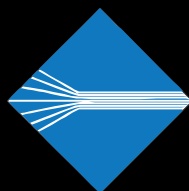


# MXPB3

Profibus  
Communications  
Module

User's Manual

890041-02-00



**BENSHAW**  
ADVANCED CONTROLS & DRIVES



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# 1 - Introduction

|                              |   |
|------------------------------|---|
| <b>Technical Support</b>     | Technical Support personnel are available to answer questions and provide technical support, including information regarding start-up services and fees, over the telephone. Refer to the following page for contact information.   |
| <b>Documentation</b>         | <p>Benshaw can provide all customers with:</p> <ul style="list-style-type: none"><li>• Operation Manuals</li><li>• Wiring Diagrams</li></ul> <p>All drawings are produced in AutoCAD™ and are available on CD / DVD or via e-mail by contacting Benshaw Customer Service.</p> |
| <b>On-Line Documentation</b> | All MXPB3 documentation is available on-line at <a href="http://www.benshaw.cwfc.com">http://www.benshaw.cwfc.com</a>   |
| <b>Replacement Parts</b>     | Spare and replacement parts can be purchased from Benshaw Technical Support.  |
| <b>Publication History</b>   | Refer to the inside back cover.   |
| <b>Warranty</b>              | Benshaw provides a standard 1 Year factory warranty on the MXPB3 Communications Module.   |

## ***MXPB3 Profibus Communications Module***

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**Contacting Benschaw** Information about Benschaw products and services is available by contacting Benschaw at one of the following offices:

***Benschaw Corporate Headquarters***

615 Alpha Drive  
Pittsburgh, PA 15116  
Phone: 412-968-0100  
Tech Support: 1-800-203-2416  
Fax: 412-968-5415

***Benschaw Canada***

550 Bright Street East  
Listowel, Ontario N4W 3W3  
Phone: 519-291-5112  
Tech Support: 1-877-291-5112  
Fax: (519) 291-2595

Technical support for the MXPB3 Communications Module is available at no charge by contacting Benschaw Customer Service at any of the above telephone numbers. A service technician is available Monday through Friday from 8:00 a.m. to 5:00 p.m. EST.

**NOTE:** An on-call technician is available after normal business hours and on weekends by calling Benschaw and following the recorded instructions.

To help assure prompt and accurate service, please have the following information available when contacting Benschaw:

- Name of Company
- Telephone number where the caller can be contacted
- Fax number of caller
- Benschaw product name
- Benschaw model number
- Benschaw serial number
- Name of product distributor
- Approximate date of purchase
- A brief description of the application

## Overview

### MXPB3 Communications Module

The Benshaw MXPB3 Communications Module is designed to make communicating with an MX<sup>2</sup> or MX<sup>3</sup> starter a simple and easy task. The MXPB3 requires only a few simple configuration parameters to connect with a Profibus-DP network. Configuration parameters are easily accessed from the built in web server (refer to “Quickstart - Web Page Based Setup” in Section 2).



**CAUTION:** When using the MXPB3 on a Profibus-DP network, the serial timeout function of the MX<sup>2</sup>/MX<sup>3</sup> must be enabled. Refer to the Communications Timeout parameters in an MX<sup>2</sup> or MX<sup>3</sup> User Manual for details on enabling the serial time-out function.

### Technical Specifications

#### *Network Interface*

RJ-45 10/100Base-T Ethernet port

#### *Protocols Supported*

Profibus-DP V0 / V1

#### *LEDs*

Nine LEDs for device and communication status.

Refer to Section 5 for Diagnostic Codes

#### *Physical Characteristics*

Dimensions: 4.2"x 3.75"x 1"

