.	RW
1576	P8.21.13	**Pos Speed Limit** Frequency limit in the forward direction in Open Loop Control mode.	RW
1585	P8.21.14	**Frequency Ramp Out FilterTime Constant** Filter time used to ramp the drive deceleration into stop mode.	RW
1611	P8.21.19	**Acc Compensation Time Constant** This value will compensate for the amount of inertia on the motor when start and stopping. It improves speed response and is defined as acceleration time to nominal speed with nominal torque.	RW
1612	P8.21.20	**Acc Compensation Filter Time Constant** The Filter time for the Acceleration Compensation time Constant (ID1611). Used to remove any disturbances in the inertia feedback.	RW
3962	P8.21.25	**Speed Reg BW0** Apply when speed is less than SpeedLoopF1	RW
3963	P8.21.26	**Speed Reg BW1** Apply when speed is greater than SpeedLoopF2	RW
4000	P8.21.27	**Id Kp0** This parameter is the proportional gain ecoefficiency for adjusting the d-axis current controller gain when output frequency is below the parameter "Current Control F0".	RW
4001	P8.21.28	**Id Ti0** This parameter is the integral gain ecoefficiency for adjusting the d-axis current controller gain when output frequency is below the parameter 'Current Control F0'.	RW

Modbus ID	Code	Parameters	RO/RW
4002	P8.21.29	**Iq Kp0** This parameter is the proportional gain ecoefficiency for adjusting the q-axis current controller gain when output frequency is below the parameter 'Current Control F0'.	RW
4003	P8.21.30	**Iq Ti0** This parameter is the integral gain ecoefficiency for adjusting the q-axis current controller gain when output frequency is below the parameter 'Current Control F0'.	RW
4004	P8.21.31	**Id Kp1** This parameter is the proportional gain ecoefficiency for adjusting the d-axis current controller gain when output frequency is below the parameter 'Current Control F1'.	RW
4005	P8.21.32	**Id Ti1** This parameter is the integral gain ecoefficiency for adjusting the d-axis current controller gain when output frequency is below the parameter 'Current Control F1'.	RW
4006	P8.21.33	**Iq Kp1** This parameter is the proportional gain ecoefficiency for adjusting the q-axis current controller gain when output frequency is below the parameter 'Current Control F1'.	RW
4007	P8.21.34	**Iq Ti1** This parameter is the integral gain ecoefficiency for adjusting the q-axis current controller gain when output frequency is below the parameter 'Current Control F1'.	RW
4008	P8.21.35	**Current Control F0** This parameter defines the Low Frequency Level F0 in Hz for current loop gain adjustment. When output frequency is below F0, the current controller gain ecoefficiency are selected from parameters Id_Kp0, Id_Ti0, Iq_Kp0, and Iq_Ti0.	RW
4009	P8.21.36	**Current Control F1** This parameter defines the High Frequency Level F1 in Hz for current loop gain adjustment. When output frequency is above F1, the current controller gain ecoefficiency are selected from parameters Id_Kp1, Id_Ti1, Iq_Kp1, and Iq_Ti1.	RW
1631	P8.22.5	**Startup Torque Selection** Stator inductance of the motor, magnetizing	RW
1602	P8.22.6	**Motoring Torque Limit** Setting the torque limit for motor operation.	RW
1603	P8.22.7	**Generator Torque Limit** Setting the torque limit for generator operation.	RW
1604	P8.22.8	**Torque Limit Forward** Setting the torque limit (M-Max) in clockwise operation.	RW
1605	P8.22.9	**Torque Limit Reverse** Setting the torque limit (M-Max) in anticlockwise operation	RW
1632	P8.22.10	**Torque Memory Start** This starting torque reference comes from the (ID1635) Actual Torque. On start it will use the measure actual torque value stored to memory and then use that value the next time a start is required.	RW
1633	P8.22.11	**Startup Torque Forward** Defines the amount of the start torque setpoint applied when starting clockwise if this option was selected in "Startup Torque Selection" (ID1631).	RW
1634	P8.22.12	**Startup Torque Reverse** Defines the amount of the start torque setpoint applied when starting anticlockwise if this option was selected in "Startup Torque Selection" (ID1631).	RW
1635	P8.22.13	**Startup Torque Actual** Display parameter for the actual starting torque.	RO
1667	P8.22.14	**Startup Torque Time** This time is used to define the amount of time the Start Torque value assigned in ID1631 will be applied for before the normal torque reference is used.	RW
295	P8.22.15	**Torque Limit** Torque Limit	RW
1606	P8.22.16	**Pull Out Torque** Start up torque level in percentage.	RW

Modbus ID	Code	Parameters	RO/RW
303	**P8.22.17**	**Torque Ref Select** Defines the source for torque reference. 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 Process Data Input 1 9 = PID1 Control Output 10 = PID2 Control Output 11 = FB Torque Ref 12 = High Freq Pulse Input 1 13 = High Freq Pulse Input 2 14 = Slot C: AI1 15 = Slot D: AI1	RW
304	**P8.22.18**	**Torque Ref Max** Scales the minimum and maximum level for the torque ref to be between –300.0 to 300.0%.	RW
305	**P8.22.19**	**Torque Ref Min** Scales the minimum and maximum level for the torque ref to be between –300.0 to 300.0%.	RW
1640	**P8.22.20**	**Torque Reference Filter TC** Filter time in milliseconds for the torque reference (M setpoint).	RW
1666	**P8.22.21**	**Speed Limiter Mode** Defines the Speed limit control which the frequency converter operates in the open loop torque control mode.	RW
3950	**P8.22.22**	**Window Pos Width** Frequency in positive direction when drive goes into Speed control from Torque Control mode. This references back to setting for the Frequency Max set point option 4 or 6.	RW
3952	**P8.22.23**	**Window Neg Width** Frequency in negative direction when drive goes into Speed control from Torque Control mode. This references back to setting for the Frequency Max set point option 4 or 6.	RW
3954	**P8.22.24**	**Window Pos Off Limit** Frequency in positive direction when drive comes out of Speed control from Torque Control mode. This references back to setting for the Frequency Max set point option 6.	RW
3956	**P8.22.25**	**Window Neg Off Limit** Frequency in negative direction when drive comes out of Speed control from Torque Control mode. This references back to setting for the Frequency Max set point option 6.	RW
1684	**P8.22.26**	**Stop State Magnetisation Time** Motor stop magnetization time when stopping in torque control with open control loop (OL).	RW
1890	**P8.23.1**	**PM Initial Selection** Method for detecting the initial angle on the PM motor. If it is not desirable for the motor to move before the drive releases the motor control, six pulse or HFI can be selected. When 'Align' is selected, the drive is set so that it aligns the motor with the U-phase shaft.	RW
1891	**P8.23.2**	**PM Initial Time** The time to detect the initial angle on the PM motor for the detection method 'Align'. This is the time the drive attempts to align the rotor with the U-phase.	RW
1892	**P8.23.3**	**PM Excited Current** Magnetizing current for PM motor at low speeds as a percentage of the rated AC current that the drive feeds in, in order to align the rotor.	RW
1893	**P8.23.4**	**PM Excited Current Off Frequency** Switch-off frequency for I-PM1 magnetization as a percentage of the rated motor frequency. The magnetizing current is fed below the switch-off frequency defined here.	RW

Modbus ID	Code	Parameters	RO/RW
550	P10.1.1	**PID1 Control Enable** Allows for activating PID1 control mode when it is set as a reference place in local reference or remote reference. If the input is not enabled when starting the the drive with PID1 Controller set as the reference the drive outout will not start. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot,or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Contact Close: Enables PID 1 control mode.	RW
351	P10.1.2	**PID1 Set Point Select** Selection allows for selecting between Setpoint 1 and setpoint 2 when in the PID control mode, depending on the PID Controller you are using this will all for multiple setpoints. When this function is set for Normally Open and the drive is in PID mode, it will use the first PID Set Point Reference. When the function is set for Normally Close the 1st PID Set Point will be active. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: setpoint2 is selected for pid1. Open contact:setpoint1 is selected for pid1.	RW
1294	P10.2.1	**PID1 Control Gain** PI(D) controller proportional gain Higher values will result in a larger change at the frequency inverter output frequency as a response to small changes in the feedback. Too high value can cause instability	RW
1295	P10.2.2	**PID1 Control ITime** PI(D) controller integral time constant Higher values will result in a more damped response. Used in systems in which the overall process responds slowly.	RW
1296	P10.2.3	**PID1 Control DTime** PID controller differential time constant	RW
1297	P10.2.4	**PID1 Process Unit** This is used to preselect the unit of the process variable. For a pump this could be e.g. the pressure in bar (= 16 “bar”)	RW
1298	P10.2.5	**PID1 Process Unit Min** This parameter determines what is to be displayed at 0 % actual value.	RW
1300	P10.2.6	**PID1 Process Unit Max** This parameter determines what is to be displayed at 100 % actual value.	RW
1302	P10.2.7	**PID1 Process Unit Decimal** Number of decimals when displaying the process variable.	RW
1303	P10.2.8	**PID1 Error Inversion** Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set-point, PID controller output increases. 1 = Inverted, If feedback is less than set-point, PID controller output decreases.	RW
1304	P10.2.9	**PID1 Dead Band** PID Dead band around set point in process units. This is the band where no actions occur, to prevent oscillation or repeated activation/deactivation of controller. The PID output is locked if the feedback stays within the dead band area.	RW
1306	P10.2.10	**PID1 Dead Band Delay** If the control deviation is greater than the defined dead band, the time set here must elapse before the controller can work again.	RW
1311	P10.2.11	**PID1 Ramp Time** Ramp time for the PID setpoint. The time set here applies both when the setpoint is increased and when it is reduced. It refers to the range between the minimum and maximum setpoint.	RW
4013	P10.2.12	**PID1 Output Min** PID1-OutLimLow min. output value of the PI(D) controller	RW
4014	P10.2.13	**PID1 Output Max** PID1-OutLimHigh max. output value of the PI(D) controller	RW

Modbus ID	Code	Parameters	RO/RW
1307	P10.3.1	**PID1 Keypad Set Point 1** Constant PID setpoint, used if the PID setpoint source is set to (1) "PID1 Keypad Set Point 1".	RW
1309	P10.3.2	**PID1 Keypad Set Point 2** Constant PID setpoint, used if the PID setpoint source is set to (2) "PID1 Keypad Set Point 2".	RW
2466	P10.3.3	**PID1 Wake Up Action** "This parameter defines the wakeup function action. 0 = Wakeup when below wakeup level 1 = Wakeup when above wakup leve 2 = Wakeup when below wakeup level % from PIDsetpoint 3 = Wakeup when above wakeup level %from PIDsetpoint"	RW
2660	P10.3.4	**PID1 Sleep Boost level** Automatic increase for the PID setpoint in process unit before sleep mode is enabled.	RW
2661	P10.3.5	**PID1 Sleep Boost Max Time** This parameter defines the maximum time for the automatic increase of the PID setpoint before sleep mode is enabled. If the PID actual value does not reach the increased setpoint (setpoint + sleep boost) within this time, sleep mode is enabled.	RW
1312	P10.4.1	**PID1 Set Point 1 Source** This parameter defines which source specifies setpoint 1. The PID setpoint is selected via parameter ID351 "PID1 setpoint selection B0".	RW
1315	P10.4.2	**PID1 Set Point 1 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	RW
1317	P10.4.3	**PID1 Set Point 1 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluxuations when going into the Sleep function to save motor run time.	RW
1318	P10.4.4	**PID1 Set Point 1 Wake Up Level** Defines the level for the PID feedback value to go above top enable the PID output to be re enabled. This value is based of the % of feedback which can be scaled based off the PID Unit Min/Max values.	RW
1320	P10.4.5	**PID1 Set Point 1 Boost** The set point can be boosted via a multiplier value.	RW
2450	P10.4.6	**PID1 Set Point 1 Sleep Level** Multiplication factor for adjusting the PID setpoint 1.	RW
1313	P10.4.9	**PID1 Set Point 1 Min** Defines Minimum Value for the set point 1 source.	RW
1314	P10.4.10	**PID1 Set Point 1 Max** Maximum value of setpoint 1 in process unit. If the setpoint were specified by a potentiometer, this value corresponds to the right stop.	RW
2396	P10.4.11	**PID1 Set Point 1 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run.	RW
1352	P10.4.12	**PID1 Set Point 1 Comp Enable** The process variable, e.g. pressure, can sometimes not be measured at the point where a specific value is required. This causes false control results. As this is not constant but dependent on the flow rate, this parameter can be used to enable an output frequency-dependent equalization for the PID1 setpoint 1. The impact of this compensation is defined via the "PID1 Set Point 1 Comp Max" parameter.	RW
1353	P10.4.13	**PID1 Set Point 1 Comp Max** Output frequency-dependent impact of the compensation for the PID1 setpoint 1: Compensation = CompMax * ((output frequency - f-Min)/(f-Max - f-Min).	RW
1321	P10.5.1	**PID1 Set Point 2 Source** This parameter defines which source specifies setpoint 2. The PID setpoint is selected via the parameter "PID1 Set Point Select" (ID351).	RW

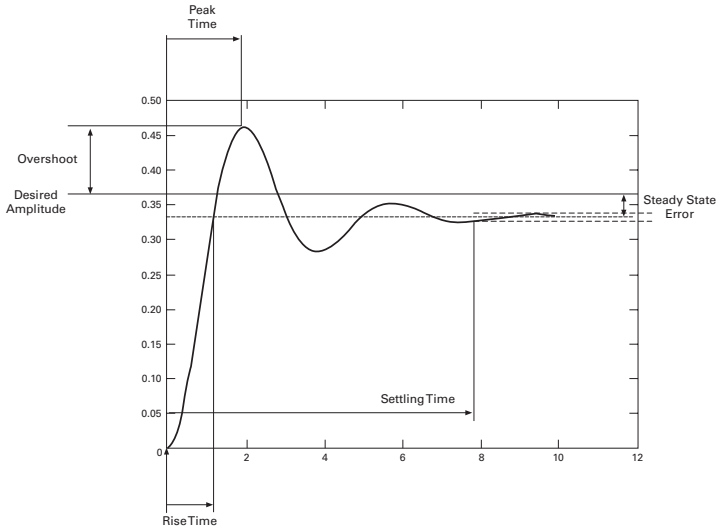
Modbus ID	Code	Parameters	RO/RW
1324	P10.5.2	**PID1 Set Point 2 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	RW
1326	P10.5.3	**PID1 Set Point 2 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluxuations when going into the Sleep function to save motor run time.	RW
1327	P10.5.4	**PID1 Set Point 2 Wake Up Level** Definition of the threshold value in the process unit at which the PID controller exits sleep mode. The condition under which sleep mode is exited depends on the setting of 'PID1 Wake Up Action".	RW
1329	P10.5.5	**PID1 Set Point 2 Boost** Multiplication factor for adjusting the PID setpoint 2.	RW
2452	P10.5.6	**PID1 Set Point 2 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	RW
1322	P10.5.9	**PID1 Set Point 2 Min** Defines Minimum Value for the set point 2 source.	RW
1323	P10.5.10	**PID1 Set Point 2 Max** Maximum value of setpoint 2 in process unit. If the setpoint were specified by a potentiometer, this value corresponds to the right stop.	RW
2397	P10.5.11	**PID1 Set Point 2 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run.	RW
1354	P10.5.12	**PID1 Set Point 2 Comp Enable** The process variable, e.g. pressure, can sometimes not be measured at the point where a specific value is required. This causes false control results. As this is not constant but dependent on the flow rate, this parameter can be used to enable an output frequency-dependent equalization for the PID1 setpoint 2. The impact of this compensation is defined via the "PID1 Set Point 2 Comp Max" parameter.	RW

Modbus ID	Code	Parameters	RO/RW
1355	P10.5.13	**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 seting up PID Application. Initially set PID Gain to 0.0% and set the PID I Time 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 until the drive speed oscillates constantly. After this occurs reduce the PID Gain slightly to reduce the oscillation. From here take the value found for PID Gain to 0.5 times that value and reduce the PID I time until the feedback signal oscillates again. INcrease the PID I time until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time. If signal noise is seen at high frequency increase the filter time valies to filter the signal. If further tuning is required refer to the table showing what is effected.	RW

Figure 61. 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.



2542	P10.6.1	**FB PID1 Set Point 1** PID1 set point 1 value from fieldbus	RW
2544	P10.6.2	**FB PID1 Set Point 2** PID1 set point 2 value from fieldbus	RW
2550	P10.6.3	**FB PID1 Feedback 1** PID1 feedback 1 value from fieldbus	RW
2551	P10.6.4	**FB PID1 Feedback 2** PID1 reference value feedback 2 from fieldbus	RW
2554	P10.6.5	**FB PID1 Feedforward 1** PID1 reference value feedforward 1 from fieldbus	RW
2555	P10.6.6	**FB PID1 Feedforward 2** PID1 reference value feedforward 2 from fieldbus	RW
1331	P10.7.1	**PID1 Feedback Gain** Define Gain associated with feedback signal from the measuring device.	RW

Modbus ID	Code	Parameters	RO/RW
1330	**P10.7.2**	**PID1 Feedback Function** This parameter determines how the process variable is fed back to the controller. Two actual value sources can also be linked via mathematical functions; please note that the signal may need to be scaled with "PID1 Feedback Gain".	RW
2811	**P10.7.3**	**PID1 Low Feedback Level** This parameter defines the level for evaluating the "PID actual value min" message. If this value is lower than the value defined here, the "Action@PID actual value Min" is executed.	RW
2812	**P10.7.4**	**PID1 Low Feedback Time** This parameter can be used to delay the "Action@PID actual value min". The PID actual value must be lower than the value defined here for the set time before the "Action@PID actual value min" is executed.	RW
2813	**P10.7.5**	**PID1 Low Feedback Protection** This parameter defines the drive's response if the 'PID actual value Min' level is not reached for longer than the time PID t actual value Min. The following settings are possible: 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	RW
2814	**P10.7.6**	**PID1 High Feedback Level** This parameter defines the level for evaluating the "PID actual value max" message. If the value exceeds the value defined here, the "Action@PID actual value max" is executed.	RW
2815	**P10.7.7**	**PID1 High Feedback Time** This parameter can be used to delay the "Action@PID actual value max". The PID actual value must exceed the value defined here for the set time before the "Action@PID actual value max" is executed.	RW
2816	**P10.7.8**	**PID1 High Feedback Protection** This parameter defines the drive's response if the 'PID actual value Max' level is not reached for longer than the time PID t actual value Max. The following settings are possible: 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	RW
2817	**P10.7.9**	**PID1 Hysteresis Level** This parameter defines when the "PID actual value min" or "PID actual value max" message is disabled again. The PID actual value must exceed the "PID actual value min level" plus the value defined here or be lower than the "PID actual value max level" minus the value defined here for the message to be disabled again.	RW
2825	**P10.7.10**	**PID1 Backup Feedback Source** PID backup feedback source selection has five options, default value is 0 0= Not Used; 1= AI1; 2= AI2; 3=Slot A: AI1; 4=Slot B: AI1	RW
1332	**P10.8.1**	**PID1 Feedback 1 Source** This parameter defines which source specifies actual value 1. The actual value used is selected via parameter "PID1 Feedback Function" (ID1330).	RW
1333	**P10.8.2**	**PID1 Feedback 1 Min** Minimum value in process unit for the actual value 1 signal.	RW
1334	**P10.8.3**	**PID1 Feedback 1 Max** Maximum value in process unit for the actual value 1 signal.	RW
1335	**P10.8.4**	**PID1 Feedback 2 Source** DThis parameter defines which source specifies actual value 2. The actual value used is selected via parameter "PID1 Feedback Function" (ID1330).	RW
1336	**P10.8.5**	**PID1 Feedback 2 Min** MMinimum value in process unit for the actual value 2 signal.	RW
1337	**P10.8.6**	**PID1 Feedback 2 Max** Maximum value in process unit for the actual value 2 signal.	RW

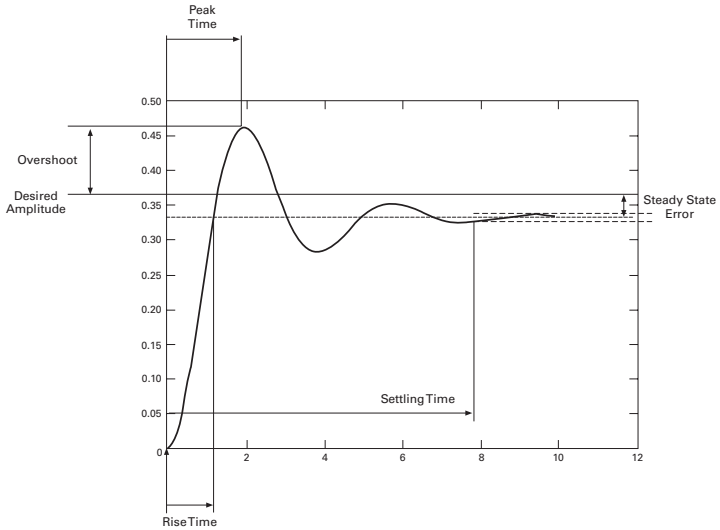
Modbus ID	Code	Parameters	RO/RW
1338	P10.9.1	**PID1 Feedforward Func** The feedforward signal is added to the output signal of the PID1 controller. Shorter response times can thus be achieved. Two feedforward channels are available, which can be used individually or jointly. This parameter determines how the feedforward to the PID1 controller is controlled. When choosing a mathematical function, please note that it may be necessary to scale the signal with "PID1 Feedforward Gain".	RW
1339	P10.9.2	**PID1 Feedforward Gain** Multiplication factor for adjusting the PID feedforward signal.	RW
1340	P10.9.3	**PID1 Feedforward 1 Source** This parameter defines which source specifies the feedforward channel 1. The feedforward channel used is selected via parameter "PID1 Feedforward Func" (ID1338).	RW
1341	P10.9.4	**PID1 Feedforward 1 Min** Minimum value in process unit for feedforward channel 1.	RW
1342	P10.9.5	**PID1 Feedforward 1 Max** Maximum value in process unit for feedforward channel 1.	RW
1343	P10.9.6	**PID1 Feedforward 2 Source** This parameter defines which source specifies the feedforward channel 2. The feedforward channel used is selected via parameter ID1338 "PID1 Feedforward Func".	RW
1344	P10.9.7	**PID1 Feedforward 2 Min** Minimum value in process unit for feedforward channel 2.	RW
1345	P10.9.8	**PID1 Feedforward 2 Max** Maximum value in process unit for feedforward channel 2.	RW
553	P11.1.1	**PID2 Control Enable** Allows activating the PID2 controller if it has been set as the setpoint in "Local Reference" (ID136) or "Remote 1 Reference" (ID137). If the setpoint of the drive is set to the PID2 output and this function has not been enabled, the drive output will not start. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2 DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output.	RW
352	P11.1.2	**PID2 Set Point Select** This setting allows switching between setpoint 1 and 2 in PID2 control mode. Depending on the PID controller used, this allows using several setpoints. When this function is set to DI = OFF and the drive is in PID2 controller mode, PID setpoint 1 is used. When the function is set to DI = ON, PID setpoint 2 is used. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2, DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Setpoint 2 is selected for PID2. Open contact: Setpoint 1 is selected for PID2.	RW
1356	P11.2.1	**PID2 Control Gain** Defines the gain of the PID Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100% a change of 10% in the error value causes the controller output to change 10%.	RW
1357	P11.2.2	**PID2 Control I Time** Defines the integration time of the PID Controller. Over the time the integral time contributes to the deviation between the reference and the feedback signal. 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.	RW
1358	P11.2.3	**PID2 Control D Time** Defines the derivation time of the PID Controller. This value will adjust the rate of change on the feedback signal. 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 PIDcontroller	RW
1359	P11.2.4	**PID2 Process Unit** This is used to preselect the unit of the process variable. For a pump this could be e.g. the pressure in bar (= 16 "bar")	RW

Modbus ID	Code	Parameters	RO/RW
1360	P11.2.5	**PID2 Process Unit Min** This parameter determines what is to be displayed at 0 % actual value.	RW
1362	P11.2.6	**PID2 Process Unit Max** This parameter determines what is to be displayed at 100 % actual value.	RW
1364	P11.2.7	**PID2 Process Unit Decimal** Number of decimals when displaying the process variable.	RW
1365	P11.2.8	**PID2 Error Inversion** Defines the way the process value output reacts to the feedback signal. 0 = Normal, If feedback is less than set-point, PID controller output increases. 1 = Inverted, If feedback is less than set-point, PID controller output decreases.	RW
1366	P11.2.9	**PID2 Dead Band** PID Dead band around set point in process units. This is the band where no actions occur, to prevent oscillation or repeated activation/deactivation of controller. The PID output is locked if the feedback stays within the dead band area.	RW
1368	P11.2.10	**PID2 Dead Band Delay** If the control deviation is greater than the defined dead band, the time set here must elapse before the controller can work again.	RW
1373	P11.2.11	**PID2 Ramp Time** Ramp time for the PID setpoint. The time set here applies both when the setpoint is increased and when it is reduced. It refers to the range between the minimum and maximum setpoint.	RW
4015	P11.2.12	**PID2 Output Min**	RW
4016	P11.2.13	**PID2 Output Max**	RW
1369	P11.3.1	**PID2 Keypad Set Point 1** Constant PID setpoint, used if the PID2 setpoint source is set to (1) “PID2 Keypad Set Point 1”.	RW
1371	P11.3.2	**PID2 Keypad Set Point 2** Constant PID setpoint, used if the PID2 setpoint source is set to (2) “PID2 Keypad Set Point 2”.	RW

Modbus ID	Code	Parameters	RO/RW
2467	P11.3.3	**PID2 Wake Up Action** This parameter defines the wakeup function action. 0 - Wakeup when below wakeup level 1 - Wakeup when above wakup level 2 - Wakeup when below wakeup level % set in from PID setpoint 3 - Wakeup when above wakeup level % set in from PID setpoint	RW

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.



2662	P11.3.4	**PID2 Sleep Boost level** Automatic increase for the PID setpoint in process unit before sleep mode is enabled.	RW
2663	P11.3.5	**PID2 Sleep Boost Max Time** This parameter defines the maximum time for the automatic increase of the PID setpoint before sleep mode is enabled. If the PID actual value does not reach the increased setpoint (setpoint + sleep boost) within this time, sleep mode is enabled.	RW
1374	P11.4.1	**PID2 Set Point 1 Source** This parameter defines which source specifies setpoint 1. The PID setpoint is selected via the parameter “PID2 setpoint selection B0” (ID352).	RW
1377	P11.4.2	**PID2 Set Point 1 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	RW
1379	P11.4.3	**PID2 Set Point 1 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluxuations when going into the Sleep function to save motor run time.	RW
1380	P11.4.4	**PID2 Set Point 1 WakeUp Level** Definition of the threshold value in the process unit at which the PID controller exits sleep mode. The condition under which sleep mode is exited depends on the setting of ‘PID2 Wake Up Action”.	RW
1382	P11.4.5	**PID2 Set Point 1 Boost** Multiplication factor for adjusting the PID setpoint 1.	RW

Modbus ID	Code	Parameters	RO/RW
2454	**P11.4.6**	**PID2 Set Point 1 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	RW
1375	**P11.4.9**	**PID2 Set Point 1 Min** Defines Minimum Value for the set point 1 source.	RW
1376	**P11.4.10**	**PID2 Set Point 1 Max** Maximum value of setpoint 1 in process unit. If the setpoint were specified by a potentiometer, this value corresponds to the right stop.	RW
2398	**P11.4.11**	**PID2 Set Point 1 Sleep Unit Sel** PID2 Set point 1 Sleep Unit Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run.	RW
1416	**P11.4.12**	**PID2 Set Point 2 Comp Enable** The process variable, e.g. pressure, can sometimes not be measured at the point where a specific value is required. This causes false control results. As this is not constant but dependent on the flow rate, this parameter can be used to enable an output frequency-dependent equalization for the PID2 setpoint 2. The impact of this compensation is defined via the "PID2 Set Point 2 Comp Max" parameter.	RW
1417	**P11.4.13**	**PID2 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 seting up PID Application. Initially set PID Gain) to 0.0% and set the PID I Time 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 until the drive speed oscillates constantly. After this occurs reduce the PID Gain slightly to reduce the oscillation. From here take the value found for PID Gain to 0.5 times that value and reduce the PID I time until the feedback signal oscillates again. INcrease the PID I time until the oscillation stops, with that value take it times 1.2 and use that value for the PID I time . If signal noise is seen at high frequency increase the filter time valies to filter the signal. If further tuning is required refer to the table showing what is effected.	RW
1383	**P11.5.1**	**PID2 Set Point 2 Source** This parameter defines which source specifies setpoint 2. The PID setpoint is selected via the parameter "PID2 setpoint selection B0" (ID352).	RW
1386	**P11.5.2**	**PID2 Set Point 2 Sleep Enable** Enable PID Set Point Sleep mode. This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re engages when feedback rises above the wakeup level.	RW
1388	**P11.5.3**	**PID2 Set Point 2 Sleep Delay** This parameter sets the delay time after the Setpoint drops below the Sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluxuations when going into the Sleep function to save motor run time.	RW
1389	**P11.5.4**	**PID2 Set Point 2 WakeUp Level** Definition of the threshold value in the process unit at which the PID controller exits sleep mode. The condition under which sleep mode is exited depends on the setting of 'PID2 Wake Up Action".	RW
1391	**P11.5.5**	**PID2 Set Point 2 Boost** Multiplication factor for adjusting the PID setpoint 2.	RW
2456	**P11.5.6**	**PID2 Set Point 2 Sleep Level** Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time it will put the drive into the sleep mode.	RW
1384	**P11.5.9**	**PID2 Set Point 2 Min** Defines Minimum Value for the set point 2 source.	RW
1385	**P11.5.10**	**PID2 Set Point 2 Max** Maximum value of setpoint 2 in process unit. If the setpoint were specified by a potentiometer, this value corresponds to the right stop.	RW
2399	**P11.5.11**	**PID2 Set Point 2 Sleep Unit Sel** Defines what value would be looked at when drive is going into the sleep mode when the motor is not required to run.	RW

Modbus ID	Code	Parameters	RO/RW
1414	P11.5.12	**PID2 Set Point1 Comp Enable** The process variable, e.g. pressure, can sometimes not be measured at the point where a specific value is required. This causes false control results. As this is not constant but dependent on the flow rate, this parameter can be used to enable an output frequency-dependent equalization for the PID2 setpoint 1. The impact of this compensation is defined via the "PID2 Set Point 1 Comp Max" parameter.	RW
1415	P11.5.13	**PID2 Set Point1 Comp Max** Output frequency-dependent impact of the compensation for the PID2 setpoint 1: Compensation = CompMax * ((output frequency - f-Min)/(f-Max - f-Min).	RW
2546	P11.6.1	**FB PID2 Set Point 1** PID1 set point 1 value from fieldbus	RW
2548	P11.6.2	**FB PID2 Set Point 2** PID1 set point 2 value from fieldbus	RW
2552	P11.6.3	**FB PID2 Feedback 1** PID1 feedback 1 value from fieldbus	RW
2553	P11.6.4	**FB PID2 Feedback 2** PID1 reference value feedback 2 from fieldbus	RW
2556	P11.6.5	**FB PID2 Feedforward 1** PID1 reference value feedforward 1 from fieldbus	RW
2557	P11.6.6	**FB PID2 Feedforward 2** PID1 reference value feedforward 2 from fieldbus	RW
1393	P11.7.1	**PID2 Feedback Gain** Define Gain associated with feedback signal from the measuring device.	RW
1392	P11.7.2	**PID2 Feedback Func** This parameter determines how the process variable is fed back to the controller. Two actual value sources can also be linked via mathematical functions; please note that the signal may need to be scaled with "PID2 Feedback Gain".	RW
2818	P11.7.3	**PID2 Low Feedback Level** This parameter defines the level for evaluating the "PID actual value min" message. If this value is lower than the value defined here, the "Action@PID actual value Min" is executed.	RW
2819	P11.7.4	**PID2 Low Feedback Time** This parameter can be used to delay the "Action@PID actual value min". The PID actual value must be lower than the value defined here for the set time before the "Action@PID actual value min" is executed.	RW
2820	P11.7.5	**PID2 Low Feedback Protection** This parameter defines the drive's response if the 'PID actual value Min' level is not reached for longer than the time PID t actual value Min. The following settings are possible: 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	RW
2821	P11.7.6	**PID2 High Feedback Level** This parameter defines the level for evaluating the "PID actual value max" message. If the value exceeds the value defined here, the "Action@PID actual value max" is executed.	RW
2822	P11.7.7	**PID2 High Feedback Time** This parameter can be used to delay the "Action@PID actual value max". The PID actual value must exceed the value defined here for the set time before the "Action@PID actual value max" is executed.	RW
2823	P11.7.8	**PID2 High Feedback Protection** This parameter defines the drive's response if the 'PID actual value Max' level is not reached for longer than the time PID t actual value Max. The following settings are possible: 0 = No Action 2 = Fault 3 = Fault, Coast	RW

Modbus ID	Code	Parameters	RO/RW
2824	P11.7.9	**PID2 Hysteresis Level** This parameter defines when the “PID actual value min” or “PID actual value max” message is disabled again. The PID actual value must exceed the “PID actual value min level” plus the value defined here or be lower than the “PID actual value max level” minus the value defined here for the message to be disabled again.	RW
2826	P11.7.10	**PID2 Backup Feedback Source** PID backup feedback source selection has five options, default value is 0 0= Not Used; 1= AI1; 2= AI2; 3=Slot A: AI1; 4=Slot B: AI1	RW
1394	P11.8.1	**PID2 Feedback 1 Source** This parameter defines which source specifies actual value 1. The actual value used is selected via parameter “PID2 Feedback Function” (ID1392).	RW
1395	P11.8.2	**PID2 Feedback 1 Min** Minimum value in process unit for the actual value 1 signal.	RW
1396	P11.8.3	**PID2 Feedback 1 Max** Maximum value in process unit for the actual value 1 signal.	RW
1397	P11.8.4	**PID2 Feedback 2 Source** This parameter defines which source specifies actual value 2. The actual value used is selected via parameter ID1392 “PID2 Feedback Func”.	RW
1398	P11.8.5	**PID2 Feedback 2 Min** Minimum value in process unit for the actual value 2 signal.	RW
1399	P11.8.6	**PID2 Feedback 2 Max** Maximum value in process unit for the actual value 2 signal.	RW
1400	P11.9.1	**PID2 Feedforward Func** The feedforward signal is added to the output signal of the PID2 controller. Shorter response times can thus be achieved. Two feedforward channels are available, which can be used individually or jointly. This parameter determines how the feedforward control to the PID2 controller takes place. When choosing a mathematical function, please note that it may be necessary to scale the signal with “PID2 Feedforward Gain”.	RW
1401	P11.9.2	**PID2 Feedforward Gain** Multiplication factor for adjusting the PID feedforward signal.	RW
1402	P11.9.3	**PID2 Feedforward 1 Source** This parameter defines which source specifies the feedforward channel 1. The feedforward channel used is selected via parameter “PID2 Feedforward Func” (ID1400).	RW
1403	P11.9.4	**PID2 Feedforward 1 Min** Minimum value in process unit for feedforward channel 1.	RW
1404	P11.9.5	**PID2 Feedforward 1 Max** Maximum value in process unit for feedforward channel 1.	RW
1405	P11.9.6	**PID2 Feedforward 2 Source** This parameter defines which source specifies the feedforward channel 2. The feedforward channel used is selected via parameter “PID2 Feedforward Func” (ID1400).	RW
1406	P11.9.7	**PID2 Feedforward 2 Min** Minimum value in process unit for feedforward channel 2.	RW
1407	P11.9.8	**PID2 Feedforward 2 Max** Maximum value in process unit for feedforward channel 2.	RW
3506	P14.1	**Master Follower Mode** Master Follower mode parameter determines the role of drive on the Master/Follower link. On the Master station, set this parameter to 'Master'.	RW
3510	P14.2	**Synchronization Mode** Synchronization Mode parameter is used to select the type of operation of the Synchronization.	RW
3511	P14.3	**Communication Link** Communication link is used to send follower reference and control word from master.	RW

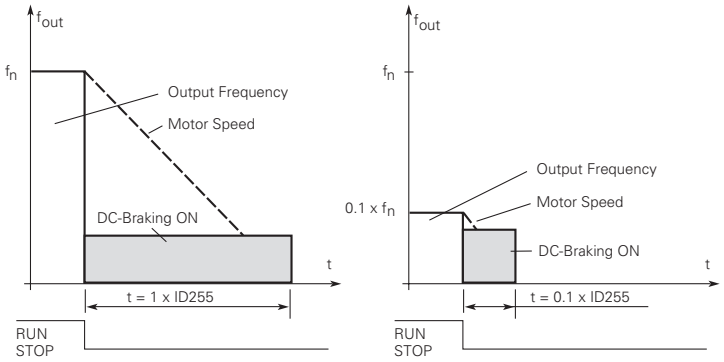
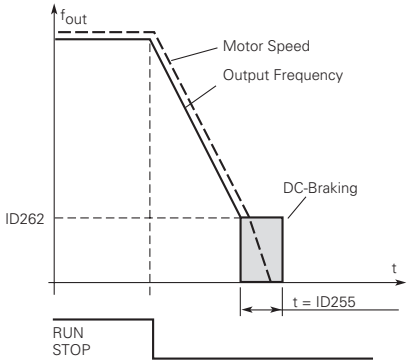
Modbus ID	Code	Parameters	RO/RW
3509	P14.4	**Speed Ratio Refresh Mode** Selection for speed ration activation when the ratio is changed. 0 No Action, when the ratio is changed, the new ration will active only when the drive is stopped. 1 Digital Input, when the ratio is changed, the new ration will active when digital input of speed ration activation is raising edge or the drive is stopped. 2 Continuous Change, when the ratio is changed, the new ratio will active.	RW
3513	P14.5	**Speed Ratio Refresh Source** Selection actives the new speed ratio when speed ratio activation select parameter is set to 'Digital Input'. It's active when digital input is raising edge. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
3514	P14.6	**Speed Error Response** Device reaction after occuring of 'Speed error'. Possibilities device dependent	RW
3512	P14.7	**Speed Error Limit** Defines the limit when fault situation is noted. The difference between the speed reference and the encoder speed. Percentage value is in relation to motor nominal frequency	RW
3515	P14.8	**Speed Fault Delay** Defines the delay after which a speed error is considered as a fault.	RW
3516	P14.9	**Torque Ratio** The torque ratio.	RW
3517	P14.10	**Follower Incoming Reference** Follower incoming reference parameter determines the follower reference source, it's valid in Follower drive and will be hidden in Master drive.	RW
3518	P14.11	**Follower Start Delay** Defines the delay time when Follower receive start command from Master	RW
3519	P14.12	**Follower Stop Delay** Defines the delay time when Follower receive stop command from Master	RW
3520	P14.13	**Master Outgoing Reference** Master outgoing reference parameter determines the source of a reference value that is provided for the Follower drive in the Master.	RW
3521	P14.14	**M/F COMM T-OUT** Defines the time delay for the Master/Follower communication is lost.	RW
3522	P14.15	**M/F COMM Fault Response** Action at COM-Loss Fault M/F, Occurs when communication between Master and Followe Drive timed out.	RW
3523	P14.16	**Follower Error Response** Action at Follower Error, Occurs when a fault raises in any of follower drives or one of follower drives is not ready	RW
3524	P14.17	**Supervision Response** Action at Level reached, Occurs when a level supervision is active, such as frequency supervision, current supervision, torque supervision etc.	RW
3525	P14.18	**Limit Reached Response** Action at Limit reached, Occurs when limit is active, such current limit.	RW
3526	P14.19	**Follower Stop Mode** When the follower drive does not use the Master Ramp Out as reference this parameter defines how the follower drive will stop as Run request is removed from the Master drive.	RW
3536	P14.20	**Speed Ratio** The gear ratio	RW
3538	P14.21	**Speed Multiplier** Speed multiplier is a correction factor to add or subtract some percent of give speed.	RW
3539	P14.22	**Speed Ratio Ramp Time** Ramp time in milliseconds for the variation of the ratio,a change of ratio from 0 to 0.1% takes a time equal to this parameter.	RW

Modbus ID	Code	Parameters	RO/RW
199	**P15.1**	**Jog Enable** This setting activates jog mode, which starts the drive with setpoint 'Jog Reference' (ID117) and runs as long as the input is enabled. If this function is set to DI = OFF, jog mode is never used. If the function is set to DI = ON, the drive always runs in jog mode with the setpoint Jog Reference. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2, DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Drive is in inching mode.	RW
3527	**P15.2**	**Jog Direction** "Jog direction 0:Forward; 1:Reverse"	RW
3528	**P15.3**	**Jog 1 Start Source** This setting activates jog mode, which starts the drive with setpoint 'Jog Reference' (ID117) and runs as long as the input is enabled. If this function is set to DI = OFF, jog mode is never used. If the function is set to DI = ON, the drive always runs in jog mode with the setpoint Jog Reference. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2, D310X for the inputs on the optional board in slot 3, D420X for the inputs on the optional board in slot 4 or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Drive is in inching mode.	RW
3958	**P15.4**	**Jog1/Inch1 Ref** Defines the setpoint for jog mode. This speed is used as the setpoint for jog mode when the digital input set under 'Jog Enable' (ID199) is enabled. If the input for jog mode is enabled, the drive starts and accelerates to this speed. The variable frequency drive stops when the input is disabled. The valid value range of this parameter is automatically limited between the min frequency 'f-min' (ID3916) and the max frequency 'f-max' (ID3918).	RW
3530	**P15.5**	**Jog1/Inch1 Acc time** Defines the acceleration time for the jog function i.e. the time required for the speed to change from zero to the speed value.	RW
3531	**P15.6**	**Jog1/Inch1 Dec time** Defines the deceleration time for the jog1 function i.e. the time required for the speed to change from the speed valueto zero.	RW
3532	**P15.7**	**Jog 2 Start Source** Selection the'Jog2 Start Source' parameter's value, when this parameter's value is active and 'Jog Enable' parameter's value is 'Enabled', drive will be following Jog2 reference to run.	RW
3960	**P15.8**	**Jog2/Inch2 Ref** Defines the jogging2 speed set point, when the'Jog2 Start Source' parameter's valuee is active and 'Jog Enable' parameter's value is 'Enabled' the drive starts and ramps to this speed.	RW
3534	**P15.9**	**Jog2/Inch2 Acc time** Defines the acceleration time for the jog2 function i.e. the time required for the speed to change from zero to the speed value.	RW
3535	**P15.10**	**Jog2/Inch2 Dec time** Defines the deceleration time for the jog2 function i.e. the time required for the speed to change from the speed valueto zero.	RW
3768	**P16.1**	**Inch Enable** Selects the source for a Inch enable signal.(The sources for inch activation signals are selected by parameters DCI_ubDiFunc_Inch1StartSource and DCI_ubDiFunc_Inch2StartSource.) 1 = Inch is enabled. 0 = Inch is disabled. Inch can be enabled only when no start command from an external control location is active, if Inch is already enabled, the drive cannot be started from an external control location.	RW
3769	**P16.2**	**Inch Direction** Inch direction 0 = Forward 1 = Reverse	RW

Modbus ID	Code	Parameters	RO/RW
3770	**P16.3**	**Inch 1 Start Source** If enabled by parameter Inch enable, selects the source for the activation of Inch function 1. (Inch function 1 can also be activated through fieldbus regardless of parameter jog enable) 1 = Inch 1 active when drive in stop mode	RW
3771	**P16.4**	**Inch 2 Start Source** If enabled by parameter Inch enable, selects the source for the activation of inch function 2. Inch function 2 can also be activated through fieldbus regardless of parameter inch enable. 1 = Inch 2 active when drive in stop mode	RW
218	**P22.1.1**	**Force Bypass** Selection allows for switching between bypass and drive modes. When this input is enabled the Bypass output contactor is enabled ot bypass the drive, when disabled this relay opens. When the input is enabled on the rising edge the bypass output contactor function is enabled in the output functions on the drive. When this fault is set for Normally Open/Normally Closed the drive will not activate the bypass relay ouptut function due to the drive looking for a rising edge trigger. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: switch to bypass. Open contact: switch to drive.	RW
1246	**P22.1.2**	**Bypass Overload** Function faults frequency converter when using an external overload block, the relay would be fed into this input to fault the drive. When the function is set for Normally Open the drive will not go into the fault state, if it is set for Normally Closed the drive will go into this fault state and stay even if reset is applied. Input needs to be low to allow operation. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor is over load in bypass. Use TTF method to realize the above functions.	RW
1418	**P22.1.3**	**Bypass Enable** This parameter indicates whether entering bypass mode is enabled. If enabled, the soft key on the keypad displays “Bypass”. Bypass mode can then be enabled via the soft key on the keypad, a digital input (see “Bypass Start” ID218), or the field bus control word bit 7. In bypass mode, the keypad displays “BPS” as the current control position.	RW
544	**P22.1.4**	**Bypass Start Delay** This parameter defines the delay time required in bypass mode after the start signal is detected via I/O, field bus or keypad in order to switch on the outlet used as a bypass (output function = 60: ‘Run Bypass/Drive’ or 62: ‘Operation in bypass’).	RW
542	**P22.2.1**	**Auto Bypass** This parameter specifies whether an automatic switch to bypass will occur based on Overvoltage Fault condition, is enabled based off a specfic fault conditon of Auto Bypass through Undervoltage Fault Auto Bypass parameters below. 0 = Auto Bypass disabled 1 = Auto Bypass enabled	RW
543	**P22.2.2**	**Auto Bypass Delay** This parameter defines the delay required after change-over switching into AutoBypass mode to switch on the outlet used as a bypass (output function = 60: ‘Run Bypass/Drive’ or 62: ‘Operation in bypass’).	RW
547	**P22.2.3**	**OverCurrent Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the over current fault auto-restart tries have been exceeded. 0 = Auto bypass on over current fault tries exceeded disabled 1 = Auto bypass on over current fault tries exceeded enabled	RW
546	**P22.2.4**	**IGBT Fault Bypas 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	RW