#### *Power Requirements*

DC Input Voltage: 260mA @ 7V to 75mA @ 24V

#### *Environmental*

Operating Temperature: -10°C to +50°C

### MXPB3 Kit Part Number

Profibus-DP Communications Kit: COM-100000-02

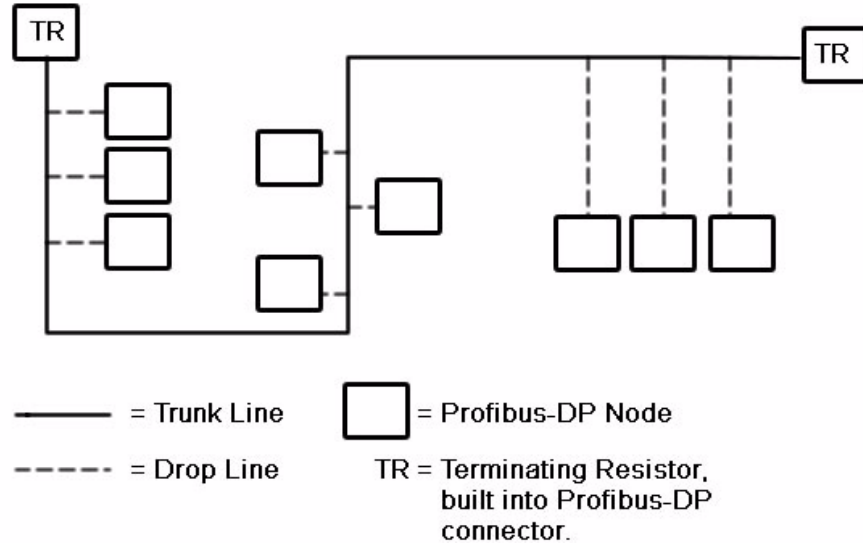




# 2 - Installation

## Profibus-DP Considerations

The MXPB3 adheres to the connection/cabling standards of Profibus-DP.



There are physical specifications to consider when installing a Profibus-DP network or adding a new Profibus-DP device. The table below outlines a few key considerations in planning your Profibus-DP network.

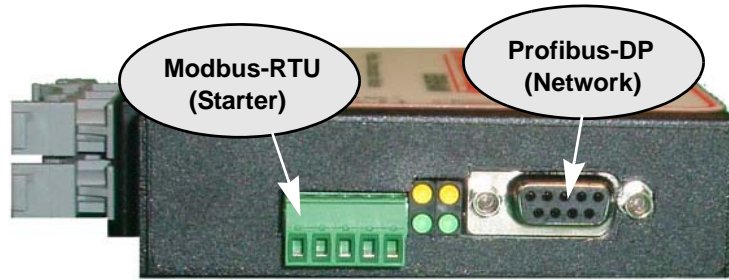
## Profibus-DP Specification

**Table 1: Profibus-DP Specifications**

|                   |  |                |               |              |              |
|-------------------|--|----------------|---------------|--------------|--------------|
| Comm Speed        | 93.75 Kbps                                 | 187.5 Kbps     | 500 Kbps      | 1500 Kbps    | 12000 Kbps   |
| Cable Length      | 1200m (3937ft)                             | 1000m (3280ft) | 400m (1312ft) | 200m (656ft) | 100m (328ft) |
| Number of Devices | 32 per segment; Up to 126 with 4 repeaters |                |               |              |              |
| Bus Power         | Must have auxiliary 24VDC supply           |                |               |              |              |
| Device Identity   | Specific ID Number for each device         |                |               |              |              |

# MXPB3 Profibus Communications Module

## LEDs and Connectors



## Profibus Connector

**Table 2: Profibus-DP Connector Pinout**

| PIN     | Profibus-DP               |
|---------|---------------------------|
| Housing | Shield (Protective earth) |
| 1       | Not Connected             |
| 2       | Not Connected             |
| 3       | B-Line (+ Rx/TxD)         |
| 4       | RTS (request to send)     |
| 5       | GND BUS (Isolated GND)    |
| 6       | +5V BUS (Isolated +5V)    |
| 7       | Not Connected             |
| 8       | A-Line (- Rx/TxD)         |
| 9       | Not Connected             |

## Modbus RTU Connector

The Starter Connector is used to connect the MXPB3 to a Benshaw starter. Refer to the example wiring diagram in this section.

**Table 3: Modbus RTU Connector Pinout**

| PIN | RS-485 (TB-4) |
|-----|---------------|
| 1   | Not Connected |
| 2   | A -           |
| 3   | Common        |
| 4   | B +           |
| 5   | Not Connected |

### Ethernet (RJ45) Connector

The Ethernet Connector is located next to the Power LED on the back panel of the MXPB3. Connect an RJ45 cable into the jack (shown below) on the MXPB3 communications module.



There are two LEDs associated with the Ethernet connection; Speed (on the right) and Link (on the left). The Speed LED indicates the current communication speed. If the Speed LED is off, the connection speed is 10 MB. If the Speed LED is illuminated, the connection speed is 100 MB. The Link LED indicates that a valid link is established and there is activity on the connection.