Modbus ID	Code	Parameters	RO/RW
548	P22.2.5	**4mA Fault 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: 4 mA (Reference) Fault Auto Bypass) must be set to 4 or 5 (Fault)	RW
545	P22.2.6	**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	RW
549	P22.2.7	**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	RW
1698	P22.2.8	**Motor OverTemp Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the over temperature motor fault auto-restart tries have been exceeded. 0 = Auto bypass on over temperature motor fault tries exceeded disabled 1 = Auto bypass on over temperature motor fault tries exce	RW
1699	P22.2.9	**UnderLoad Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the motor underLoad fault auto-restart tries have been exceeded. 0 = Auto bypass on motor underLoad fault tries exceeded disabled 1 = Auto bypass on motor underLoad fault tries exce	RW
1700	P22.2.10	**External Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the external fault auto-restart tries have been exceeded. 0 = Auto bypass on external fault tries exceeded disabled 1 = Auto bypass on external fault tries exce	RW
1701	P22.2.11	**Charge Switch Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the charging switch fault auto-restart tries have been exceeded. 0 = Auto bypass on charging switch fault tries exceeded disabled 1 = Auto bypass on charging switch fault tries exce	RW
1702	P22.2.12	**Saturation Trip Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the saturation trip fault auto-restart tries have been exceeded. 0 = Auto bypass on saturation trip fault tries exceeded disabled 1 = Auto bypass on saturation trip fault tries exce	RW
1703	P22.2.13	**Under Temp Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the motor under temperature fault auto-restart tries have been exceeded. 0 = Auto bypass on motor under temperature fault tries exceeded disabled 1 = Auto bypass on motor under temperature fault tries exce	RW
1704	P22.2.14	**EEPROM Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the EEPROM fault auto-restart tries have been exceeded. 0 = Auto bypass on EEPROM fault tries exceeded disabled 1 = Auto bypass on EEPROM fault tries exce	RW
1705	P22.2.15	**Control Board EEPROM Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the FRAM fault auto-restart tries have been exceeded. 0 = Auto bypass on FRAM fault tries exceeded disabled 1 = Auto bypass on FRAM fault tries exce	RW

Modbus ID	Code	Parameters	RO/RW
1706	P22.2.16	**Watchdog Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the watchdog fault auto-restart tries have been exceeded. 0 = Auto bypass on watchdog fault tries exceeded disabled 1 = Auto bypass on watchdog fault tries exce	RW
1707	P22.2.17	**Fan Cooling Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the fan cooling fault auto-restart tries have been exceeded. 0 = Auto bypass on fan cooling fault tries exceeded disabled 1 = Auto bypass on fan cooling fault tries exce	RW
1708	P22.2.18	**Keypad Com Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the keypad com fault auto-restart tries have been exceeded. 0 = Auto bypass on keypad com fault tries exceeded disabled 1 = Auto bypass on keypad com fault tries exce	RW
1709	P22.2.19	**Option Card Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the option card fault auto-restart tries have been exceeded. 0 = Auto bypass on option card fault tries exceeded disabled 1 = Auto bypass on option card fault tries exce	RW
1710	P22.2.20	**RTC Clock Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the realtime clock fault auto-restart tries have been exceeded. 0 = Auto bypass on realtime clock fault tries exceeded disabled 1 = Auto bypass on realtime clock fault tries exce	RW
1711	P22.2.21	**Ctrl Board OverTemp Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the control board over temperature fault auto-restart tries have been exceeded. 0 = Auto bypass on control board over temperature fault tries exceeded disabled 1 = Auto bypass on control board over temperature fault tries exce	RW
1713	P22.2.22	**Fieldbus Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the network COM fault auto-restart tries have been exceeded. 0 = Auto bypass on network COM fault tries exceeded disabled 1 = Auto bypass on network COM fault tries exce	RW
2832	P22.2.23	**Op Cont Interlock Fault Bypass Enable** This parameter specifies whether an automatic switch to bypass will occur after the output contactor interlock fault auto-restart tries have been exceeded. 0 = Auto bypass on output contactor interlock fault tries exceeded disabled 1 = Auto bypass on output contactor interlock fault tries exce	RW
1829	P23.1.1	**Brake Chopper Enable** Enable Brake Chopper	RW
251	P23.1.2	**Brake Chopper Mode** Enable Brake Chopper	RW
646	P23.1.3	**Brake Chopper Status** "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)"	RW

Modbus ID	Code	Parameters	RO/RW
647	**P23.1.4**	**Brake Resistor Status** This display parameter indicates whether a brake resistor is installed and whether it has been tested correctly, whether a setting with test has been selected under 'Brake chopper mode' (ID251). 0 = No – device without braking resistor or test failed. 1 = Yes – Device with braking resistor or test passed.	RO
254	**P23.1.5**	**DC-Brake Current** This parameter defines the current in amperes that is injected into the motor during a DC braking.	RW
263	**P23.1.6**	**Start DC-Brake Time** DC-brake is activated when the start command is given. This parameter defines the time the drive injects DC into the motor before ramping to reference level. This is to stop motors that are potentially spinning before a run command is given.	RW
262	**P23.1.7**	**Stop DC-Brake Frequency** The output frequency at which the DC-braking is applied on stopping. See Figure 66 of DX1 Application Manual.	RW
255	**P23.1.8**	**Stop DC-Brake Time** "Determines the length of DC braking while stopping . 0.00 = DC-brake is not used >0.0 = The amount of time DC-braking will occur after falling below the stop DC brake frequency" **Figure 62. DC-braking time when stop mode = coasting.**  **Figure 63. DC-braking time when stop mode = ramp.** 	RW
266	**P23.1.9**	**Flux Brake** "while stopping the output 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 carefully to avoid motor damage."	RW

Modbus ID	Code	Parameters	RO/RW
265	**P23.1.10**	**Flux Brake Current** This parameter defines the current in amperes that is injected into the motor during flux braking.	RW
202	**P23.2.1**	**DC Brake Active** Selection enables DC brake on a closed contact. When enabled this will cause the DX1 drive inject DC voltage into the motor to assist in bring it to a stop. When this function is set for Normally Open the drive will not activate the DC brake function.	RW
163	**P24.1**	**Ext Brake Off Delay** The function of the external brake can be timed on or time off delay to provide ample time to enable and disable an external brake module. The brake control signal can be programmed via digital output DO1 or via one of the relay outputs RO1, RO2. a) Start/Stop Logic Selection, 0, 1 or 2 b) Start/Stop Logic Selection, 3	RW

Modbus ID	Code	Parameters	RO/RW
164	P24.2	**Ext Brake On Delay**	RW

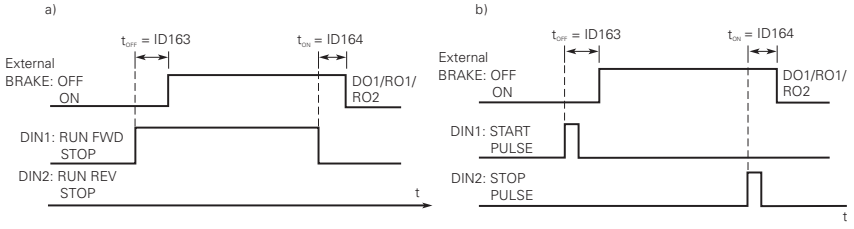
The function of the external brake can be timed on or time off delay to provide ample time to enable and disable an external brake module. The brake control signal can be programmed via digital output DO1 or via one of the relay outputs RO1, RO2.

a) Start/Stop Logic Selection, 0, 1 or 2

b) Start/Stop Logic Selection, 3

When using the brake control the following table is used to demonstrate the control functions. Brake on delay should be set longer than the ramp time in order to avoid damaging the brake.

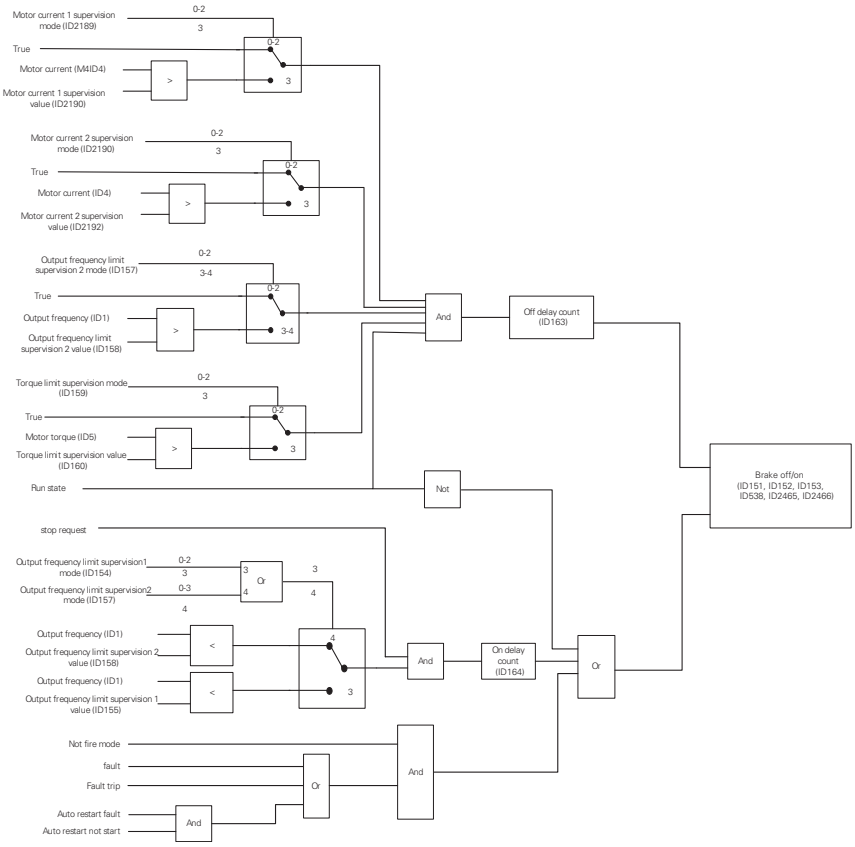
External brake control.



a) Start/Stop logic selection, 0, 1 or 2.

b) Start/Stop logic selection, 3

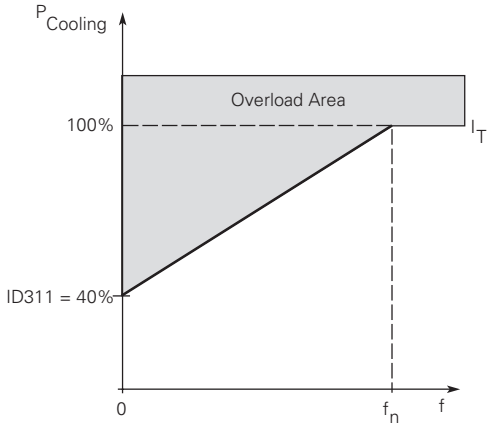
.When using the brake control, the following table is used to demonstrate the control functions. Brake on delay should be set longer than the ramp time in order to avoid damaging the brake.

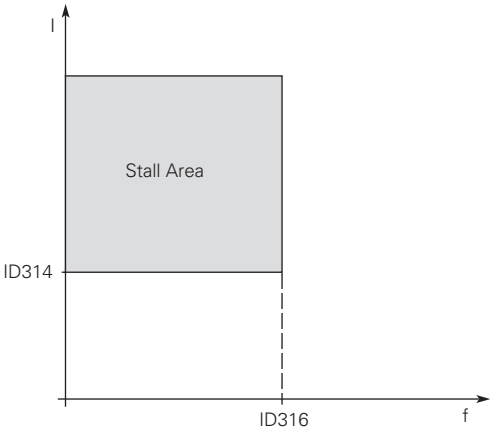
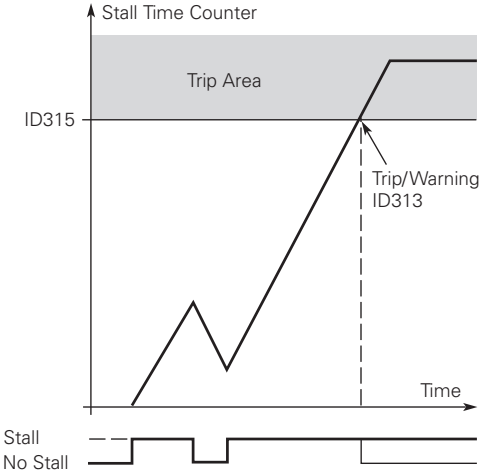


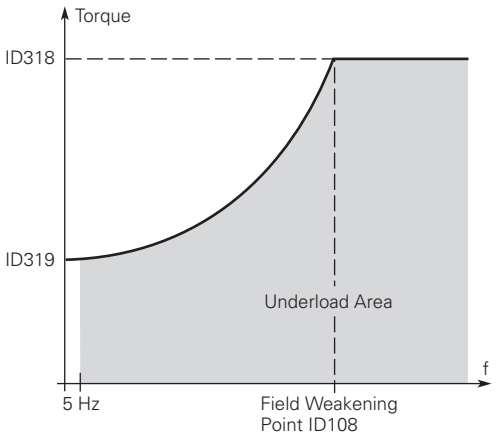
Modbus ID	Code	Parameters	RO/RW
193	**P25.1.1**	**Ext. Fault 1 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. The description on the fault can be changed. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = no external fault. Open contact = external fault.	RW
192	**P25.1.2**	**Ext. Fault 1 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. The description on the fault can be changed. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact = external fault. Open contact = no external fault.	RW
2294	**P25.1.3**	**Ext. Fault 2 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function.Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed. Closed contact = no external fault. Open contact = external fault.	RW
2293	**P25.1.4**	**Ext. Fault 2 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function.Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed. Closed contact = external fault. Open contact = no external fault.	RW
2296	**P25.1.5**	**Ext. Fault 3 NC** Allows for external input causing drive to fault. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always on so the drive will not fault, when set to Normally Open the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.The description on the fault can be changed. Closed contact = no external fault. Open contact = external fault.	RW

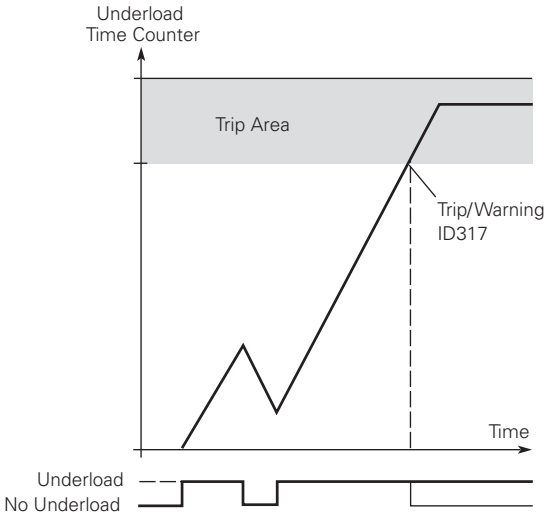
Modbus ID	Code	Parameters	RO/RW
2295	P25.1.6	**Ext. Fault 3 NO** Allows for external input causing drive to fault. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time. The additional settings allow assigning them to an input to control the function. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. The description on the fault can be changed . Closed contact = external fault. Open contact = no external fault.	RW
2297	P25.2.1	**Ext. Fault 1 Text** Defines the text to be displayed when external Fault 1 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in webserver	RW
2298	P25.2.2	**Ext. Fault 2 Text** Defines the text to be displayed when external Fault 2 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in webserver	RW
2299	P25.2.3	**Ext. Fault 3 Text** Defines the text to be displayed when external Fault 3 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in webserver	RW
750	P26.1.1	**Line Start Lockout** "Determines the response of frequency converter going to a run state cycle with I/O run comand is still active as the control place. 0 = Respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond. (Run Command has to be cycled) 1 = Do not respond to I/O run command when power is applied. If in another control place and switched to I/O control do not respond(Run Command has to be cycled) 2 = Respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command. 3 = Do Not respond to I/O commands when power is applied. If in another control place and switched to I/O control the drive will respond to a maintained Run Command."	RW
332	P26.1.2	**Input Phase Fault** Device reaction after occuring of 'Phase Loss Mains'. Possibilities device dependent	RW
306	P26.1.3	**4mA 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 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 is set as reference 4 = Fault, stop mode after fault according to parameter stop mode. 5 = Fault, stop mode after fault always by coasting	RW
331	P26.1.4	**4mA Fault Frequency** If a 4-20 mA fault is detected and the action in 'Action@4-20mA error' (ID306) = 3 ist set, the inverter uses the speed reference value.	RW
307	P26.1.5	**External Fault** External Fault	RW
2666	P26.1.6	**Under Voltage Trip Level** Selects the level at which to trip the under voltage fault. When the measured value defined in the Detection Method drops below this level for the under voltage fault check time and is under the under voltage trip level, the drive will respond based on the parameter 'Uvolt Fault Response'.	RW
330	P26.1.7	**Uvolt Fault Response** Frequency converter monitors DC Bus Voltage if drops below set level (via trouble shooting guide for more information on fault level) the drive will respond corresponding to this setting.	RW
1564	P26.1.8	**Unit Under Temp Prot** Device reaction after occuring of 'Undertemperature Device'. Possibilities device dependent	RW

Modbus ID	Code	Parameters	RO/RW
2427	P26.1.9	**Safe Torque Off Response** Device reaction after occuring of 'STO Circuit'. Possibilities device dependent	RW
1840	P26.1.10	**OverVoltage Controller Response** Device reaction after occuring of 'Overvoltage Control'. Possibilities device dependent	RW
1841	P26.1.11	**OverCurrent Controller Response** Device reaction after occuring of 'Overcurrent controller'. Possibilities device dependent	RW
2130	P26.1.12	**Under Temp Fault Override** With the password set to the correct value this parameter is enabled and will give the ability to override the under temp fault. This function gets reset when power is cycled.	RW
955	P26.1.13	**RTC Fault** RTC (Real Time Clock) fault protection ensures the real time display is correct, the interval and timer function can run normally.	RW
337	P26.1.14	**PT100 Fault Response** PT100 Therminstor protection used with motor PT100 thermistors input option board are used to fault frequency conveter if motor has reached the set temperature fault level on the option card. If using PT100 thermistors Motor Therminal Protection can be disabled. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to stop mode 3 = Fault, stop mode after fault always by coasting	RW
1256	P26.1.15	**Replace Battery Fault Response** Sets how the frequency converter responds to a low voltage on the Real Time Clock battery. If the voltage on the battery drops below 2V drive will display a warning by default.	RW
1257	P26.1.16	**Replace Fan Fault Response** Replace Fan Fault will show when the fan life is less than 2 months; remind user to replace the fan. The time is based off the power on time of the drive.	RW
2163	P26.1.17	**Preheat Output Volt** Voltage level output to the motor when the drive is in the Preheat operation mode. This is a percentage of the motor nameplate voltage.	RW
2657	P26.1.18	**Warning Operation Mode** This parameter sets out the behavior of the drive in case of a warning message. 0 = No action - All warning messages are suppressed and not displayed on the keypad or in the error memory. 1 = Warning, without saving log - Warnings are displayed in the keypad but not recorded in the error memory. 2 = Warning, store log- Warnings are displayed in the keypad but not recorded in the error memory.	RW
2664	P26.1.19	**Fan Protection** Upwards of frame size 3, the built-in heat sink fans use a feedback signal. This parameter determines the behavior of the drive if the feedback signal is missing. If Warning or Fault is set, the message F032 'Device fan fault' is displayed.	RW
4018	P26.1.20	**AI-Fault Protection** Action at AI Fault, Analog input signal is faulty, missing or out of range	RW
3841	P26.1.21	**AI Fault Frequency** When AI fault happens, the output frequency of drive goes to this preset speed.	RW
2894	P26.1.22	**CP Interlock NC** This function is defined as normally closed contact so the function activates on an open contact. When enabled, it triggers a CleanPower interlock warning when the drive is stopped and a CleanPower interlock fault during operation.	RW
2895	P26.1.23	**CP Interlock Run Protection**	RW
2896	P26.1.24	**CP Interlock Stop Protection** CleanPower interlock fault protection parmeters only for drive stop.	RW
2897	P26.1.25	**CP Interlock Attempts**	RW

Modbus ID	Code	Parameters	RO/RW
308	**P26.2.1**	**Output Phase Fault** Output phase supervision of the motor ensures that the motor phases have equal currents, if phases are 5% difference from one another, the frequency converter will respond corresponding to this setting.	RW
309	**P26.2.2**	**Ground Fault** "Earth fault protection ensures that the sum of the motor phase currents is zero. There is a current level setting parameter Ground fault limit. that allows for setting the allowable ground current level based off the total drive current. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency Conveter will corespond the the setting below. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting"	RW
2158	**P26.2.3**	**Ground Fault Limit** Sets the level of the ground fault protection, this protection is based off the amount of leakage current that is seen to ground on the output of the drive.	RW
310	**P26.2.4**	**Motor Thermal Protection** "If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the instiall power on values of the drive and monitoring values as the drive is running. 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 parameter stop mode 3 = Fault, stop mode after fault always by coasting"	RW
311	**P26.2.5**	**Motor Thermal F0 Current** The current can be set between 0–150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). Note: The value is set as a percentage of the motor nameplate data, parameter '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. **Figure 64. Motor thermal current it curve.**  	RW

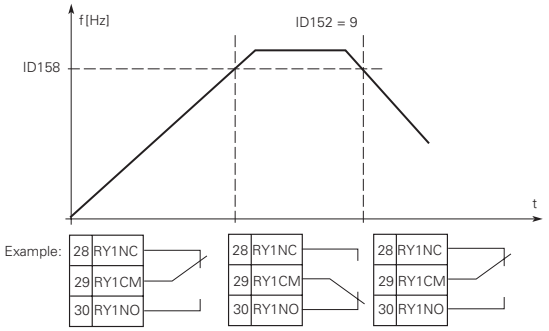
Modbus ID	Code	Parameters	RO/RW
333	P26.2.8	**Thermistor Fault Response** Setting the parameter to 0 will deactivate the protection. If motor thermistors input is enabled it requires enabling the fault condition, the thermistor is usually in the winding of the motor or an external sensor, Motor Thermal Protection can be deactivated. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting	RW
313	P26.2.9	**Stall Protection** Stall protection is a user defined 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.	RW
314	P26.2.10	**Stall Current Limit** The current can be set to 0.1–InMotor*2. For a stall stage to occur, the current must have exceeded this limit. The software does not allow entering a greater value than InMotor*2. If Parameter ' nominal motor current' is changed, this parameter is automatically restored to the default value (IL). **Figure 65. Stall characteristics settings.** 	RW
315	P26.2.11	**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 based off the current being above the limit setting. If the stall time counter value goes above this limit the protection will cause a trip. **Figure 66. Stall time count.** 	RW

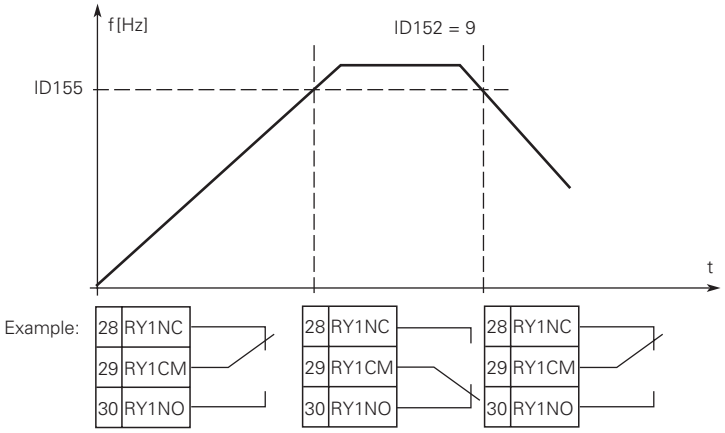
Modbus ID	Code	Parameters	RO/RW
316	**P26.2.12**	**Stall Frequency Limit** The frequency can be set between 1–fmax (ID3918). For a stall state to occur, the output frequency must have remained below this limit, above the current limit for the stall time to occur.	RW
317	**P26.2.13**	**Underload Protection** "If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting"	RW
318	**P26.2.14**	**Underload Fnom Torque** The torque limit can be set between 10.0–150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. If you change pareamter 'nominal motor current', this parameter is automatically restored to the default value. **Figure 67. Setting of minimum load.**  	RW
319	**P26.2.15**	**Underload F0 Torque** The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives value for the minimum torque allowed at zero frequency. If you change the value of nominal motor current, this parameter is automatically restored to the default value.	RW

Modbus ID	Code	Parameters	RO/RW
320	P26.2.16	**Underload Time Limit** This time can be set between 2.0 and 600.0s. This is the time allowed for an fault 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 protection parameter. If the drive is stopped, the counter is reset to zero. **Figure 68. Underload time counter function.**  	RW
3965	P26.2.17	**Thermistor Check Enable** Thermistor Check Enable 0:Disable, not do the thermistor check 1:Enable, do the thermistor check	RW
334	P26.3.1	**Fieldbus Fault Response** This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communicaiton port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.	RW
335	P26.3.2	**OPTCard Fault Response** This parameter defines the drive's response if an expansion module is not plugged in correctly or is defective. Options for the individual settings are: 0 = No Action 1 = Warning 2 = Fault, stop mode after fault according to parameter Stop mode (ID253). 3 = Fault, stop mode after fault always by coasting.	RW
1678	P26.3.3	**IP Address Confliction Resp** Indicates there is a conflict in the IP address assigned to the drive, typically meaning there are multiple devices with the same IP address assigned.	RW
4017	P26.3.4	**Card Plug Slot Error Fault Protection** Action at Card Plug Error, Option card is plugged in the wrong slot.	RW
2405	P26.10.1	**PID Feedback AI Loss Attempts** PID Feedback AI Loss Attempts This parameter sets the amount of tries it will try to Auto restart the Feedback AI loss fault.	RW
2401	P26.10.2	**PID Feedback AI Loss Response** PIDFeedback AI loss Response This parameter defines the function of the PIDFeedback Analog Input loss response, if the AI feedback is lost based off the programed AI feedback. 0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency 4 = Warning: Analog -> Net	RW

Modbus ID	Code	Parameters	RO/RW
2402	P26.10.3	**PID Feedback AI Loss Pre Freq** PID Feedback AI Loss Pre Freq This parameter defines the frequency the master would run to if a feedback is lost and ID2401 was set to option 3.	RW
2403	P26.10.4	**PID Feedback AI Loss Pipe Fill Loss Level** PID Feedback AI Prime Level Detects loss of prime in the pump based off the measured level. If the value drops below this level for the timeout time and below the frequency inpill loss level , 'loss of Prime' occurs.	RW
2404	P26.10.5	**PID Feedback AI Loss PreFreq Timeout** PID Feedback AI Loss PreFreq Timeout When response is set to 3 or 4, when the Feedback signal is lost, the drive will run at the frequency set by AI loss pipe fill prefrquency for the time set here, after this time the drive will fault out on 'Feedback Loss'. The Time is disabled when set to 0sec.	RW
3281	P26.12.1	**PID2 Feedback AI Loss Attempts** PID Feedback AI Loss Attempts This parameter sets the amount of tries it will try to Auto restart the Feedback AI loss fault.	RW
3277	P26.12.2	**PID2 Feedback AI Loss Response** PIDFeedback AI loss Response This parameter defines the function of the PIDFeedback Analog Input loss response, if the AI feedback is lost based off the programed AI feedback. 0 = No Action 1 = Warning 2 = Fault 3 = Warning: Preset Frequency 4 = Warning: Analog -> Net	RW
3278	P26.12.3	**PID2 Feedback AI Loss Pre Freq** PID Feedback AI Loss Pre Freq This parameter defines the frequency the master would run to if a feedback is lost and ID2401 was set to option 3.	RW
3279	P26.12.4	**PID2 Feedback AI Loss Pipe Fill Loss Level** PID Feedback AI Prime Level Detects loss of prime in the pump based off the measured level. If the value drops below this level for the timeout time and below the frequency inpill loss level , 'loss of Prime' occurs.	RW
3280	P26.12.5	**PID2 Feedback AI Loss PreFreq Timeout** PID Feedback AI Loss PreFreq Timeout When response is set to 3 or 4, when the Feedback signal is lost, the drive will run at the frequency set by AI loss pipe fill prefrquency for the time set here, after this time the drive will fault out on 'Feedback Loss'. The Time is disabled when set to 0sec.	RW
2428	P26.20.1	**Prime Pump Enable** This will enable or disabled the Pre-Charge function to allow for pre filling a system before going into PID control mode.	RW
2429	P26.20.2	**Prime Pump Level** This defines the level at which the Pre Charge function will drop out, If the feedback level raise above this value Pre-charge becomes deactivated, if the level is not reach it will switch after the delay time.	RW
2431	P26.20.3	**Prime Pump Frequency** Frequency at which the Pre-Charge function will operate when enabled.	RW
2432	P26.20.4	**Prime Pump Delay Time** This is the time that the drive will run the Pre-charge function on start up. When set to '0 Hz' this function is not enabled. When set to '0 Hz' this function is not enabled.	RW
2433	P26.20.5	**Prime Pump Loss Of Prime Level** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assigned in the Prime Loss of Time setting the drive will display a Pre-charge Loss of Prime.	RW
2434	P26.20.6	**Prime Pump Level 2** This defines the level at which the Pre Charge function will drop out, If the feedback level raise above this value Pre-charge becomes deactivated, if the level is not reach it will switch after the delay time.	RW
2436	P26.20.7	**Prime Pump Frequency 2** Frequency at which the Pre-Charge level 2 will operate at when enabled.	RW

Modbus ID	Code	Parameters	RO/RW
2437	P26.20.8	**Prime Pump Delay Time 2** This is the time that the drive will run at the 2nd Level Pre Charge function level. When set to '0 Hz' this function is not enabled.	RW
2438	P26.20.9	**Prime Pump Loss Of Prime Level 2** Selects the limit to indicate a loss of Prime in pump. If the measured current drops below the determined value for the value assigned in the Prime Loss of Time setting the drive will display a Pre-charge Loss of Prime.	RW
2410	P26.21.1	**Pipe Fill Loss Response** Defines the response method when a 'Loss of Prime' condition occurs	RW
2406	P26.21.2	**Pipe Fill Loss Detection Method** "Defines the value for looking at a loss of prime 0 = Motor Current 1 = Motor Power (%) 2 = Motor Torque (%)"	RW
2409	P26.21.4	**Pipe Fill Loss Frequency** Defines the frequency point at which the drive needs to be above to enabled the 'Loss of Prime' feature. When set to 0 Hz protection is disabled.	RW
2408	P26.21.7	**Pipe Fill Loss Time** Defines the delay time before a 'Loss of Prime' condition will occur based of the Detection Method and Prime Loss Level.	RW
2411	P26.21.8	**Pipe Fill Loss Attempts** Defines the amount of temps to auto restart the drive on an 'Prime Loss' condition.	RW
170	P27.1.1	**AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI1 1 = Analog reference from AI2	RW
171	P27.1.2	**AI Limit Supv** Selects how the frequency converter functions based off the analog input limit value setting	RW
172	P27.1.4	**AI Limit Supv Val** Selects the analog reference value supervised by the analog reference limit supervision funciton	RW
2198	P27.1.5	**AI Supv Hyst** This value selects the bandwidth between when the AI supervision enables and disables itself.	RW
2193	P27.1.6	**Second AI Supv Select** Selects analog signal to use for the analog input supervision 0 = Analog reference from AI1 1 = Analog reference from AI2	RW
2194	P27.1.7	**Second AI Limit Supv** Selects how the frequency converter functions based off the analog input limit value setting	RW
2195	P27.1.9	**Second AI Limit Supv Val** Selects the analog reference value supervised by the analog reference limit supervision funciton	RW
2199	P27.1.10	**Second AI Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the analog input 'Second AI Limit Supv' (ID2194).	RW
165	P27.7.1	**Temp Limit Supv** Selects how the frequency converter functions upon the value setting based off the Drive Temperature.	RW
166	P27.7.3	**Temp Limit Supv Val** Heat sink temperature (deg C)	RW
2204	P27.7.4	**Temp Limit Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the temperature limit "Temp Limit Superv" (ID165).	RW
167	P27.8.1	**Power Limit Supv** Selects how the frequency converter functions based off the power monitor upon the limit value setting	RW

Modbus ID	Code	Parameters	RO/RW
168	**P27.8.3**	**Power Limit Supv Val** Selects the output power value supervised by the power limit supervision funciton.	RW
2205	**P27.8.4**	**Power Limit Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the power limit "Power Limit Supv" (ID167).	RW
159	**P27.8.5**	**Torque Limit Supv** Selects how the drives torque limit supervision controller functions. **Figure 69. Supervision function.** 	RW
160	**P27.8.7**	**Torque Limit Supv Val** Selects the torque value supervised by the torque limit supervision funciton.	RW
2202	**P27.8.8**	**Torque Limit Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the torque limit "Torq Limit Superv" (ID159).	RW
2189	**P27.8.9**	**Motor Current 1 Supv** Selects how the motor current limit supervision controller function	RW
2190	**P27.8.11**	**Motor Current 1 Supv Value** Selects the motor current value supervised by the motor current limit supervision funciton	RW
2196	**P27.8.12**	**Motor Current 1 Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the motor current limit "Motor Current 1 Supv" (ID2189).	RW
2191	**P27.8.13**	**Motor Current 2 Supv** Selects how the motor current limit supervision controller function	RW
2192	**P27.8.15**	**Motor Current 2 Supv Value** Selects the motor current value supervised by the motor current limit supervision funciton	RW
2197	**P27.8.16**	**Motor Current 2 Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the motor current limit "Motor Current 2 Supv" (ID2191).	RW
154	**P27.8.17**	**Freq Limit 1 Supv** "Selects how the Frequency converter supervision controller functions as either a high or low limit based off the set supervision value. It can also be used to enabled an external brake control relay. 0: No supervision 1: Low limit supervision 2: High limit supervision 3: Brake-on Control	RW

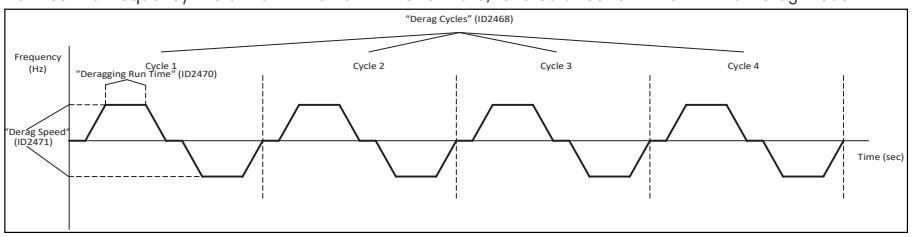
Modbus ID	Code	Parameters	RO/RW
155	P27.8.19	**Freq Limit 1 Supv Val** Selects the frequency value supervised by the frequency limit supervision funciton. **Figure 70. Supervision function.** 	RW
2200	P27.8.20	**Freq Limit 1 Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the frequency limit "Freq Limit 1 Supv" (ID154).	RW
157	P27.8.21	**Freq Limit 2 Supv** Defines how the monitoring control of the drive for the frequency limit works. The output of this function can be assigned to a digital or relay output of the drive if the corresponding output function is set to 10 = "Freq Limit 2 Supv". The following settings are possible: 0 = No supervision 1 = Low Limit Superv – The output is enabled if the frequency is lower than the threshold value set with "Freq Limit 1 Supv Val" (ID155). This is also the case when the device is locked. 2 = High Limit Superv – The output is enabled if the frequency is greater than the threshold value set with "Freq Limit 2 Supv Val" (ID158) threshold value set with "Freq Limit 1 Supv Val" (ID155). 3 = Brake-off control (only for universal application) – used in conjunction with the internal braking logic. 4 = Brake control (only for universal application) – used in conjunction with the internal braking logic.	RW
158	P27.8.23	**Freq Limit 2 Supv Val** Selects the frequency value supervised by the frequency limit supervision funciton.	RW
2201	P27.8.24	**Freq Limit 2 Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the frequency limit "Freq Limit 2 Supv" (ID157).	RW
161	P27.8.25	**Ref Limit Supv** Selects how the frequency converter functions upon the reference supervision value being a high or low limit.	RW
162	P27.8.27	**Ref Limit Supv Val** Selects the reference frequency value supervised by the reference frequency limit supervision funciton	RW
2203	P27.8.28	**Ref Limit Supv Hyst** This parameter defines the hysteresis for activating and deactivating the monitoring control of the drive for the frequency setpoint limit "Ref Limit Supv" (ID161).	RW
3772	P27.8.29	**Speed Limit Supervision** Selects how the drives speed limit supervision controller functions.	RW
3773	P27.8.30	**Speed Limit Supervised Value** Selects the speed value supervised by the speed limit supervision funciton.	RW
3774	P27.8.31	**Speed Limit Supervised Hysteresis** This value selects the bandwidth between when the speed limit supvervision enables and disables.	RW

Modbus ID	Code	Parameters	RO/RW
1346	P27.10.1	**PID1 Superv Enable** Upper and lower limits around the reference are set. When the actual value goes above or below the upper limit and lower limit the delay timer will increment. When the actual value is within the allowed area the delay counter decrements. After the delay time expires the relay output for PIDsupervision will be activated. This function is used for process value out of range faults	RW
1347	P27.10.3	**PID1 Superv Upper Limit** Upper limit for PID feedback value used with the PID supervision controller	RW
1349	P27.10.4	**PID1 Superv Lower Limit** Lower limit for PID feedback value used with the PID supervision controller	RW
1351	P27.10.5	**PID1 Superv Delay** Defines the delay time that the PID feedback value must be out of range before activating the PID supervision output	RW
1408	P27.11.1	**PID2 Superv Enable** 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. These can be fed into a digital input for preasure level faults.	RW
1409	P27.11.3	**PID2 Superv Upper Limit** 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. These can be fed into a digital input for preasure level faults.	RW
1411	P27.11.4	**PID2 Superv Lower Limit** 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. These can be fed into a digital input for preasure level faults.	RW
1413	P27.11.5	**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. These can be fed into a digital input for preasure level faults.	RW
224	P30.1.1	**Start Timer 1** This setting activates the timer functions to start Timer 1 Duration' (ID511). If this function is set to DI = OFF, the timer is never started. If the function is set to DI = ON, the timer function is always live. If assigned to an input, the active input starts the timer. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2 , DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Timer1 is started.	RW
225	P30.1.2	**Start Timer 2** This setting activates the timer functions to start Timer 2 Duration' (ID513). If this function is set to DI = OFF, the timer is never started. If the function is set to DI = ON, the timer function is always live. If assigned to an input, the active input starts the timer. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2 , DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Timer2 is started.	RW
226	P30.1.3	**Start Timer 3** This setting activates the timer functions to start Timer 3 Duration' (ID515). If this function is set to DI = OFF, the timer is never started. If the function is set to DI = ON, the timer function is always live. If assigned to an input, the active input starts the timer. Can be set to DIX for the terminal inputs on the control card, to DI10X for the inputs on the optional board in slot 1, DI20X for the inputs on the optional board in slot 2 , DI30X for the inputs on the optional board in slot 3, DI40X for the inputs on the optional board in slot 4, or time channel X. The ROX function allows switching on an input without wiring it to the physical relay output. Closed contact: Timer3 is started.	RW
558	P30.2.1	**TC1, TC2, TC3** Time channel status.	RO

Modbus ID	Code	Parameters	RO/RW
569	P30.2.2	**Timer 1** Timer 1 value in seconds.	RO
571	P30.2.3	**Timer 2** Timer 2 value in seconds.	RO
573	P30.2.4	**Timer 3** Timer 3 value in seconds.	RO
511	P30.2.5	**Timer 1 Duration** Defines the runtime of timer 1. The timer output is set to HIGH with a rising edge of the start signal at 'Start Timer 1' (ID224). After the time defined here has elapsed, it switches to LOW. A rising edge is once again required to restart. If the start signal changes to LOW while the timer is running, its output is immediately set to LOW.	RW
532	P30.2.6	**Timer 1 Channel** Select affected time channel.	RW
513	P30.2.7	**Timer 2 Duration** Defines the runtime of timer 2. The timer output is set to HIGH with a rising edge of the start signal at 'Start Timer 1' (ID225). After the time defined here has elapsed, it switches to LOW. A rising edge is once again required to restart. If the start signal changes to LOW while the timer is running, its output is immediately set to LOW.	RW
533	P30.2.8	**Timer 2 Channel** Select affected time channel.	RW
515	P30.2.9	**Timer 3 Duration** Defines the runtime of timer 3. The timer output is set to HIGH with a rising edge of the start signal at 'Start Timer 3' (ID226). After the time defined here has elapsed, it switches to LOW. A rising edge is once again required to restart. If the start signal changes to LOW while the timer is running, its output is immediately set to LOW.	RW
534	P30.2.10	**Timer 3 Channel** Select affected time channel.	RW
559	P30.3.1	**Interval 1** Status Interval1 (ID491).	RO
560	P30.3.2	**Interval 2** Status Interval2 (ID495).	RO
561	P30.3.3	**Interval 3** Status Interval3 (ID499).	RO
562	P30.3.4	**Interval 4** Status Interval4 (ID503).	RO
563	P30.3.5	**Interval 5** Status Interval5 (ID507).	RO
2487	P30.4.1	**Interval 1 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily.	RW
2488	P30.4.2	**Interval 2 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily.	RW
2489	P30.4.3	**Interval 3 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily.	RW
2490	P30.4.4	**Interval 4 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily.	RW
2491	P30.4.5	**Interval 5 Setting** Defines the Interval time setting for interval 1; to be Weekly or Daily.	RW
491	P30.5.1	**Interval 1 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
493	P30.5.2	**Interval 1 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
517	P30.5.3	**Interval 1 From Day** On day of week for Interval function.	RW

Modbus ID	Code	Parameters	RO/RW
518	P30.5.4	**Interval 1 To Day** On day of week for Interval function.	RW
519	P30.5.5	**Interval 1 Channel** Select affected time channel.	RW
495	P30.5.6	**Interval 2 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
497	P30.5.7	**Interval 2 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
520	P30.5.8	**Interval 2 From Day** On day of week for Interval function.	RW
521	P30.5.9	**Interval 2 To Day** On day of week for Interval function.	RW
522	P30.5.10	**Interval 2 Channel** Select affected time channel.	RW
499	P30.5.11	**Interval 3 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
501	P30.5.12	**Interval 3 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
523	P30.5.13	**Interval 3 From Day** On day of week for Interval function.	RW
524	P30.5.14	**Interval 3 To Day** On day of week for Interval function.	RW
525	P30.5.15	**Interval 3 Channel** Select affected time channel.	RW
503	P30.5.16	**Interval 4 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
505	P30.5.17	**Interval 4 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
526	P30.5.18	**Interval 4 From Day** On day of week for Interval function.	RW
527	P30.5.19	**Interval 4 To Day** On day of week for Interval function.	RW
528	P30.5.20	**Interval 4 Channel** Select affected time channel.	RW
507	P30.5.21	**Interval 5 On Time** On time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
509	P30.5.22	**Interval 5 Off Time** Off time for Interval function. It uses 24-hour format. Use to specify a time of day for a desired function to be disabled.	RW
529	P30.5.23	**Interval 5 From Day** On day of week for Interval function.	RW
530	P30.5.24	**Interval 5 To Day** On day of week for Interval function.	RW
531	P30.5.25	**Interval 5 Channel** Select affected time channel.	RW

Modbus ID	Code	Parameters	RO/RW
317	**P40.1.1**	**Underload Protection** "If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero. 0 = No response 1 = Warning 2 = Fault, stop mode after fault according to parameter stop mode 3 = Fault, stop mode after fault always by coasting"	RW
318	**P40.1.2**	**Underload Fnom Torque** The torque limit can be set between 10.0–150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. If you change pareamter 'nominal motor current', this parameter is automatically restored to the default value.	RW
319	**P40.1.3**	**Underload F0 Torque** The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives value for the minimum torque allowed at zero frequency. If you change the value of nominal motor current, this parameter is automatically restored to the default value.	RW
320	**P40.1.4**	**Underload Time Limit** This time can be set between 2.0 and 600.0s. This is the time allowed for an fault 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 protection parameter. If the drive is stopped, the counter is reset to zero.	RW
483	**P40.2.1**	**Damper Start** "This parameter determines the function of damper. 0 = Start—standard start 1 = Interlocked Start—To use this, a relay output, RO1/RO2, needs to be programmed for selections 29 "Damper Control," and a digital input function must be programmed for selection "RunEnable". 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."	RW
484	**P40.2.2**	**Damper Time Out** This parameter works in conjunction with the setting 'Start delay mode' (ID483) = 2. It defines the time to give feedback via an aux contact. If this time is exceeded, the drive switches off and the error message 'Start-up Prevent" is displayed.	RW
485	**P40.2.3**	**Damper Delay** This parameter works in conjunction with the setting 'Start delay mode' (ID483) = 3. It defines the delay time for starting the drive after receiving the start signal.	RW
1847	**P41.1.1**	**Valve Start** "This parameter determines the function of damper. 0 = Start—standard start 1 = Interlocked Start—To use this, a relay output, RO1/RO2, needs to be programmed for selections 29 "Damper Control," and a digital input function must be programmed for selection "RunEnable". 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."	RW
1848	**P41.1.2**	**Valve Time Out** This parameter works in conjunction with the setting 'Start delay mode' (ID483) = 2. It defines the time to give feedback via an aux contact. If this time is exceeded, the drive switches off and the error message 'Start-up Prevent" is displayed.	RW

Modbus ID	Code	Parameters	RO/RW
1849	P41.1.3	**Valve Delay** This parameter works in conjunction with the setting 'Start delay mode' (ID483) = 3. It defines the delay time for starting the drive after receiving the start signal.	RW
2423	P41.1.4	**Run Delay Time** Run Delay time parameter sets the time required for the drive to wait before another run command can be received. During this time the run signal is given will be ignored until the time has expired upon which it will then start, this is true for keypad, I/O and fieldbus.	RW
1813	P41.1.5	**Minimum Run Time** Specifies the minimum runtime of the inverter. If a stop command is given, the drive continues to run as long as the minimum runtime has not yet been reached.	RW
2394	P41.2.1	**Deragging Enable** When Deragging Enable is Enabled it will allow the drive to cycle the motor forward and reverse for 3 cycles, this would be used to remove any jamming on start. If the funciton is set for Normally Open the deragging functionwill not be activated, if he function is set for Normally Closed then the Derag Function will always be active. Can be set to DigiIN: X indicates on board terminal inputs, DigiIN:A:IOX:X indicates option boards in A slot, DigiIN:B:IOX:X indicates optional board in B slto, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X function allows for having an input trun on without having to hard wire it to the physical relay output.	RW
2468	P41.2.2	**Derag Cycles** This parameter defines the number of cycles, each in clockwise and anticlockwise rotation, that take place during pump cleaning.	RW
2469	P41.2.3	**Derag At Start/Stop** This parameter specifies when the pump should be cleaned. At every start (1), at every stop (2), at both (3) or via the digital input 'Pump cleaning source' (4).	RW
2470	P41.2.4	**Deragging Run Time** This parameter defines the runtime in one direction of rotation during the pump cleaning cycle. It starts when the operation frequency set with 'f-Ref pump cleaning' (ID2471) is reached.	RW
2471	P41.2.5	**Derag Speed** Defines the frequency the drive will run at in the forward/reverse direction when in the Derag mode.  	RW
2472	P41.2.6	**Derag Off Delay** Downtime of the drive during pump cleaning before changing the direction of rotation.	RW
2279	P41.3.1	**Multi-pump Mode** Determines the number of drives being used in the Multi-pump configuration. 0 = Single Drive - single drive for main motor, contactors used on other motors 1 = Multi Drive - multi-follower sequence with multiple drives.	RW
2659	P41.3.2	**Multi-pump Mode 2** Determines the number of drives being used in the Multi-pump configuration. 0 = Single Drive - single drive for main motor, contactors used on other motors 1 = Multi Drive - multi-follower sequence with multiple drives.	RW
2658	P41.3.3	**Multi-pump Mode 1/2 Select** DI function selection parameter, it will select MPFC use parameter MFC mode or MFC mode2. User could switch the pump mode between MFC mode and MFC mode2 by DI.	RW
2449	P41.3.4	**Number Of Drives** This defines the number of drives active when doing the Multi-Drive Pump and fan scheme. By default there will be always 1 drive active at 1 time by setting value to above 1 it allows to bring in additional drives to maintain the system.	RW

Modbus ID	Code	Parameters	RO/RW
2278	P41.3.5	**Drive ID** This parameter defines the drive address when using the multi-pump mode or the redundant drive function. The address must not be equal to "0". The setting "0" means that such a drive is not participating in the system. The address also determines the switch-on sequence. The lowest address has priority when assigning the master function. It is also used to display statuses and measured values.	RW
2458	P41.3.6	**PID Bandwidth** Percentage based off the setpoint above and below which defines when the aux motor will come online or offline.	RW
2315	P41.3.7	**Staging Frequency** Output frequency of the master drive above which more pumps can be switched on. This value must be less than Max Frequency! The control deviation for the time set with "t-delay bandwidth" (ID344) must also be outside the bandwidth defined with "bandwidth" (ID2458).	RW
2316	P41.3.8	**De-Staging Frequency** The De-Staging frequency provides a level at which if the master drive goes below this frequency it then looks to drop out the next aux motor. This would indicate the system is able to maintain the reference level without the current running pumps.	RW
344	P41.3.9	**Add/Remove Delay** If the control deviation is outside the "bandwidth" (ID2458) and the output frequency is higher than "Staging Frequency (ID2315) or lower than "f switch-off" (ID2316), the time set here must elapse before a motor can be switched on or off.	RW
350	P41.3.10	**Interlock Enable** If this parameter is enabled, the master drive can recognize which motor is available for multi-pump mode. To this end, digital inputs must be configured accordingly with the parameters "Motor1 ... 5 Interlock source" (ID210-214). When disabled, the drives are controlled without this feedback.	RW
2803	P41.3.11	**OP Cont Interlock Attempts** "This parameter determines how many automatic restarts can be made during the trial time after an OP Cont Interlock fault trip. 0 = No automatic restart >0 = Number of automatic restarts after OP Cont Interlock fault. The fault is reset and the drive is started automatically after the output contactor interlock input return normal."	RW
2831	P41.3.12	**OP Cont Interlock Protection** Device response following "OP Cont Interlock Fault". Options depend on the device: 0 = No Action; 1 = Warning; 2 = Fault; 3 = Fault, Coast.	RW
2802	P41.3.13	**OP Cont Interlock NC** Allows for Output Contactor Interlock input causing drive to fault if drive in run mode and have a time delay of 250ms. This function is defined as NC so the function activates on a open contact. If this function is assigned to Normally Closed - the function is always off so the drive will not fault, when set to Normally Open the function will be active and fault all the time if run drive. The additional settings allow assigning them to an input to control the function. 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot,or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
2801	P41.3.14	**OP Cont Interlock NO** Allows for Output Contactor Interlock input causing drive to fault if drive in run mode and have a time delay of 250ms. This function is defined as NO so the function activates on a closed contact. If this function is assigned to Normally Open - the function is always off so the drive will not fault, when set to Normally Closed the function will be active and fault all the time if run drive. The additional settings allow assigning them to an input to control the function. 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW

Modbus ID	Code	Parameters	RO/RW
210	**P41.3.15**	**Motor Interlock 1** Selectes inputs allowed to verify aux mutors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	RW
211	**P41.3.16**	**Motor Interlock 2** Selectes inputs allowed to verify aux mutors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	RW
212	**P41.3.17**	**Motor Interlock 3** Selectes inputs allowed to verify aux mutors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	RW
213	**P41.3.18**	**Motor Interlock 4** Selectes inputs allowed to verify aux mutors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	RW

Modbus ID	Code	Parameters	RO/RW
214	**P41.3.19**	**Motor Interlock 5** Selectes inputs allowed to verify aux mutors are connected to allow them to run, if inputs are disabled drive will see this as a motor not connected an skip over the motor in the booster/auto-change sequence. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. When this function is set for Normally Open the drive will not see a motor interlock enabled when doing multi-pump and fan. If the function is set for Normally Close the drive will initialize that motors are connected to allow running. These are ideally tied to aux contacts on the output contactor to the motor. Can be set to 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, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: motor interlock signal activated. Open contact: motor interlock signal unactivated.	RW
2284	**P41.4.1**	**Regulation Source** For drives that have been connected with both start/stop signal and PID feedback can be set up as 'Feedback', so they will have ability to be master. 0 = Network 1 = Feedback	RW
2285	**P41.4.2**	**Recovery Method** This parameter is for the slave when multi-drive system lost master, slave drive can continue run if it set to be 'Automatic', however slave drive will stop immediately if it is set to be 'Stop'. 0 = Automatic 1 = Stop	RW
2311	**P41.4.3**	**Add/Remove Drive Selection** In default, MPFC system will add/remove pump according to their drive ID, from small to large; and the order can also depend on each slave drive's running time: add the drive has shortest running time and remove the drive has longest running time first.	RW
2280	**P41.4.4**	**Run Time Enable** The run time counter will start counting only if this parameter is enabled. 0 = Disable 1 = Enable	RW
2281	**P41.4.5**	**Run Time Limit** If the runtime of the drive is above the limit specified here, the network status changes to "Need Alternation". This status is also communicated to the master via the bus. When the setting = 0, this function is disabled.	RW
2283	**P41.4.6**	**Run Time Reset** This parameter resets the runtime counter by selecting "Reset (1)". After reset, the parameter is automatically reset to "No action (0)".	RW
2473	**P41.4.7**	**Master Drive Mode** This parameter determines the behavior of the master when slave drives are switched on. 0 = Follow PID - The master drive follows the signal at the output of the PID controller. 1 = Preset speed - When a slave is switched on, the master switches to the preset speed defined with 'Master Fixed Speed Delay' (ID2475) after the time defined with 'Master Fixed Speed' (ID2474). The PID controller of the master continues to specify the operation frequency setpoint for the slaves. 2 = Turn off - When a slave is switched on, the master switches off after the delay defined with 'Master Fixed Speed Delay' (ID2475).	RW
2474	**P41.4.8**	**Master Fixed Speed** Defines the fixed speed frequency when the Master Drive mode is set for Fixed Speed control when slaves are brought in.	RW
2475	**P41.4.9**	**Master Fixed Speed Delay** Defines the delay time before the master drive begins running at the fixed speed or turns off if the Master Mode is set for Fixed Speed or Turn Off.	RW

Modbus ID	Code	Parameters	RO/RW
2476	P41.5.1	**Redundant Drive Enable** This parameter activates the redundant drive function, whereby several drives are connected to each other via Modbus communication (RS485 via A/B terminals) and the device with the smallest drive ID is considered the main drive. If the main drive fails due to a fault or shutdown, or if the runtime limits are reached, the secondary drive is switched on and ensures that the system continues to operate.	RW
2477	P41.5.2	**Redundant Run Time Enable** This parameter activates the runtime limit for the redundant drive function so that drives are switched on and off based on the runtime limit value 'Redundant RunTime Limit' (ID2479).	RW
2478	P41.5.3	**Redundant Run Time Reset** This parameter resets the counter for the runtime limit in the redundant drive function.	RW
2479	P41.5.4	**Redundant RunTime Limit** Sets the time limit for the Run time of one drive when enabled for the Redundant drive scheme.	RW
342	P41.6.1	**Number Of Pumps** Total number of auxiliary motors/pumps to be used with the Multi-Pump System. When in single drive mode, this functions as the amount of motors on a single drive. When in multi drive mode, this functions as the most drives active at one time.	RW
346	P41.6.2	**Include Freq Converter** The automatic pump changeover function allows changing the switching sequence so that the pumps in the system have almost the same runtime. It is possible to select in advance whether the controlled pump 1 is included in the change or whether only the sequence of pumps 2 to 5 is changed. 0 = Disabled: The change only occurs between the unregulated pumps. 1 = Enabled: The regulated pump is included in the change. Not available in multiple drive mode.	RW
345	P41.6.3	**Auto-Change Enable** Enables the automatic pump change function, which allows changing the switching sequence so that the pumps in the system have almost the same run time. Not available in multiple drive mode.	RW
347	P41.6.4	**Auto-Change Interval** Defines how often to rotate starting order of motors/pumps. Not available in multi-drive mode.	RW
349	P41.6.5	**Auto-Change Freq Limit** A pump is changed automatically only if the time defined with "t-AutoChange Interval" (ID347) has elapsed and the operation frequency of the controlled drive is below the limiting value defined here. Not available in multiple drive mode.	RW
348	P41.6.6	**Auto-Change Pump Limit** A pump is changed automatically only if the time defined with "t-AutoChange Interval" (ID347) has elapsed and the number of uncontrolled pumps is lower than the limit defined here. Not available in multiple drive mode.	RW
2439	P41.7.1	**Pipe Fill Aux Pump Select** This parameter activates the pipe filling function by preselecting the drive used for filling. Only available in single drive mode.	RW
2440	P41.7.2	**Pipe Fill Aux Pump Run Time** The maximum duration for pipe filling with the unregulated drive.	RW
2441	P41.7.3	**Pipe Fill Aux Pump Operation** Behavior of the uncontrolled filling pump after the times preselected with 'Pipe Fill Aux Pump Run Time' (ID2440) and 'Pipe Fill Aux Pump Delay' (ID2442). 0 = Automatic: The uncontrolled motor remains active after the filling process and is only switched off again when the pressure in the system is too high. 1 = Stop: The uncontrolled motor is switched off immediately when the controlled drive leaves pipe filling mode, but after the time set with "Pipe Fill Aux Pump Run Time" (ID2440) at the latest.	RW
2442	P41.7.4	**Pipe Fill Aux Pump Delay** Definition of the switch-on time for the uncontrolled auxiliary drive.	RW

Modbus ID	Code	Parameters	RO/RW
2286	**P41.7.5**	**Callback Source** Slave paraemters which will update to master. Sometimes some information needs to be callback from slave to master and affect whole system; if slave drive has a callback source as STO, when it suffers STO fault, master drive will answer this callback and shutdown whole system. 0 = No Action 1 = Safety Torque Off	RW
2407	**P41.7.6**	**Pipe Fill Loss Level** Selects the level at which to look at a condition of Loss of Prime. When the measured value defined in the Detection Method drops below this level for the Prime Loss Time and is above the Prime Loss Freuency level, the drive will respond based off the parameter 'pipe fill loss response'.	RW
2804	**P41.8.1**	**Jockey Pump Enable** "Parameter "Jockey Enable' specifies drive shall use jockey function. there are three options, default value is 0. 0 = Not Used; 1 = PID Sleep, jockey pump will start when PID sleep is active and stopped when PID wakes up; 2 = PID Sleep(Level), jockey pump will start when PID sleep is active and PID feedback value goes below the level defined by parameter 'Jockey Start Level', jockey pump will be stopped when the feedback value exceeds the level defined by parameter 'Jockey Stop Level' or PID wakes up;"	RW
2805	**P41.8.2**	**Jockey Start Level** This parameter defines the level at which the jockey pump is enabled when sleep mode is active and 'Jockey Pump Enable' (ID2804) is set to PID sleep mode level (=2).	RW
2807	**P41.8.3**	**Jockey Stop Level** This parameter defines the level at which the jockey pump is disabled when sleep mode is active and 'Jockey Pump Enable' (ID2804) is set to PID sleep mode level (=2).	RW
2809	**P41.9.1**	**Lube Pump Enable** Lube Pump Enable' parameter is used to enable/disable lube pump function. there are two options, one is 'Enabled', another is 'Disabled', default is 'Disabled'.	RW
2810	**P41.9.2**	**Lube Pump Time** This parameter defines the delay time for the lubrication pump function. The relay or digital output set as 'Lube pump active' (72) is set after this time if the start command is active. If this parameter is set to 0, the function is disabled.	RW
1853	**P41.10.1**	**Broken Pipe Fault Response** If the output frequency is greater than 'f-pipe break' (ID1856) and the PID actual value is below the pipe break level (ID1854), for longer than 't-pipe break delay' (ID1855), the response follows this setting: 0 = No Action 1 = Warning 2 = Fault 3 = Fault, Coast	RW
1854	**P41.10.2**	**Broken Pipe Level** Burst pipe level as a function of the PID actual value in process unit for fault detection after 'Action@BurstPipe' (ID1853).	RW
1855	**P41.10.3**	**Broken Pipe Delay** Specifies the delay time for a burst pipe fault according to the setting 'Action@BurstPipe' (ID1853).	RW
1856	**P41.10.4**	**Broken Pipe Frequency** Defines the level that the output frequency must exceed to fulfill the condition for a pipe break fault.	RW
751	**P80.1.1**	**Logic Function Select** The logic function enables you to link both parameters logic function input(A) and logic function input (B) logically with each other. The value can be And - indicating both being active then enable the logic, OR - if one or both inputs are active then it will enabled the logic, XOR - if any one of the inputs are active the logic is enabled, if both logic's are the same state it disables the logic. The result (LOG) can then be assigned to the digital outputs DO, RO1, RO2. The type of operation is defined in parameter logic function selection: 0 = AND 1 = OR 2 = XOR	RW

Modbus ID	Code	Parameters	RO/RW
752	**P80.1.2**	**Logic Operation Input A** Input A for Logic function calculation defined in ID751. See ID151 DO/RO Functions for settings.	RW
753	**P80.1.3**	**Logic Operation Input B** Logic operation input B for using the logic function in ID751 For selection, see description ID151 DO1 function.	RW
5005	**P81.1**	**Logic Engine Control** "This parameter is used to control to run or stop Logic Engine function Stop: stop plc. Hot Start: start plc without resetting data memory areas (all variable values will be kept) . Warm Start: start plc resetting data memory areas (variable values) except for retentive area (retentive variable values will be kept). Cold Start: start plc resetting all data memory areas, including retentive area (all variable values will be resetted)."	RW
5006	**P81.2**	**Logic Engine Status** This parameter indicates the running status of Logic Engine	RO
627	**P95.1.1**	**Multimonitor Set** This function can be used to prevent the monitoring values in the 'Multi-Monitor' (ID1753) from being changed. To allow changes, this parameter must be set to 0.	RW
116	**P95.1.3**	**Keypad Direction** 0 = Forward: The rotation of the motor is forward or clockwise direction , when the keypad is the active control place. 1 =Reverse: The rotation of the motor is reversed or counter clockwise direction, when the keypad is the active control place.	RW
114	**P95.1.4**	**Keypad Stop** 0 = Enabled-Keypad opertation - In this mode the keypad stop will only operate when the cotnrol source is set to keypad 1 = Always Enables - In this mode the stop button will always stop the drive regardless of control mode	RW
628	**P95.1.7**	**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.	RW
2157	**P95.1.8**	**Keypad Comm Fault Response** This parameter defines the function of the keypad communication response in the case the keypad is removed.	RW
629	**P95.1.9**	**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.	RW
630	**P95.1.10**	**Contrast Adjust** This parameter can be used to adjust the contrast of the display to adapt it to the ambient light.	RW
631	**P95.1.11**	**Backlight Time** If nothing is entered via the keypad buttons for the duration of the time specified here in minutes, the display backlight is switched off.	RW
632	**P95.1.12**	**Fan Control** This function allows you to control the PowerXL DX1's cooling fan. You can set the fan to run: Note: The fan runs continuously, regardless of this setting, when the frequency converter is in RUN state.	RW
633	**P95.1.13**	**Keypad ACK Timeout** This function allows the user to change the timeout of the Keypad acknowledgement time. This is the communication performed between the control module and the keypad. This would be adjusted when using long communication cables between drive and a keypad to delay message timeouts. Example: Transfer delay between the frequency converter and the PC = 600 ms The value of HMI Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay) The corresponding setting shall be entered in the [Misc]-part of the file It must also be considered that intervals shorter than the HMI Acknowledge Timeout time cannot be used in frequency converter drive monitoring.	RW

Modbus ID	Code	Parameters	RO/RW
634	P95.1.14	**Keypad Retry Number** This parameter defines how often the variable frequency drive attempts to confirm a keypad telegram that is faulty or not received within the confirmation time 'Keypad ACK Timeout' (ID633) before a 'Keypad Comm Fault' error message is output.	RW
75	P95.1.15	**Keypad Lock Password** The keypad can be protected against unauthorized changes with the keypad lock function after no press keys 5 minutes. When the password function is enabled, the user will be prompted to enter a password before keypad display parameter or response to key press except up/down/left/right. 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.	RW
2412	P95.1.17	**Jog Softkey Hidden** Jog Soft Key Hidden This parameter will enable or disable the soft key function for Jog as a soft key function on the display. 0 = Disable 1 = Enable	RW
2413	P95.1.18	**Reverse Softkey Hidden** Reverse Soft key Hidden This parameter will enable or disable the soft key function for Reverse as a soft key function on the display. 0 = Disable 1 = Enable	RW
2424	P95.2.1	**Output Display Unit** Output Display Unit	RW
2460	P95.2.2	**Output Display Unit Min** This parameter sets out which numerical value to display for the monitor values 'Output value' (ID2445) and 'Setpoint value' (ID2447) at the frequency preselected with 'Min Frequency' (ID3916).	RW
2425	P95.2.3	**Output Display Unit Max** This parameter sets out which numerical value to display for the monitor values 'Output value' (ID2445) and 'Setpoint value' (ID2447) at the frequency preselected with 'Max Frequency' (ID102).	RW
3833	P95.3.1	**Touch Screen Backlight Time** Determine how long the backlight of touch screen keypad stays on before going out.	RW
3834	P95.3.2	**Backlight Brightness** The parameter determines the brightness of the touch screen keypad backlight.	RW
2533	P96.1.1	**FB Process Data Input 1 Sel** NETInputPZD	RW
2534	P96.1.2	**FB Process Data Input 2 Sel** NETInputPZD	RW
2535	P96.1.3	**FB Process Data Input 3 Sel** NETInputPZD	RW
2536	P96.1.4	**FB Process Data Input 4 Sel** NETInputPZD	RW
2537	P96.1.5	**FB Process Data Input 5 Sel** NETInputPZD	RW
2538	P96.1.6	**FB Process Data Input 6 Sel** NETInputPZD	RW
2539	P96.1.7	**FB Process Data Input 7 Sel** NETInputPZD	RW
2540	P96.1.8	**FB Process Data Input 8 Sel** NETInputPZD	RW
3988	P96.1.9	**FB Process Data Input 9 Sel** NETInputPZD	RW
3989	P96.1.10	**FB Process Data Input 10 Sel** NETInputPZD	RW
3990	P96.1.11	**FB Process Data Input 11 Sel** NETInputPZD	RW

Modbus ID	Code	Parameters	RO/RW
3991	**P96.1.12**	**FB Process Data Input 12 Sel** NETInputPZD	RW
1556	**P96.2.1**	**FB Process Data Output 1 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
1557	**P96.2.2**	**FB Process Data Output 2 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW

Modbus ID	Code	Parameters	RO/RW
1558	**P96.2.3**	**FB Process Data Output 3 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
1559	**P96.2.4**	**FB Process Data Output 4 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
1560	**P96.2.5**	**FB Process Data Output 5 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW

Modbus ID	Code	Parameters	RO/RW
1561	**P96.2.6**	**FB Process Data Output 6 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
1562	**P96.2.7**	**FB Process Data Output 7 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
1563	**P96.2.8**	**FB Process Data Output 8 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW

Modbus ID	Code	Parameters	RO/RW
3984	**P96.2.9**	**FB Process Data Output 9 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
3985	**P96.2.10**	**FB Process Data Output 10 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
3986	**P96.2.11**	**FB Process Data Output 8 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW

Modbus ID	Code	Parameters	RO/RW
3987	**P96.2.12**	**FB Process Data Output 12 Sel** With the Fieldbus Data Output Selections, parameter/monitor ids can be assigned to these registers and then read over the desired Fieldbus Network Word for Process Data. Any drive parameter with an ID can be read over these values. Default Values for Process Data Out in Fieldbus(build table for below values) Process Data Out1 - Output Frequency = ID 1 Process Data Out2 - Motor Speed = ID 3915 Process Data Out3 - Motor Current = ID 3 Process Data Out4 - Motor Torque = ID 4 Process Data Out5 - Motor Power = ID 5 Process Data Out6 - Motor Voltage = ID 6 Process Data Out7 - DC Link Voltage = ID 7 Process Data Out8 - Active Fault Code = ID 28 Process Data Out9 - Active Fault Code = ID 1 Process Data Out10 - Active Fault Code = ID 1 Process Data Out11 - Active Fault Code = ID 1 Process Data Out12 - Active Fault Code = ID 1 see Communication Manual MN040010EN for more details.	RW
2415	**P96.3.1**	**Standard Status Word Bit0 Function Select** Standard Status Word Bit0 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	RW
2416	**P96.3.2**	**Standard Status Word Bit1 Function Select** Standard Status Word Bit1 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	RW
2417	**P96.3.3**	**Standard Status Word Bit2 Function Select** Standard Status Word Bit2 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value M50.	RW
2418	**P96.3.4**	**Standard Status Word Bit3 Function Select** Standard Status Word Bit3 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value ID2414.	RW
2419	**P96.3.5**	**Standard Status Word Bit4 Function Select** Standard Status Word Bit4 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value ID2414.	RW
2420	**P96.3.6**	**Standard Status Word Bit5 Function Select** Standard Status Word Bit5 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value ID2414.	RW
2421	**P96.3.7**	**Standard Status Word Bit6 Function Select** Standard Status Word Bit6 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value ID2414.	RW
2422	**P96.3.8**	**Standard Status Word Bit7 Function Select** Standard Status Word Bit7 Function Select This parameter allows for setting one of the DO/RO functions to a status word that then can be read over the communication Standard Status Word. This also can be viewed in the keypad monitor value ID2414.	RW
586	**P96.4.1**	**RS485 Comm Set** This parameter defines the communication protocol for RS-485. 0 = Modbus RTU	RW
588	**P96.4.2**	**Modbus RTU Protocol Status** This parameter shows the protocol status for RS-485 communication.	RO

Modbus ID	Code	Parameters	RO/RW
3969	P96.4.3	**RS485 Terminal Resistance Connect** RS485 Terminal Resistance Connect select: 0: Not connect the RS485 terminal resistance 1: Connect the RS485 terminal resistance"	RW
1500	P96.5.1	**IP Address Mode** This parameter defined the IP address configuration mode for EIP/Modbus TCP. 0 = Static IP 1 = DHCP with AutoIP This parameter defined the IP address configuration mode for EIP/Modbus TCP. 0: Static IP	RW
1507	P96.5.2	**Active IP Address** The current used IP address.	RO
1509	P96.5.3	**Active Subnet Mask** Display parameter for the sub-network mask currently in use.	RO
1511	P96.5.4	**Active Default Gateway** Display parameters for the gateway currently used for communication in other networks.	RO
1513	P96.5.5	**MAC Address** Display parameter for the current BACnet MAC address.	RO
1501	P96.5.6	**Static IP Address** This parameter defines the static IP address.	RW
1503	P96.5.7	**Static Subnet Mask** This parameter defines the static sub-network mask.	RW
1505	P96.5.8	**Static Default Gateway** This parameter defines the static standard gateway for communication in other networks.	RW
2921	P96.6.1	**WebUI Enable** Enables web service communications, must be enabled to connect to web service.	RW
68	P96.6.2	**Trusted IP White List** This parameter activates the whitelist for IP addresses. Devices not included in the whitelist cannot establish communication with the variable frequency drive.	RW
1894	P96.6.3	**Web Service Enable** Enables web service communications, must be enabled to connect to web service.	RW
74	P96.6.4	**Modbus TCP Trusted IP Enable** This parameter defines the IP addresses in the whitelist. The setting 192.168.1.255 allows all connections in the local sub-network.	RW
1942	P96.6.5	**Modbus TCP Enable** Enables Modbus TCP communications, must be enabled to connect to Power Xpert inControl.	RW
1895	P96.7.1	**Bluetooth Enable** Activate Bluetooth	RW
2920	P96.7.2	**Bluetooth Broadcast Mode** Bluetooth broadcast mode 0 = Off 1 = On	RW
2935	P96.7.3	**Bluetooth Pairing Reset** "Bluetooth Pairing Reset 0 = Not Reset 1 = Reset"	RW
3974	P96.7.4	**Bluetooth Connect Status** Bluetooth Connection Status 0 = Disconnected 1 = Connected	RO
3001	P96.8.1	**IOT Enable** IoT connect setting 0 = Disabled 1 = Enabled	RW

Modbus ID	Code	Parameters	RO/RW
3002	M96.8.2	**IOT Connection Status** IOT Connection Status 0 = Disconnected 1 = Connected	RO
3188	M96.8.3	**SNTP Server Status** SNTP Server Status	RO
3003	P96.8.4	**Proxy Enable** IOT PROXY setting 0 = Disabled 1 = Enabled	RW
3178	P96.8.5	**SNTP Enable** SNTP sever setting 0 = Disabled 1 = Enabled	RW
3179	P96.8.6	**SNTP Server 1** SNTP server 1 IP address	RW
3181	P96.8.7	**SNTP Server 2** SNTP server 2 IP address	RW
3183	P96.8.8	**SNTP Server 3** SNTP server 3 IP address	RW
3185	P96.8.9	**Sntp Update Time** SNTP Update Time	RW
3187	P96.8.10	**Sntp Retry Time** Retry time will be doubled when no server is responding. It will increased upto 10 times of retry time which user has configured.	RW
584	P96.9.1	**Baud Rate** This parameter defines the symbol rate for RS-485 communication via the A/B terminals. 0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200	RW
585	P96.9.2	**Parity Type And Stop Bit** This parameter defines parity type for RS-485 communication.	RW
593	P96.9.3	**Comm Timeout Modbus RTU** Defines the maximum response time before a Modbus RTU communication error (error code 83) is detected if no messages are received.	RW
587	P96.9.4	**Slave Address** This parameter specifies the slave address for Profibus communication	RW
2516	P96.9.5	**Modbus RTU Fault Response** Device reaction after occuring of 'Modbus RTU Fault'. Possibilities device dependent	RW
609	P96.13.1	**Connection Limit** This parameter defines the maximum number of permitted connections to the variable frequency drive.	RO
610	P96.13.2	**Modbus TCP Unit ID** This parameter defines the device ID for Modbus TCP.	RW
611	P96.13.3	**Comm Timeout Modbus TCP** This parameter defines the maximum response time before a TCP communication error (error code 84) is detected if no messages are received.	RW
612	P96.13.4	**Modbus TCP Protocol Status** Indicates if Modbus Protocol is active or not.	RO

Modbus ID	Code	Parameters	RO/RW
2517	P96.13.5	**Modbus TCP Fault Response** This parameter defines when a Modbus TCP communication error (error code 84) is monitored. 0 = in Fieldbus Control - In the event of a loss of communication fault, the error is only output if the control location is active on 'Fieldbus' (BUS). 1 = Always - The error is always output in the event of a loss of communication, regardless of the active control station.	RW
3978	P96.13.6	**TCP Fieldbus Fault Response** This parameter defines when a Modbus TCP communication error (error code 84) is monitored. 0 = in Fieldbus Control - In the event of a loss of communication fault, the error is only output if the control location is active on 'Fieldbus' (BUS). 1 = Always - The error is always output in the event of a loss of communication, regardless of the active control station.	RW
2915	P96.16.1	**WebUI Protocol Status** This parameter shows the protocol status for Webserver communication. 0 = Off 1 = Operational 2 = Faulted	RO
2916	P96.16.2	**WebUI Fault Response** This parameter defines when a WebUI communication error (error code 133) is monitored. 0 = in Fieldbus Control - In the event of a loss of communication fault, the error is only output if the control location is active on 'Fieldbus' (BUS). 1 = Always - The error is always output in the event of a loss of communication, regardless of the active control station.	RW
2919	P96.16.3	**WebUI Communication Timeout** Defines the maximum response time before a WebUI communication error (error code 133) is detected if no messages are received.	RW
3979	P96.16.4	**WebUI Fieldbus Fault Response** This parameter defines when a WebUI communication error (error code 133) is monitored. 0 = in Fieldbus Control - In the event of a loss of communication fault, the error is only output if the control location is active on 'Fieldbus' (BUS). 1 = Always - The error is always output in the event of a loss of communication, regardless of the active control station.	RW
3801	P98.1	**User Access Level** Shows which access levels have been activated by pass codes entered .	RW
3802	P98.2	**Operator Level Password** Password can be entered into this parameter to activate the Operator access levels or modify the Operator level's password.	RW
3810	P98.3	**Installer Level Password** Password can be entered into this parameter to activate the Installer access levels or modify the Installer level's password.	RW
3826	P98.5	**User Access Level Password Timeout** To avoid a password for each edit,will allow to define how long the password remains valid.	RW
3827	P98.6	**User Access Level Logout** Logout from a user level	RW
340	P99.1.1	**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.	RW
624	P99.1.3	**Password** Entry of the password to get access to the extended parameter set.	RW
625	P99.1.4	**Parameter Lock** This function allows the user to prohibit changes to the parameters. Note: This function does not prevent unauthorized editing of parameter values.	RW
626	P99.1.5	**Startup Wizard**	RW

Modbus ID	Code	Parameters	RO/RW
2312	P99.2.1	**Parameter Set1/2 Sel** Allows for the drive to select between the stored parameter set1 or set2, this requires saving parameters to the stored sets parameter set. When the function is set for Normally Open the drive will use the standard Parameter Set 1 in the keypad, if the function is set for Normally Closed the drive will follow Parameter Set 2 setting when stored to the keypad. DigiIN:A:IOX:X indicates optional board inputs in A slot, DigiIN:B:IOX:X indicates optional board inputs in B slot, DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output.	RW
215	P99.2.2	**No Access To Param** Locks out the ability to change parameters when this input is enabled, this can be used with the password protection. When this function is set for Normally Open it will allow for changing of parameters, if it is set for Normally Closed it prevents any changes to parameters. If a input is desired to control this DIGIN X can be used. Can be set to 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, , DigiIN:C:IOX:X indicates optional board inputs in C slot, DigiIN:D:IOX:X indicates optional board inputs in D slot, or Timer Channel X. RO X Function allows for having an input turn on without having to hard wire it to the physical relay output. Closed contact: all writable parameters cannot be edited.	RW
619	P99.2.3	**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 = Reload Set 1 3 = Reload Set 2 4 = Store parameter set1 5 = Store parameter set2 6 = Reset 7 = Reload Defaults VM	RW
620	P99.2.4	**Up To Keypad** This function uploads all existing parameter groups to the keypad.	RW
621	P99.2.5	**Down From Keypad** This function downloads one or all parameter groups from the keypad to the drive.	RW
623	P99.2.6	**Parameter 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 con 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.	RW
566	P99.3.1	**Real Time Clock** This parameter shows the real time clock, user can also edit it to adjust time.	RW
582	P99.3.2	**Daylight Saving** Daylight saving rule.	RW
583	P99.3.3	**RTC Battery Status** Real time clock battery status.	RO
5581	P99.3.4	**Drive Time Offset** Timezone value will be set with offset. E.g GMT+530 value would be -330.	RW
640	P99.4.1	**Keypad Software Version**	RO

Modbus ID	Code	Parameters	RO/RW
642	P99.4.2	**Motor Control Software Version** System Version	RO
644	P99.4.3	**Application Software Version** Firmware version of the MCU processor on the power card.	RO
1714	P99.4.4	**Software Bundle Version** The Software Bundle Version	RO
648	P99.5.1	**Serial Number** The Hardware information - Serial number of the drive.	RO
1270	P99.5.2	**Power Unit Serial Number** Power unit serial number	RO
1276	P99.5.3	**Control Unit Serial Number** Control board serial number	RO
2122	P99.6.1	**Currency** Sets the local currency value for where the drive is located so it can perform the Energy Savings estimation in terms of currency saved.	RW
2123	P99.6.2	**Energy Cost** Defines the local energy costs per kW. The drive uses this value to calculate energy savings.	RW
2124	P99.6.3	**Data Type** Selects the format to view Energy Savings. The drive takes four recordings in an hour and then calculates the average based off this setting. The savings is compared to what it would cost to run a across the line starter in the same load.	RW
2125	P99.6.4	**Energy Savings Reset** Resets the Energy Savings calculation value.	RW
3832	P99.7.1	**SD Card Copy Operation** Select the copy operation, copy the log file from drive to SD card.	RW
3911	P99.7.2	**SD Card Download Operation** Select the download operation, download the parameters to drive.	RW
3966	P99.7.3	**SD Card Firmware Upgrade Select** "SD Card Firmware Upgrade Select: 0:No Action 1:Drive Firmware Upgrade 2:Touch Keypad Firmware Upgrade"	RW
5587	P99.7.4	**SD Upgrade language 1 selection** Check translation set assignement for this item.	RW
5588	P99.7.5	**SD Upgrade language 2 selection** Language upgrading selection if using SD card upgrade firmware.	RW

Appendix B—Fault log

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

Table 198. 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 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 Active Faults submenu shows the list of faults. Select the fault and push DETAIL to see the fault data.	The memory of active faults can store the maximum of 10 faults in the order of appearance.

Table 199. 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 description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
1	Over Current	Over Current	Fault			0x2310	• 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	Over Voltage	Over Voltage	Fault			0x3210	• 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	Earth Fault	Configurable	Fault		0x2330	• Insulation failure in cables or motor	Check motor cables and motor. DG1 FR7-8 only fault, can't change fault type.
6	Ext Fault-AR	Emergency Stop	Fault			0xA001		• Close input signal from DI"
7	Saturation Trip	Saturation Trip	Fault			0xA002	• IGBT module is damaged	Check cables and connections Reset the fault and restart verify that EMC screw is installed Should the fault re-occur, contact the distributor near to you"
9	Under Voltage Fault	UnderVoltage	Configurable	Fault		0x3220	• 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
10	Input Phase Superv	Input Phase Spv	Configurable	No Action		0xA004		Check supply voltage, fuses and cable
11	Output Phase Superv	Output Phase Spv	Configurable	Fault		0xA005		Check motor cable and motor
12	Brake Chopper Superv	BrakeChopperSpv	Fault			0x7110	• 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
13	Drive Under Temp	Drive UnderTemp	Configurable	Warning		0x4320	Heat sink temperature is below –10°C	

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
14	Drive OverTemp Fault	Drive OverTemp	Fault			0x4310	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
15	Motor Stalled	Motor Stalled	Configurable	No Action		0x7121		Check motor and load
16	Motor Overload	Motor OverTemp	Configurable	No Action		0x4210		Decrease motor load. If no motor overload exists, check the temperature model parameters
17	Motor Under Load	Motor UnderLoad	Configurable	No Action		29		Check load
18	IP Address Conflict	IP conflict	Configurable	Warning		0xA006		Check settings for IP address, verify no duplicates are on the network.
19	Power Board EEPROM Fault	Power board EEPROM Fault	Fault			0xA007		Cycle power to drive. Try updating software, if issue continues contact Distributor near you.
20	Control Board EEPROM fault	FRAM Fault	Fault			0xA008		Try updating software, reload default. If issue contines contact a Distributor near you.
21	S-Flash Fault	Serial Flash Fault	Warning			0xA009		Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.
22	Speed Deviation	Speed Deviation	Fault			0xA05C	Estimated speed is greater than 115% of maximum frequency. Or current loop is oscillating.	Check motor parameters and run identification. Adjust the Observer Kp.
23	STO Fault	STO Fault	Fault			0xA071	1) STO1or STO2 is open 2) Control board STO1/STO2 diagnostic failed. 3) FS card STO1/STO2 diagnostic failed if FS is on board 3) STO OE is over voltage	•Check STO1 and STO2 connctions •If the fault recurs, contact your local/nearest service center or distributor.
25	Watchdog Fault	MCU WatchDog Fault	Fault			0x6010		Cycle power to drive. Try updating software, if issue contines contact a Distributor near you.
26	Start-up Prevent	Start-up Prevent	Fault			0xA00A		Stop drive and resend start command.
29	Thermistor Fault	Thermistor Fault	Configurable	Fault		0x7300		Thermistor open or short, over temperature
32	Fan Cooling	Fan Cooling	Configurable	Fault		0xA00B		Check fan and fan connected wires, verify 24Vdc is supplied to fan.
37	Device Change	Device Change	Warning			0xA00C		Alarm will reset
38	Device Added	Device Added	Warning			0xA00D		Device is ready for use
40	Device Unknown	Device Unknown	Fault			0xA00F		Check eeprom connection. Check board connection on slot A/B Power cycle to drive.
41	IGBT Over Temp	IGBT Temperature	Fault			66		Check output loading • Check motor size • Decrease switching frequency
50	AI < 4mA (4to20mA)	AIN<4mA(4to20mA)	Configurable	No Action		0xA011		Verify analog input current reference value on either AI1 or AI2, check cabling.
51	External Fault	External Fault	Configurable	Fault		0x9000		check digital input settings and verify input level, could be an extrnal device causing fault.
52	Keypad Comm Fault	Keypad Communication Fault	Configurable	Fault		0xA012		Check keypad connection and possible keypad cable. Check the local reference is keypad reference or the local control place is keypad, and the keypad communication fault protection is not “NO action”

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
54	Option Card Fault	OPT Card Fault	Configurable	Fault		0xA013		Check right option card and optoin card slot connections. Check Board Status on Keypad for exact cause of fault. Contact distributor nearest you.
55	Realtime Clock Fault	Real time clock fault	Configurable	Warning		0xA015	• Communication between MCU and RTC chip isn't normal • The power of RTC chip isn't normal • The real time isn't normal	Check the RTC chip, power cycle to drive. If issue contines contact distributor near you.
56	PT100 Fault	PT100 Fault	Configurable	Fault		0xA016		Pt100 short, open or over temperature, check PT100 temperature probe.
57	Motor ID Fault	Motor ID fault	Fault			0xA017		Check motor size Verify the input and output wiring is connected properly.
58	Current Measure Fault	Current Measure Fault	Warning			0x2100		Restart the drive again. Should the fault re-occur, contact the distributor near to you
60	Control Board Overtemp	Control Board OverTemp	Configurable	Fault		0x4300		Check NTC resistor Check control board temperature
64	Replace Battery	Replace Battery	Configurable	Warning		0xA019		Check the RTC battery voltage, contact distributor near you for replacement battery.
65	Replace Fan	Replace Fan	Configurable	Warning		0xA01A		Check the fan, clean out any contamination, contact distributor near you for replacement fan.
66	Safe Torque Off	Safety Torque Off	Configurable	Fault		0xA01B		Reset STO Trigger and verify wiring. Reset fault after input is enabled.
67	Current Limit Control	current limit control	Warning			0x2200		Check the load Set the acceleration time longer
68	Over Voltage Control	over voltage control	Warning			0x3310		Check the input voltage Set the acceleration/deceleration time longer
69	Thermistor spi fault	Thermistor spi fault	Fault			0xA01C		Check thermistor chip.
70	DSP parameter fault	DSP parameter fault	Fault			0xA01D		Restart the drive again. Should the fault re-occur, contact the distributor near to you.
82	Bypass Overload	BypassOverLoad	Fault			0xA025		Check motor connection situation
83	FieldBus RTU Fault	FieldBus RTU Fault	Configurable	Fault		0xA026	(1)DCI_ubRTUFaultBehavior parameter's value is 0,Loss of communication with Modbus RTU, and The fieldbus reference is the remote reference and The fieldbus control place is the RTU_ Fieldbus control place ,and the fault protection DCI_ubFieldbusFaultProtect is not "NO action"; (2)DCI_ubRTUFaultBehavior parameter's value is 1,Loss of communication with Modbus RTU and the fault protection DCI_ubFieldbusFaultProtect is not "NO action"; Note:If remote control place is not RTU_Fieldbus then on communication loss it would be Warning.	Check RS485 communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
84	FieldBus TCP Fault	FieldBus TCP Fault	Configurable	Fault		0xA027	(1)DCI_ubTCPFaultBehavior parameter's value is 0,Loss of communication with Modbus TCP ,and The fieldbus reference is the remote reference and The fieldbus control place is the TCP_Fieldbus remote control place ,and The fault protection DCI_ubTCPFieldbusFaultProtect is not "NO action"; (2)DCI_ubTCPFaultBehavior parameter's value is 1,Loss of communication with Modbus TCP and the fault protection DCI_ubTCPFieldbusFaultProtect is not "NO action"; Note:If remote control place is not TCP_ Fieldbus then on communication loss it would be Warning.	Check Ethernet communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.
87	FieldBus SlotA Fault	FieldBus SlotA Fault	Configurable	Fault		0xA029	The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Profibus/Canopen/ Devicenet/ProfiNet communication wiring. Verify drive parameter are set correctly. Check Profibus/ Canopen/Devicenet/ProfiNet master configuration programming to verify proper addressing.
88	FieldBus SlotB Fault	FieldBus SlotB Fault	Configurable	Fault		0xA02A	The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Profibus/Canopen/ Devicenet/ProfiNet communication wiring. Verify drive parameter are set correctly. Check Profibus/ Canopen/Devicenet/ProfiNet master configuration programming to verify proper addressing.
89	Under Voltage Stop Fault	Under Voltage Stop	Fault			0xA02B		
90	Drive Under Temp	Cold Weather Drive Under Temp	Configurable	Warning		0x3221	• Cold weather mode is not enabled, and unit temperature is less than -10 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is less than -30 degree. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is -20~ -30 degree. The temp <-20 degree when cold weather start time out.	If unit temp -20 ~ -10 degree, start motor in cold weather mode. If unit temp <-20 degree, Warm up unit above -20deg C for proper operation using cold weather mode.If still < -20 degree when cold weather mode time out, try higher output voltage in cold weather mode.
92	External Fault 2	External Fault 2	Configurable	Fault		0xA02D		check digital input settings and verify input level, could be an extrnal device causing fault.
93	External Fault 3	External Fault 3	Configurable	Fault		0xA02E		check digital input settings and verify input level, could be an extrnal device causing fault.
94	Pump Lost	Pump Lost	Warning			0xA02F	• In single drive control mode of MPFC, include FC, interlock enable, and all interlock signals lost. • In single drive control mode of MPFC, not include FC, interlock enable, and interlock 1 lost • In multi drive network mode of MPFC, interlock enable, and interlock 1 lost	Check digital inputs for interlock
95	Need Alternation	Need Alternation	Warning			0xA030	In multi drive network mode of MPC, run time counter enable and is over limit	Need to do motor maintainance and then reset runtime counter to clear the warning

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
97	Pipe Fill Loss	Prime Loss	Configurable	No Action		0xA031	•If prime pump is disabled, the pipe fill detection value(motor current, motor power or motor torque) is less than pipe fill loss setting level. •If prime pump is enabled and the drive in the prime pump level1 phase, the pipe fill detection value(motor current, motor power or motor torque) is less than prime pump level1 value. •If prime pump is enabled and the drive in the prime pump level2 phase, the pipe fill detection value(motor current, motor power or motor torque) is less than prime pump level2 value. •If PID feedback AI is lost and the feedback AI loss protection is warning:Preset Freq, the pipe fill detection value(motor current, motor power or motor torque) is less than pipe fill loss setting level of PID feedback AI loss	Check the motor current/power/torque of drive
98	PID1 Feedback AI Loss	PID1 Feedback AI Loss	Configurable	No Action		0xA032	The feedback function has relationship with feedback 1/2 and the feedback 1/2 source has relationship with AI, the AI signal range is 1(20-100%/2-10V/4-20mA), the AI value is out of range(AI mode: 0~20mA, AI < 4mA or AI > 20mA, AI mode: 0~10V, AI < 2V or AI > 10V) of PID1 feedback	Check the AI of PID1 feedback, the AI value whether is out of range or not, the AI range shall be 2~10V(AI mode is 0~10V) or 4~20mA(AI mode is 0~20mA)
99	PID2 Feedback AI Loss	PID2 Feedback AI Loss	Configurable	No Action		0xA033	The feedback function has relationship with feedback 1/2 and the feedback 1/2 source has relationship with AI, the AI signal range is 1(20-100%/2-10V/4-20mA), the AI value is out of range(AI mode: 0~20mA, AI < 4mA or AI > 20mA, AI mode: 0~10V, AI < 2V or AI > 10V) of PID2 feedback	Check the AI of PID2 feedback, the AI value whether is out of range or not, the AI range shall be 2~10V(AI mode is 0~10V) or 4~20mA(AI mode is 0~20mA)
103	Drive OverTemp Warning	Drive OverTemp Warning	Warning			0xA037	drive degree greater than (DCI_wDriveOverTempThreshold value - 10 degree) and less than DCI_wDriveOverTempThreshold value,report drive over temperature warning.	Check the drive degree
115	FieldBus EIP Idle Fault	FieldBus EIP Idle Fault	Configurable	Fault		0xA049	(1)DCI_ubSlotDFieldbusFaultBehavior parameter's value is 0, The fieldbus reference is the remote reference or The fieldbus control place is the EIP_Fieldbus control place ,and the fault protection DCI_ubSlotDFieldbusFaultProtect is not "NO action"; Idle bit in EtherNet master Programming is not set. (2)DCI_ubSlotDFieldbusFaultBehavior parameter's value is 1, Idle bit in EtherNet master Programming is not set and the fault protection DCI_ubSlotDFieldbusFaultProtect is not "NO action"; Note:If remote control place is not EIP_Fieldbus then on communication loss it would be Warning.	Check EtherNet IP master programming to verify proper addressing and ensure Idle communication bit is set.
118	Broken Pipe	Broken Pipe	Configurable	No Action		0xA048		Checking PID setting value and feedback.
120	PID1 Low Feedback	PID1 Low Feedback	Configurable	No Action		0xA043		Checking PID setting value and feedback.
121	PID1 High Feedback	PID1 High Feedback	Configurable	No Action		0xA044		Checking PID setting value and feedback.
122	PID2 Low Feedback	PID2 Low Feedback	Configurable	No Action		0xA045		Checking PID setting value and feedback.
123	PID2 High Feedback	PID2 High Feedback	Configurable	No Action		0xA046		Checking PID setting value and feedback.

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
124	OP Cont Interlock Fault	Op Cont Interlock Fault	Configurable	Fault		0xA047		Checking OP Cont interlock input signal.
133	FieldBus Web UI Fault	FieldBus Web UI Fault	Configurable	Fault		0xA050	(1)DCI_WEB_UI_FAULT_BEHAVIOR parameter's value is 0,Loss of communication with Web server ,and The fieldbus reference is the remote reference or The fieldbus control place is the WEbUI_Fieldbus remote control place ,and the fault protection is not "NO action"; (2)DCI_WEB_UI_FAULT_BEHAVIOR parameter's value is 1,Loss of communication with Webserver and the fault protection is not "NO action"; Note:If remote control place is not WEBUI_Fieldbus then on communication loss it would be Warning.	Check the web connection with RJ45 connector. Verify drive parameters are set correctly. Check the Web UI tool to know if there is proper request going to drive or not.
134	Bumpless Transfer Fail	Bumpless Transfer Fail	Warning			0xA053	Bumpless enable, but no start command from new control place after bumpless transition from local to remote or vice a versa.	Check whether there is no start command from new control place after bumpless transition.
135	CP Interlock Fault Run	CP Interlock Fault Run	Configurable	Fault		0xA054		Check CP interlock input signal
136	CP Interlock Fault Stop	CP Interlock Fault Stop	Configurable	Warning		0xA055		Check CP interlock input signal
139	M/F Supervision Fault	M/F Supervision Fault	Configurable	No Action		0xA058	Drive supervision function is acitve	Check supervision function settings
140	M/F Limit Reached	M/F Limit Reached	Configurable	No Action		0xA059	Motor output current is readch the limit	Check the motor output current
141	High Freq Pulse Input 1 fault	High Pulse DI1 fault	Configurable	Fault		0xA05A	The high frequency pluse input 1 value is < Fault detect low limit or > Fault detect high limit	Verfiy the high frequency pulse input 1 value
142	High Freq Pulse Input 2 fault	High Pulse DI2 fault	Configurable	Fault		0xA05B	The high frequency pluse input 2 value is < Fault detect low limit or > Fault detect high limit	Verfiy the high frequency pulse input 2 value
143	High Freq Pulse Output fault	High Pulse DO fault	Configurable	Fault		0xA05D	The high frequency pluse output value is < Fault detect low limit or > Fault detect high limit	Verfiy the high frequency pulse output value
144	Speed Error	Speed Error	Configurable	No Action		0x7310	The encoder speed is out of ramp generator output	• Check speed error settings • Check encoder signals
145	Fieldbus SlotC Fault	FieldBus SlotC Fault	Configurable	Fault		0xA05E	The fieldbus reference is the remote reference OR The fieldbus control place is the remote control place ,and The fault protection is not "NO action"	Check Profibus communication wiring. Verify drive parameter are set correctly. Check Profibus master configuration programming to verify proper addressing.
146	Fieldbus SlotD Fault	FieldBus SlotD Fault	Configurable	Fault		0xA05F	(1)DCI_ubSlotDFieldbusFaultBehavior parameter's value is 0, Loss of communication with EIP/Profinet comm-card.The fieldbus reference is the remote reference or The fieldbus control place is the EIP_Fieldbus/Profinet_Fieldbus control place ,and the fault protection DCI_ubSlotDFieldbusFaultProtect is not "NO action"; (2)DCI_ubSlotDFieldbusFaultBehavior parameter's value is 1, Loss of communication with EIP/Profinet comm-card and the fault protection DCI_ubSlotDFieldbusFaultProtect is not "NO action"; Note:If remote control place is not EIP_Fieldbus/Profinet_Fieldbus then on communication loss it would be Warning.	Check ProfiNet/ Dual Port Ethernet IP master communication wiring. Verify drive parameter are set correctly. Check ProfiNet/ Dual Port Ethernet IP master master configuration programming to verify proper addressing.

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
147	AI Fault	AI Fault	Configurable	Fault		0xA060	1) The AI mode is 0-20mA: If the AI signal range is 0 to 20mA , the analog input signal value > 20mA If the AI signal range is 4 to 20mA ,the analog input signal value < 4mA or > 20mA 2) The AI mode is 0-10V: If the AI signal range is 0 to 10Vdc, the analog input signal value >10V 3) The AI mode is -10-10V: If the AI signal range is -10 to 10Vdc, the analog input signal value >10V	Verfiy analog input signal value on either AI1 or AI2, check cabling.
148	ABZ Card Plug Slot Error	Card Plug Slot Error	Configurable	Fault		0xA064	ABZ encoder card is plugged in slot B or slot C or slot D port	Plug the ABZ encoder card in slot A port
149	FS Card Plug Slot Error	Card Plug Slot Error	Configurable	Fault		0xA065	FS card is plugged in slot A or slot C or slot D port	Plug the FS card in slot B port
150	Fiber Card Plug Slot Error	Card Plug Slot Error	Configurable	Fault		0xA066	Fiber card is plugged in slot A or slot B or slot D port	Plug the Fiber card in slot C port
151	ProfiNet Card Plug Slot Error	Card Plug Slot Error	Configurable	Fault		0xA067	Profinet card is plugged in slot A or slot B or slot C port	Plug the Profinet card in slot D port
152	EIP Card Plug Slot Error	Card Plug Slot Error	Configurable	Fault		0xA068	Dual port EIP card is plugged in slot A or slot B or slot C port	Plug the dual port EIP card in slot D port
153	MCU STO 5V Power Fault	STO Power Fault	Fault			0xA069	Control board 5V power is < 4.8V or > 5.2V	Verfiy the control board 5V power
154	DSP STO 5V Power Fault	STO Power Fault	Fault			0xA070	Control board 5V power is < 4.8V or > 5.2V	Verfiy the control board 5V power
156	M/F Configuer Error	M/F Configuer Error	Fault			0xA072	Master/follower synchronous mode is not match with motor control mode	Check the synchronous mode and mtor control mode setting
157	FC SPI Comm Fault	FC SPI Comm Fault	Fault			0xA073	Communication bus for Fast channel is damaged	• Check the Port D pin connection
158	FC Version MisMatch	FC Version MisMatch	Fault			0xA074	Fast channel packet format mismatched	Update drive with appropriate bundle
159	Encoder1 Signal Missing	Encoder1 Signal Missing	Fault			0xA075	1)The encoder is damaged. 2)Phase A is disconnect.	Check the wiring
160	Encoder2 Signal Missing	Encoder2 Signal Missing	Fault			0xA076	1)The encoder is damaged. 2)Phase A is disconnect.	Check the wiring
161	Encoder1 Inverse	Encoder1 Inverse	Fault			0xA077	1) Encoder1 A+ and A- are both high or low, B+ and B- are both high or low. 2)The use of environmental interference is large	• Check the wiring • Whether the three-phase output line of the motor crosses the signal line of the encoder.
162	Encoder2 Inverse	Encoder2 Inverse	Fault			0xA078	1) Encoder2 A+ and A- are both high or low, B+ and B- are both high or low. 2)The use of environmental interference is large	• Check the wiring • Whether the three-phase output line of the motor crosses the signal line of the encoder."
163	ABZ Card Vcc Error	ABZ Card Vcc Error	Fault			0xA079	Confirm that the switch is correct	Confirm that the switch
164	ABZ Card Dcom Error	ABZ Card Dcom Error	Fault			0xA07A	Hardware error or ABZ card not plug in	Check that the board is securely installed
165	Motor Direction Error	Motor Direction Error	Warning			0xA07B	1) Three phases output sequence is incorrect. 2) Encoder feedback signal	• Change output phase • Swap encoder A/B signal
167	M/F Comm Lost Fault	M/F Comm Lost Fault	Configurable	Fault		0xA056	Communication is lost between Master and Follower	Check the fiber cable connections
168	Follower Error	Follower Error	Configurable	Fault		0xA057	Follower is not ready	Check the drive status,

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
169	SD upgrading failed	SD upgrading failed	Warning				SD wire connectiong error, EMI etc.	Reconnect wire, clean envirment for EMI,upgrade again.
200	FS CPU Diagnosis Error	FS CPU Diagnosis Error	Warning			0xA07D	the logic of FS card MCU is diagnosed by HWBIST, and report error	power cycle. If error still exists, contact Eaton
201	FS RAM Diagnosis Error	FS RAM Diagnosis Error	Warning			0xA07E	the SRAM of FS card MCU is diagnostic and error happens	power cycle. If error still exists, contact Eaton
202	FS FLASH Diagnosis Error	FS FLASH Diagnosis Error	Warning			0xA07F	the flash of FS card MCU is diagnostic and error happens	power cycle. If error still exists, contact Eaton
203	FS BUS Diagnosis Error	FS BUS Diagnosis Error	Warning			0xA080	the bus of FS card MCU is diagnostic and error happens	power cycle. If error still exists, contact Eaton
204	FS PC Diagnosis Error	FS PC Diagnosis Error	Warning			0xA081	the PC of FS card MCU is diagnostic and error happens	power cycle. If error still exists, contact Eaton
205	FS Clock Diagnosis Error	FS Clock Diagnosis Error	Warning			0xA082	the clock of FS card is diagnosed and error happens	power cycle. If error still exists, contact Eaton
206	FS EEPROM Diagnosis Error	FS EEPROM Diagnosis Error	Warning			0xA083	there is error when EEPROM is read or written, such customer modifies safety parameters in Safety Tool	write safety parameters in Safety Tool again, or do the factory reset. If error still exists, contact Eaton
207	FS SCI Diagnosis Error	FS SCI Diagnosis Error	Warning			0xA084	FS card doesn't reponse to CB_MCU's request	power off, plug out and plug in FS card.
208	FS FSI Diagnosis Error	FS FSI Diagnosis Error	Warning			0xA085	the communication between two MCUs on FS card lost. Or there is error in the data package	power cycle. If error still exists, contact Eaton
209	FS MCU ID Diagnosis Error	FS SPI Diagnosis Error	Warning			0xA086	there is error when EEPROM is read or written, such customer modifies safety parameters in Safety Tool	write safety parameters in Safety Tool again, or do the factory reset. If error still exists, contact Eaton
210	FS Watchdog Diagnosis Error	FS Watchdog Diagnosis Error	Warning			0xA087	software error	power cycle. If error still exists, contact Eaton
211	FS Reset Circuit Diagnosis Error	FS Reset Circuit Diagnosis Error	Warning			0xA088	hardware error or software error	power cycle. If error still exists, contact Eaton
212	FS MCU1 Power Diagnosis Error1	FS MCU1 Power Diagnosis Error1	Warning			0xA089	power supply error	power cycle. If error still exists, contact Eaton
213	FS MCU1 Power Diagnosis Error2	FS MCU1 Power Diagnosis Error2	Warning			0xA08A	power supply error	power cycle. If error still exists, contact Eaton
214	FS MCU2 Power Diagnosis Error1	FS MCU2 Power Diagnosis Error1	Warning			0xA08B	power supply error	power cycle. If error still exists, contact Eaton
215	FS MCU2 Power Diagnosis Error2	FS MCU2 Power Diagnosis Error2	Warning			0xA08C	power supply error	power cycle. If error still exists, contact Eaton
216	FS SABZ 24V Diagnosis Error	FS SABZ 24V Diagnosis Error	Warning			0xA08D	power supply error	power cycle. If error still exists, contact Eaton
217	FS SABZ 6V Diagnosis Error	FS SABZ 6V Diagnosis Error	Warning			0xA08E	power supply error	power cycle. If error still exists, contact Eaton
218	FS SABZ 5V Diagnosis Error	FS SABZ 5V Diagnosis Error	Warning			0xA08F	power supply error	power cycle. If error still exists, contact Eaton

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
219	FS SABZ Power Diagnosis Error	FS SABZ Power Diagnosis Error	Warning			0xA090	power supply error	power cycle. If error still exists, contact Eaton
220	FS DI TP Diagnosis Error	FS DI TP Diagnosis Error	Warning			0xA091	DI terminal is not connected firmly	check DI connection in terminal
221	FS DI Crossing Diagnosis Error	FS DI Crossing Diagnosis Error	Warning			0xA092	DI terminal is not connected firmly	check DI connection in terminal
222	FS DO TP Diagnosis Error	FS DO TP Diagnosis Error	Warning			0xA093	DO terminal is not connected firmly	check DO connection in terminal
223	FS DO Crossing Diagnosis Error	FS DO Crossing Diagnosis Error	Warning			0xA094	DO terminal is not connected firmly	check DO connection in terminal
224	FS Speed Self Diagnosis Error	FS Speed Self Diagnosis Error	Warning			0xA095	A/B inverse signal is not always high	check A/B inverse signal to FS card
225	FS Speed Crossing Diagnosis Error	FS Speed Crossing Diagnosis Error	Warning			0xA096	The frequency of A signal and B signal are not the same	check A/B signals to FS card
226	FS Direction Self Diagnosis Error	FS Direction Self Diagnosis Error	Warning			0xA097	The phase differernce of A signal and B signal is not 90 degree	check A/B signals to FS card
227	FS Direction Crossing Diagnosis Error	FS Direction Crossing Diagnosis Error	Warning			0xA098	The direction on FS_MCU1 and FS_ MCU2 is not the same	check A/B signals to FS card
228	FS Position Diagnosis Error	FS Position Diagnosis Error	Warning			0xA099	The relative position on FS_MCU1 and FS_MCU2 is not the same	check A/B signals to FS card
229	FS Parameter Diagnosis Error	FS Parameter Diagnosis Error	Warning			0xA09A	check whether the safety parameters on two MCU are the same	check whether the safety parameters on two MCU are the same
230	SS1 Over Time	SS1 over time	Warning			0xA09B	The motor does not reduce to zero speed within the activation SS1-t function delay time	Check the FS card parameter settings. • Required parameter ""t-delay STO@ SS1"" > Motor deceleration time. • Motor deceleration time is calculated based on the parameters ""Speed scaling"" and ""Ramp time to zero"".
231	SS1 Speed Exceed Tolerance	SS1 speed exceed tolerance	Warning			0xA09C	After activating the SS1-r function, the speed change during motor deceleration is greater than the parameter “Deceleration tolerance”	• Monitor motor speed change • According to the actual deceleration of the motor, set the parameter “Deceleration tolerance”
232	SBC Relay Feedback Error	SBC relay feedback error	Warning			0xA09D	"The action that the FSC module takes when there is a problem with the SBC feedback. The FSC module activates the drive STO function."	Check SBC safety relay.
233	SBC Relay Feedback Warning	SBC relay feedback warning	Warning			0xA09E	"The action that the FSC module takes when there is a problem with the SBC feedback. The FSC module sends a warning to the drive."	Check SBC safety relay.

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
234	SLS Over Time	SLS over time	Warning			0xA09F	The motor does not reduce to zero speed within the activation SLS-t function delay time	Check the FS card parameter settings. • Required parameter ""SLS-t delay"" > Motor deceleration time. • Motor deceleration time is calculated based on the parameters ""Speed scaling"" and ""Ramp time to zero"".
235	SLS Speed Exceed Tolerance	SLS speed exceed tolerance	Warning			0xA0A0	After activating the SLS-r function, the speed change during motor deceleration is greater than the parameter "Deceleration tolerance"	• Monitor motor speed change • According to the actual deceleration of the motor, set the parameter "Deceleration tolerance"
236	SLS Trip Limit	SLS trip limit	Warning			0xA0A1	After activating the SLS function, the motor speed is uncontrolled and exceeds the trip limit value.	• Check the cause of motor speed change • Check the FS card parameter settings. Required parameter ""SLS trip limit"" > ""SLS limit"".
237	SOS Position Exceed Tolerance	SOS Position exceed tolerance	Warning			0xA0A2	After activating the SOS function, the motor deviation of the stop position exceeds the defined standstill tolerance	Check the cause of motor stop position change. Required stop position change < parameter ""SOS n=0-Hysteresis""
238	SS2 Over Time	SS2 over time	Warning			0xA0A3	The motor does not reduce to zero speed within the activation SS2-t function delay time	Check the FS card parameter settings. • Required parameter ""t-delay STO@ SS2"" > Motor deceleration time. • Motor deceleration time is calculated based on the parameters ""Speed scaling"" and ""Ramp time to zero"".
239	SS2 Speed Exceed Tolerance	SS2 speed exceed tolerance	Warning			0xA0A4	After activating the SS2-r function, the speed change during motor deceleration is greater than the parameter "Deceleration tolerance"	• Monitor motor speed change • According to the actual deceleration of the motor, set the parameter "Deceleration tolerance"
240	SS2 Position Exceed Tolerance	SS2 position exceed tolerance	Warning			0xA0A5	After activating the SS2 function, the motor deviation of the stop position exceeds the defined standstill tolerance	Check the cause of motor stop position change. Required stop position change < parameter ""SOS n=0-Hysteresis""
241	SDI Over Time	SDI over time	Warning			0xA0A6	The motor does not reduce to zero speed within the activation SDI-t function delay time	Check the FS card parameter settings. • Required parameter ""t-delay STO@ SS2"" > Motor deceleration time. • Motor deceleration time is calculated based on the parameters ""Speed scaling"" and ""Ramp time to zero"".
242	SDI Speed Exceed Tolerance	SDI speed exceed tolerance	Warning			0xA0A7	After activating the SDI-r function, the speed change during motor deceleration is greater than the parameter "Deceleration tolerance"	• Monitor motor speed change • According to the actual deceleration of the motor, set the parameter "Deceleration tolerance"
243	SDI Position Exceed Tolerance	SDI position exceed tolerance	Warning			0xA0A8	After activating the SDI function, The motor rotates to the forbidden direction exceeds the allowable degree of the SDI tolerance limit	Check the cause of motor rotates to the forbidden direction change. Required rotates to the forbidden direction change < parameter ""SDI Limit degree""
244	SLA Acceleration Exceed Tolerance	SLA Acceleration exceed tolerance	Warning			0xA0A9	After activating the SLA function, The motor acceleration/deceleration exceeds the trip limit	• Check acceleration/deceleration time • According to the actual acceleration/deceleration of the motor, set the parameter "SLA+ trip limit"/"SLA- trip limit"
245	SSR Speed Exceed Tolerance	SSR speed exceed tolerance	Warning			0xA0AA	After activating the SSR function, , the motor speed exceeds the monitoring range.	Check whether the motor speed is between the parameters "SSR upper limit" and "SSR lower limit"
246	SAR Acceleration Exceed Tolerance	SAR Acceleration exceed tolerance	Warning			0xA0AB	After activating the SAR function, , the motor accelerates/deceleration exceeds the monitoring range.	Check whether the motor speed is between the parameters "SAR upper limit" and "SAR lower limit"

Fault code	Fault name	Fault description	Fault type	Default config	CIP Code	PROFI Code	Possible cause	Remedy
247	SABZ Tick Diagnosis Error	ABZ tick diagnosis error	Warning			0xA0AC	1. Communication is disconnected due to automatic upgrade, factory reset or card not inserted properly. (between SABZ card and CB_MCU or between FS card and CB_MCU) 2. SABZ power supply diagnostic function is abnormal	•Power off, check card connectivity, and power on again • If it is adequate, an internal failure has occurred. Contact the distributor near you
248	Encoder Line Number Fault	Encoder Line Number Fault	Fault				Encoder1 pulse count or Encoder2 pulse count value error	Check the encoder's instruction manual and use the correct number of pulses

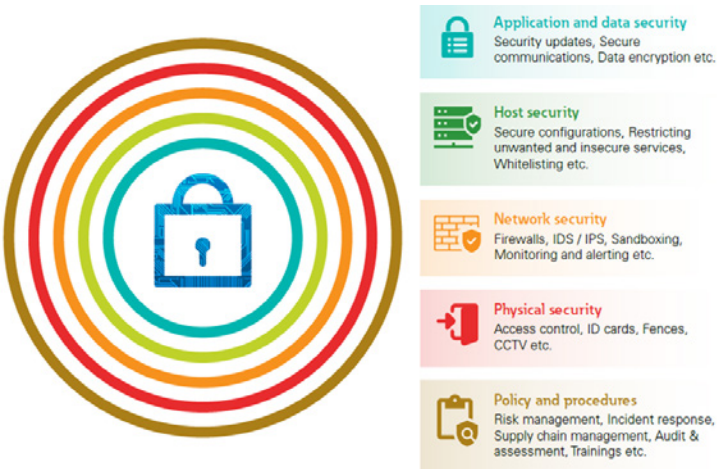
Appendix C—PowerXL Recommended secure hardening guidelines

EATON PRODUCT SECURE CONFIGURATION GUIDELINES

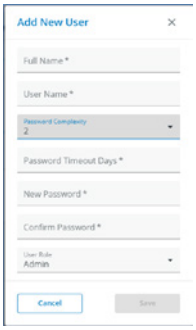
Documentation to securely deploy and configure Eaton products

DX1 has been designed with cybersecurity as an important consideration. A number of features are offered in the product to address cybersecurity risks. These Cybersecurity Recommendations provide information to help users to deploy and maintain the product in a manner that minimizes the cybersecurity risks. These Cybersecurity Recommendations are not intended to provide a comprehensive guide to cybersecurity, but rather to complement customers' existing cybersecurity programs.

Eaton is committed to minimizing the cybersecurity risk in its products and deploying cybersecurity best practices in its products and solutions, making them more secure, reliable, competitive for customers.

Category	Description
[1] Intended Use & Deployment Context	DX1 drive is a high-performance variable frequency drive to replace the legacy/branded SPX platform. The program will include closed loop control, SIL3 rated functional safety, precise speed / torque / positioning control and accommodate multiple encoder types and fieldbus comms through option cards
[2] Asset Management	Keeping track of all the devices in the system is a pre-requisite for effective management of Cybersecurity of a system. Ensure you maintain an inventory of all the components in your system in a manner in which you uniquely identify each component. To facilitate this DX1 supports the following identifying information - manufacturer, type, serial number, f/w version number, and location. Customers/users can read following information from product label - Serial Number - DX1 Information specific to communication protocols is available form parameter menu as below - IP Address Mode (P96.5.1) - Active IP Address (P96.5.2) - MAC Address (P96.5.5) Information specific to the dual communication port option cards are available from the parameter menu as below - IP Address Mode (Slot D – B38.1.2.2) - Active IP address (Slot D – B38.1.1.6) - MAC address (Slot D – B38.1.1.5) - Station Name (Slot D – B38.1.2.6)
[3] Defense in Depth	Defense in Depth basically means applying multiple counter-measures for mitigating risks, in a layered or step wise manner. A layered approach to security as shown in the below diagram is what is recommended. Defense in Depth is the responsibility of both the manufacturer and the customer.Eaton recommends below best practices to be followed to ensure adequate cybersecurity of the setup/system 

Category	Description
[4] Risk Assessment	Eaton recommends conducting a risk assessment to identify and assess reasonably foreseeable internal and external risks to the confidentiality, availability and integrity of the system | device and its environment. This exercise should be conducted in accordance with applicable technical and regulatory frameworks such as IEC 62443 and NERC-CIP. The risk assessment should be repeated periodicallyPowerXL Series VFD provides below communication protocols –
[5] Physical Security	An attacker with unauthorized physical access can cause serious disruption to system/device functionality. Additionally, Industrial Control Protocols don't offer cryptographic protections, making ICS and SCADA communications especially vulnerable to threats to their confidentiality. Physical security is an important layer of defense in such cases. DX1 is designed to be deployed and operated in a physically secure location. Following are some best practices that Eaton recommends to physically secure your system/device: • Secure the facility and equipment rooms or closets with access control mechanisms such as locks, entry card readers, guards, man traps, CCTV, etc. as appropriate. • Restrict physical access to cabinets and/or enclosures containing DX1 and the associated system. Monitor and log the access at all times. • Physical access to the telecommunication lines and network cabling should be restricted to protect against attempts to intercept or sabotage communications. It's a best practice to use metal conduits for the network cabling running between equipment cabinets. • DX1 supports the following physical access ports. ◦ RJ45 connector for removable keypad as well as Modbus RTU communications ◦ RJ45 for Modbus TCP communications ◦ Terminal block for Modbus RTU and other Digital IOs ◦ RJ45 for PROFINET communication available on PROFINET Communication card. ◦ RJ45 for dual port EtherNet IP communication available on dual port Communication card. ◦ 4 option card slots ◦ SD Card slot Access to these ports should be restricted. • Do not connect removable media (e.g., USB devices, SD cards, etc.) for any operation (e.g., firmware upgrade, configuration change, or boot application change) unless the origin of the media is known and trusted. • Before connecting any portable device through a USB port or SD card slot, scan the device for malware and viruses.
[6] COTS Platform Security	Eaton recommends that customers harden third-party commercial off-the-shelf (COTS) operating systems or platforms that are used to run Eaton applications / products (e.g., third party hardware, operating systems and hypervisors, such as those made available by Dell, Microsoft, VMware, Cisco, etc.). • Eaton recommends that customers refer to the COTS vendor's documentation for guidance on how to harden these components. • Vendor-neutral guidance is made available by the Center for Internet Security https://www.cisecurity.org/ Irrespective of the platform, customers should consider the following best practices: • Install all security updates made available by the COTS manufacturer. • Change default credentials upon first login. • Disable or lock unused built-in accounts. • Limit use of privileged generic accounts (e.g., disable interactive login). • Change default SNMP community strings. • Restrict SNMP access using access control lists. • Disable unneeded ports & services. Power Xpert inControl Software: • This PC Tool software implements the obfuscation of all the binaries and third-party libraries used for the development. Latest versions of third-party libraries are used with security updates.

Category	Description
[7] Account Management	Logical access to the system | device should be restricted to legitimate users, who should be assigned only the privileges necessary to complete their job roles/functions. Some of the following best practices may need to be implemented by incorporating them into the organization's written policies: **Eaton Recommends** • Ensure default credentials are changed upon first login DX1 should not be deployed in production environments with default credentials, as default credentials are publicly known. • No account sharing – Each user should be provided with a unique account instead of sharing accounts and passwords. Security monitoring/logging features in the product are designed based on each user having a unique account. Allowing users to share credentials weakens security. • Restrict administrative privileges - Attackers seek to gain control of legitimate credentials, especially those for highly privileged accounts. Administrative privileges should be assigned only to accounts specifically designated for administrative duties and not for regular use. • Leverage the roles / access privileges Admin, Operator, Engineer, Viewer to provide tiered access to the users as per the business /operational need. Follow the principle of least privilege (allocate the minimum authority level and access to system resources required for the role). • Perform periodic account maintenance (remove unused accounts). • Ensure password length, complexity and expiration requirements are appropriately set, particularly for all administrative accounts (e.g., minimum 10 characters, mix of upper- and lower-case and special characters, and expire every 90 days, or otherwise in accordance with your organization's policies). • Password should meet at least 3 out of the following 4 complex rules ◦ at least 10 characters ◦ at least 1 uppercase character (A-Z) ◦ at least 1 lowercase character (a-z) ◦ at least 1 digit (0-9) ◦ at least 1 special character (punctuation) — do not forget to treat space as special characters too • Enforce session time-out after a period of inactivity. Web Server Account Management Available on DX1 Initial login on web server interface Username: admin Default Password: Admin*1 *Users shall be required to change default password upon first login* DX1 User Management DX1 supports the creation of up to 5 different user accounts for the web server interface.  • When configuring user accounts on web server-Settings-User Management- Add New User page, DX1 provides 4 different user access levels ◦ Admin – Can perform parameter configuration, new user creation/deletion, Password reset. ◦ Operator - Can perform parameter configuration. Access to motor control ◦ Engineer - Can perform parameter configuration but cannot access motor related parameters. ◦ Viewer – Can only view parameters.

Category	Description

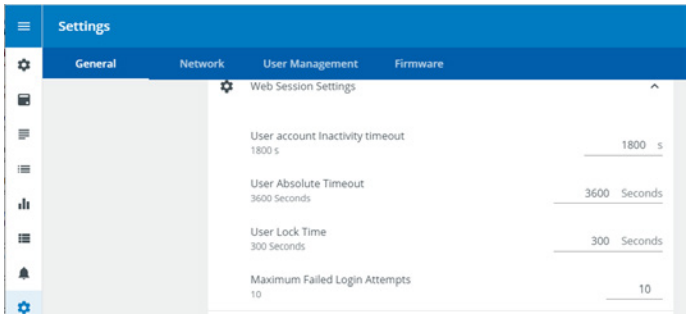
DX1 Password Management

- When configuring user accounts on web server-Settings-User Management- Add New User page, DX1 provides 4 levels of passwords complexities for the administrator to choose. Eaton recommends new accounts be set to password level 2 complexity.
  - Password complexity level – 0
    - It should be at least 6 characters long
    - It should not match with user name or full name
    - It should not match with existing password
  - Password complexity level – 1
    - It should be at least 8 characters long
    - It should not match with user name or full name
    - It should not match with existing password
    - It should contain at least 1 alphabetic and 1 numeric character
  - Password complexity level – 2
    - It should be at least 12 characters long
    - It should not match with user name or full name
    - It should not match with existing password
    - It should contain at least 1 alphabetic and 1 numeric character
    - It should contain at least 1 special character
    - It should contain at least 1 upper case alphabetic character
  - Password complexity level – 3
    - It should be at least 16 characters long
    - It should not match with user name or full name
    - It should not match with existing password
    - It should contain at least 2 alphabetic characters and 1 numeric character
    - It should contain at least 2 special characters
    - It should contain at least 1 upper case alphabetic character
    - It should contain at least 1 lower case alphabetic character
- DX1 provides the ability to set password timeout values for each individual web server user account. Timeout values can range from 0 days to 35535 days. 0 days – no timeout

DX1 Session Management

- By default, max retry attempt for login fail is 10, but this can be changed by the Admin user by changing value of parameter "Maximum Failed Login Attempts" on Settings->General tab. After the max login failed attempts, the user will be locked out for a time specified in parameter "User Lock Time". This parameter can also be changed on Settings->General tab.
- DX1 does not support multiple sessions of a single user, multiple sessions are disabled.
- DX1 supports inactivity timeout and absolute timeout for logged in User. This can also be configured from the Settings->General tab with parameters "User Absolute Timeout" & "User account inactivity timeout".
  1. A session will automatically expire if its inactivity time is greater than "User account inactivity timeout".
  2. A session will automatically expire after the "User Absolute Timeout".

Category	Description

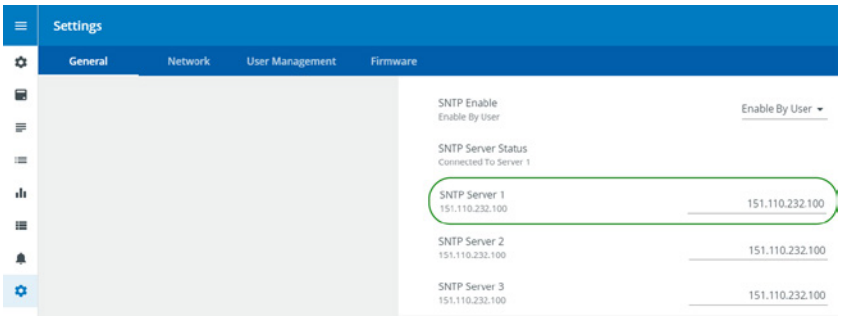


- User Account Inactivity Timeout
  - Default – 1800 seconds
- User Absolute Timeout
  - Default – 3600 seconds
- User Lock Time
  - Default – 300 seconds
- Max Failed Login Attempts
  - Default – 10 attempts

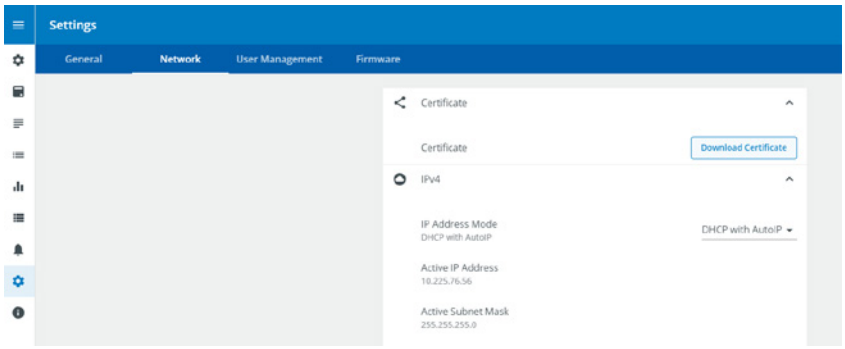
Keypad User Management Available on DX1

- DX1 provides the ability to set 3 different access levels on the local keypad. Eaton recommends using user levels passwords.
  - P32.1 User Access Level
    - Installer – Full user access.
    - Operator – Access to motor control; No configuration.
    - Observer – View only.
  - P32.2 Operator Level Password
    - Default – no password
    - Up to 16 alfa/numeric characters
  - P32.3 Installer Level Password
    - Default – no password
    - Up to 16 alfa/numeric characters
  - P32.5 User Access Level Password Timeout
    - 0-Upon change (default)
    - 1-10minutes
    - 2-30minutes
  - P32.6 User Access Level Logout
    - 0-No, will remain at current access level once logged in(default)
    - 1-Yes, logout to Observer access
- When Operator/Installer password is set
  - User can monitor parameters value “Observer” access. Users are required to enter the appropriate password to advance to either Operator or Installer access.
  - User are required to enter the current password before being allowed to change either Operator or Installer level passwords.
- The Power Xpert inControl Software tool shares the user management with the keypad:
  - Follows same user management as keypad.
- DX1 provides the ability to select which parameters are displayed on the keypad. Using the Power Xpert inControl tool, critical parameters can be “hidden” fromdisplay on the keypad, such as IP addresses and so on.
- DX1 Motor Running Lock – To enhance motor security, motor control parameters can only be modified when the motor is in the stop mode. Affected parameters are listed in the DX1 application manual

Category	Description

[8] Time Synchronization	Many operations in power grids and IT networks heavily depend on precise timing information.
	Ensure the system clock is synchronized with an authoritative time source (using manual configuration, NTP, SNTP, or IEEE 1588).
	
	DX1 Real Time Clock
	The DX1 Real Time Clock can be set manually by the user and provides accurate timekeeping. The DX1 Real Time Clock has battery backup, which provides the DX1 with continuous timekeeping even when power is removed from the drive.
	P99.3.1 Real Time Clock
	P99.3.2 Time Zone
	P99.3.3 Daylight Savings
	P99.3.4 RTC Battery Status
	
	DX1 SNTP
	 
	The SNTP is Simple Network Time Protocol, which is a subset of the Network Time Protocol (NTP) used to synchronize computer clocks in the Internet.
	
	DX1 will act as SNTP client and operate in SNTP unicast mode. SNTP uses UDP port 123. Host will act as SNTP server and operate in SNTP Broadcast mode. In unicast mode, the client sends a request (NTP mode 3) to a designated unicast server and expects a reply (NTP mode 4) from that server. Option to configure up to three different NTP servers.
	
	• Update Time(Configurable): 15sec to 24hrs. DX1 will send request to the SNTP server every Update Time
	• Retry Time(Configurable): If no or invalid response from any server then the DX1 will retry after retry Time. The retry time is incremental. Initial value of Retry_Time is configured by user.
	• Retry Mechanism:
	  ◦ If first server does not respond then DX1 SNTP service sends request to next server.
	  ◦ If any of the servers responds back then Retry_Time is reset.
	  ◦ If no server responds (one round complete by requesting all 3 servers) then Retry_Time will increase exponentially.
	• Maximum exponential rise is 10 times of base Retry_Time.
	  ◦ e.g. 3 sec > 6 > 12 > 24 > 30 sec (Max)
	• Min/Max range of Retry_Time : 3 sec to 20 sec
	• Maximum_Retry_Time will be 10 times of Retry_Time which is configured by user.
	• The DX1 SNTP client reinitializes and synchronizes with server in below events:
	  ◦ Product power up / reset.
	  ◦ SNTP server *n* target change when client is already connected to server *n*.
	  ◦ When Update Time or Retry_Time.value changes

Category	Description
[9] Network Security	DX1 supports network communication with other devices in the environment. This capability can present risks if it's not configured securely. Following are Eaton recommended best practices to help secure the network. Additional information about various network protection strategies is available in Eaton Cybersecurity Considerations for Electrical Distribution Systems [R1]. Eaton Cybersecurity Considerations for Electrical Distribution Systems Eaton recommends segmentation of networks into logical enclaves, denying traffic between segments except that which is specifically allowed, and restricting communication to host-to-host paths (for example, using router ACLs and firewall rules). This helps to protect sensitive information and critical services and creates additional barriers in the event of a network perimeter breach. At a minimum, a utility Industrial Control Systems network should be segmented into a three-tiered architecture (as recommended by NIST SP 800-82[R3]) for better security control. Communication Protection: DX1 uses AES-128 encryption for its network communications. DX1 has TLS 1.2 configured. HTTPS is enabled by default. Self-signed CA certificate is used for HTTPS. Users need to download CA certificate from webserver and install it in browser



Eaton recommends enabling only those ports that are required for operations and protect the network communication using network protection systems like firewalls and intrusion detection systems / intrusion prevention systems. Use the information below to configure your firewall rules to allow access needed for DX1 to operate smoothly.

DX1 Supported Ports and Services

Port Service	Port No.	Default
HTTPS	443	enabled
HTTP	80	disabled
DHCP	68	disabled
SNTP	123	disabled
Modbus TCP	502	disabled
MQTT	8883	disabled
MQTT over web sockets	443	disabled
EtherNet/IP TCP	44818	enabled when present
EtherNet/IP UDP	2222	enabled when present
ProfiNet UDP	34964	enabled when present

- DX1 IP Whitelisting can be used to further limit access.
  P96.6.2 Trusted IP Whitelist
  P96.6.4 Modbus TCP Trusted IP Enable (default – enabled)

  User must configure the requisite IP address in the list. IP Whitelist can be configured using WebUI or Keypad. Access to the device will be limited to only those IP addresses configured in the IP Whitelist.

  Note: - As per PROFIBUS international – Governing body of PROFINET Specification, it's not possible to implement an IP whitelist. They recommend implementing Security at network level.and intrusion detection systems / intrusion prevention systems.

- DX1 RS485 Serial
  - Modbus RTU protocol on RS485 physical layer – enabled by default

Category	Description
	• DX1 Bluetooth P96.7.1 Bluetooth Enable (default – disabled) P96.7.2 Bluetooth Broadcast Mode (default – off) P96.7.3 Bluetooth Painting Reset P96.7.4 Bluetooth Connect Status • DX1 IoT P96.8.1 IOT Enable (default – disabled) P96.8.2 IOT Connection Status P96.8.4 Proxy Enable (default – disabled) All the protocols have dedicated menu structure. See User's Manual for details on how to activate and configure them.
[10] Remote Access	Remote access to devices/systems creates another entry point into the network. Strict management and validation of termination of such access is vital for maintaining control over overall ICS security. • The DX1 provides the following access monitoring on its web server interface ◦ User Account Inactivity Timeout: User is automatically logged out if inactive and Inactivity Timeout expires • Default – 1800 seconds ◦ User Absolute Timeout: User is automatically logged out after Absolute Time expires regardless of activity • Default – 3600 seconds ◦ Max Failed Login Attempts: Number of failed log in attempts allowed before user account is "locked" • Default – 10 attempts ◦ User Lock Time: Amount of time user account will be locked if log in attempts are exceeded • Default – 300 seconds • IoT Connection
[11] Logging and Event Management	• Eaton recommends logging all relevant system and application events, including all administrative and maintenance activities. • Logs should be protected from tampering and other risks to their integrity (for example, by restricting permissions to access and modify logs, transmitting logs to a security information and event management system, etc.). • Ensure that logs are retained for a reasonable and appropriate length of time. • Review the logs regularly. The frequency of review should be reasonable, taking into account the sensitivity and criticality of the system | device and any data it processes. • DX1 provides the following 8 types of logs, 1. Fault History 2. Fault/Warning Log 3. Parameter Change Log 4. Audit Power Log 5. Audit User Log 6. Audit Firmware Upgrade Log 7. Audit Configuration Log • DX1 provides the ability to export log entries to a cvs file. • This PC Tool software has feature of logging user Audit Trails, error messages and monitor messages. • The access to generated audit log files and location change of audit log files is restricted to administrator user only.

Category	Description
[12] Vulnerability Scanning	It is possible to install and use third-party software with DX1. Any known critical or high severity vulnerabilities on third party component/libraries used to run software /applications should be remediated before putting the device | system into production. • Eaton recommends running a vulnerability scan to identify known vulnerabilities for software used with the product. For COTS components (e.g., applications running on Windows), vulnerabilities can be tracked on the National Vulnerability Database (NVD), available at https://nvd.nist.gov/. • Keep software updated by monitoring security patches made available by COTS vendors and installing them as soon as possible. • DX1 Software BOM can be found in LINK Note: Many compliance frameworks and security best practices require a monthly vulnerability review. For many non-COTS products vulnerabilities will be communicated directly through the vendor site.
[15] Malware Defenses	Eaton recommends deploying adequate malware defenses to protect the product or the platforms used to run the Eaton product.
[16] Secure Maintenance	Best Practices Update device firmware prior to putting the device into production. Thereafter, apply firmware updates and software patches regularly. Eaton publishes patches and updates for its products to protect them against vulnerabilities that are discovered. Eaton encourages customers to maintain a consistent process to promptly monitor for and install new firmware updates. DX1 firmware upgrades are done through TRC calls only and service engineers. Please check Eaton's cybersecurity website for information bulletins about available firmware and software updates.
[17] Business Continuity / Cybersecurity Disaster Recovery	Plan for Business Continuity / Cybersecurity Disaster Recovery Eaton recommends incorporating DX1 into the organization's business continuity and disaster recovery plans. Organizations should establish a Business Continuity Plan and a Disaster Recovery Plan and should periodically review and, where possible, exercise these plans. As part of the plan, important system | device data should be backed up and securely stored, including: • Updated firmware for DX1. Make it a part of standard operating procedure to update the backup copy as soon as the latest firmware is updated. • Backup the current configuration. • Documentation of the current permissions / access controls, if not backed up as part of the configuration

Category	Description
[18] Customer Application Security	DX1 provides a platform on which customers can customize and host applications according to their requirements. Security vulnerabilities in these applications may expose the underlying device to attack. Eaton recommends observing best practices for secure system development when customers develop and host an application on the device: • Privacy and Security by Design: The application should take security and privacy into consideration from the outset, including at the stage of defining requirements and assessing the associated risks. • Communication Protection: If the application communicates over the network, Eaton recommends encrypting the communications in accordance with the applicable level described by the FIPS 140-2 standard. • Access Enforcement: The application should provide the ability to enforce access controls to protect the application against unauthorized access and to protect accounts against unauthorized authentication attempts (for example, through account lockout). • Least Privilege: Any application developed by the customers should not run with root account privileges. The root account has full control over and access to the operating system. Therefore, if an application that requires root privileges has any security vulnerability, it endangers the entire system. • Input Checking: All input to the application should be sanitized before storing and processing by the application to protect against malicious code injection. • Output Handling: Data output by the application for user consumption, including error messages, should be appropriately handled to avoid revealing important information about the application and the underlying system. • Password Management: The application should securely store and transmit credentials (for example, encrypting authentication traffic, and salting and hashing passwords in transit and at rest). Password complexity should be implemented, and password should be masked when entered on-screen. • Secure Coding Practices: Follow secure coding practice while developing applications for the device (for example, implementing multiple security layers, verifying authorization for all requests, conducting code reviews, etc.). • Administration Interface: The interface for administering the application should be separated from the end-user interface. • Session Controls: All application sessions should be encrypted, logged and monitored. • Event Log Generation: The application should have the capability to log security related events at a minimum, including the time, date, and user.
[19] Sensitive Information Disclosure	Eaton recommends that sensitive information (i.e. connectivity, log data, personal information) that may be stored by DX1 be adequately protected through the deployment of organizational security practices. DX1 treats the following as sensitive data. 1. All web user passwords 2. Proxy password 3. IoT Connection String DX1 encrypts the above data before being saved to NVRAM

Category	Description
[20] Decommissioning or Zeroization	It is a best practice to purge data before disposing of any device containing data. Guidelines for decommissioning are provided in NIST SP 800-88. Eaton recommends that products containing embedded flash memory be securely destroyed to ensure data is unrecoverable.

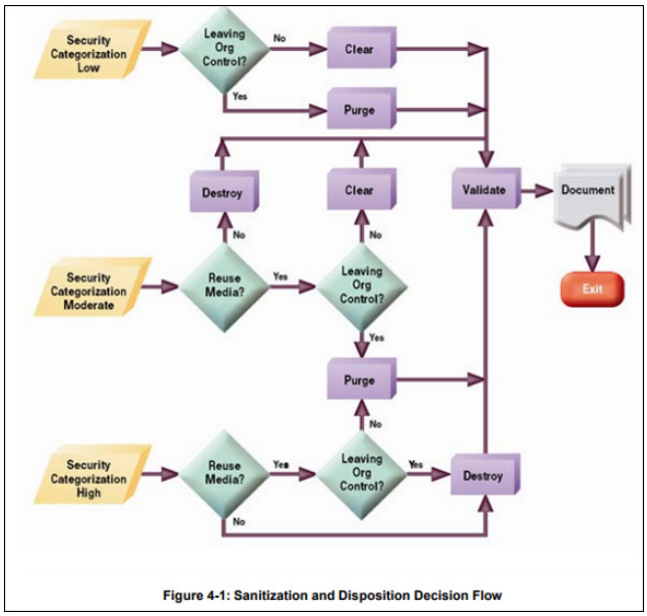


Figure 4-1: Sanitization and Disposition Decision Flow

* Figure and data from NIST SP800-88

- **Embedded Flash Memory on Boards and Devices**
- Eaton recommends the following methods for disposing of motherboards, peripheral cards such as network adapters, or any other adapter containing non-volatile flash memory.
- Clear: If supported by the device, reset the state to original factory settings. DX1 can perform factory reset using Webserver and Keypad.
  - Webserver: Settings->General->Device actions->REST Reset command->Factory Reset.
  - Keypad: Press Back Reset and OFF button simultaneously for 10 sec.
- Purge: If the flash memory can be easily identified and removed from the board, the flash memory may be destroyed independently of the board that contained the flash memory. Otherwise, the whole board would be destroyed. For this DX1 main control unit (MCU) should be destroyed completely.
- Destroy: Shred, disintegrate, pulverize, or incinerate by burning the device in a licensed incinerator.

References

[R1] Cybersecurity Considerations for Electrical Distribution Systems (WP152002EN):
http://www.eaton.com/ecm/groups/public/@pub/@eaton/@corp/documents/content/pct_1603172.pdf

[R2] Cybersecurity Best Practices Checklist Reminder (WP910003EN):
https://www.eaton.com/content/dam/eaton/company/news-insights/cybersecurity/white-papers/WP910003EN.pdf

[R3] NIST SP 800-82 Rev 2, Guide to Industrial Control Systems (ICS) Security, May 2015:
https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-82r2.pdf

[R4] National Institute of Technology (NIST) Interagency "Guidelines on Firewalls and Firewall Policy, NIST Special Publication 800-41", October 2009: http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-41r1.pdf

[R5] NIST SP 800-88, Guidelines for Media Sanitization, September 2006:
http://ws680.nist.gov/publication/get_pdf.cfm?pub_id=50819

[R6] A Summary of Cybersecurity Best Practices - Homeland Security
https://www.hsdl.org/?view&did=806518

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

Printed in USA
Publication No. MN040069EN TBG001646
August 2024