**NOTE:** For the MXPB3 to function, the module must be powered by 7 to 24 VDC using one of the supplied connectors

### Power Connector

The dual Power jack is located next to the Power LED (only one power connection can be made, either the barrel or cage-clamp connector must be selected). Insert the power connection from the supplied 24VDC power supply into one of the jacks. The Power LED should be illuminated whenever power is applied.



## ***MXPB3 Profibus Communications Module***

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### **Activity LEDs**

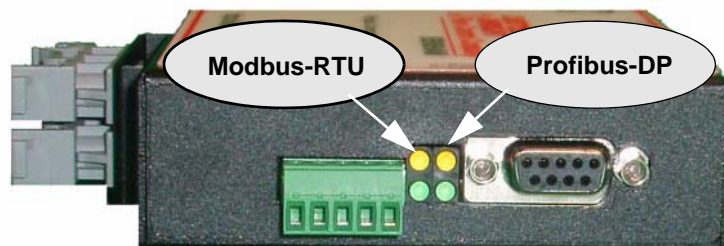
There are two communication activity LEDs on the MXPB3 communications module, located on the side opposite the DIN rail mounting hardware (pictured below). Both LEDs are two color, and indicate various states of Modbus RTU and Profibus communications. LED1 flashes red-off during Profibus parameterization, red-green during Profibus configuration, and steady green during Profibus data exchange. LED2 flashes red-off when Modbus-RTU is not communicating with the Soft Starter and steady green when Modbus-RTU is communicating with the Soft Starter.



There are two sets of Tx/Rx LEDs located on the front of the MXPB3 module, between the green Modbus-RTU plug-in connector and the 9 pin Profibus-DP connector. Facing the MXPB3 as seen in the image below; the left side Rx LED (yellow), Tx LED (green) represents Modbus-RTU, while the right side Rx LED (yellow), Tx LED (green) represents Profibus-DP.

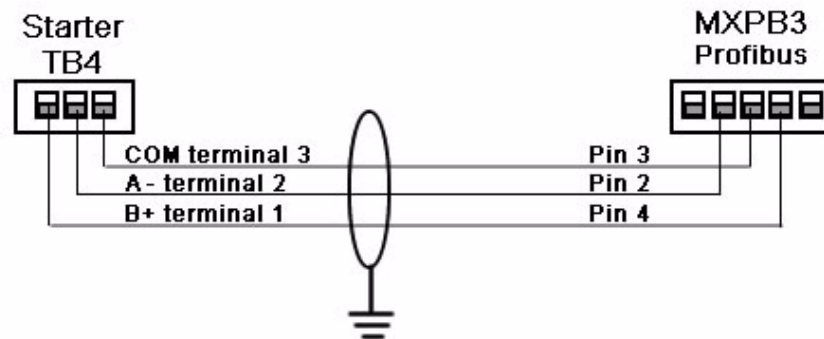
**Modbus-RTU:** Tx LED is illuminated when a message(s) is being transmitted to the Soft Starter. Rx LED is ON when response data is being received from the Soft Starter.

**Profibus-DP:** Tx LED is illuminated during Data Exchange, and blinks during parameterization. Rx LED flashes at 1 Hz when Modbus is communicating and Profibus is in Data Exchange mode.

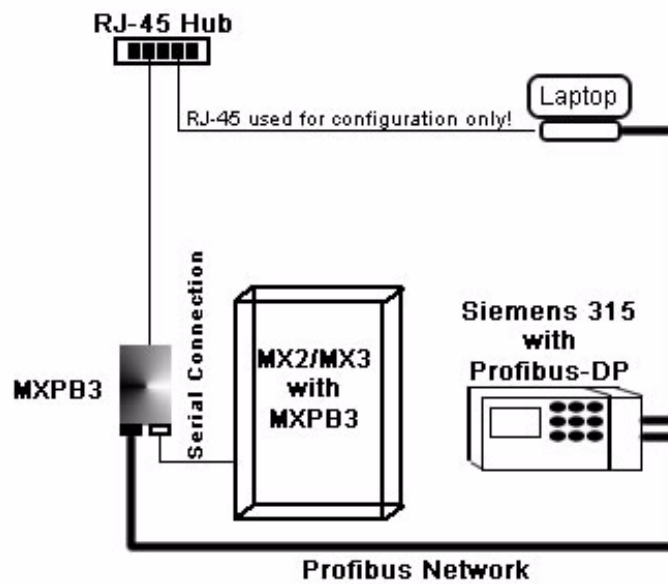


## Wiring Examples

### Serial



### Profibus-DP

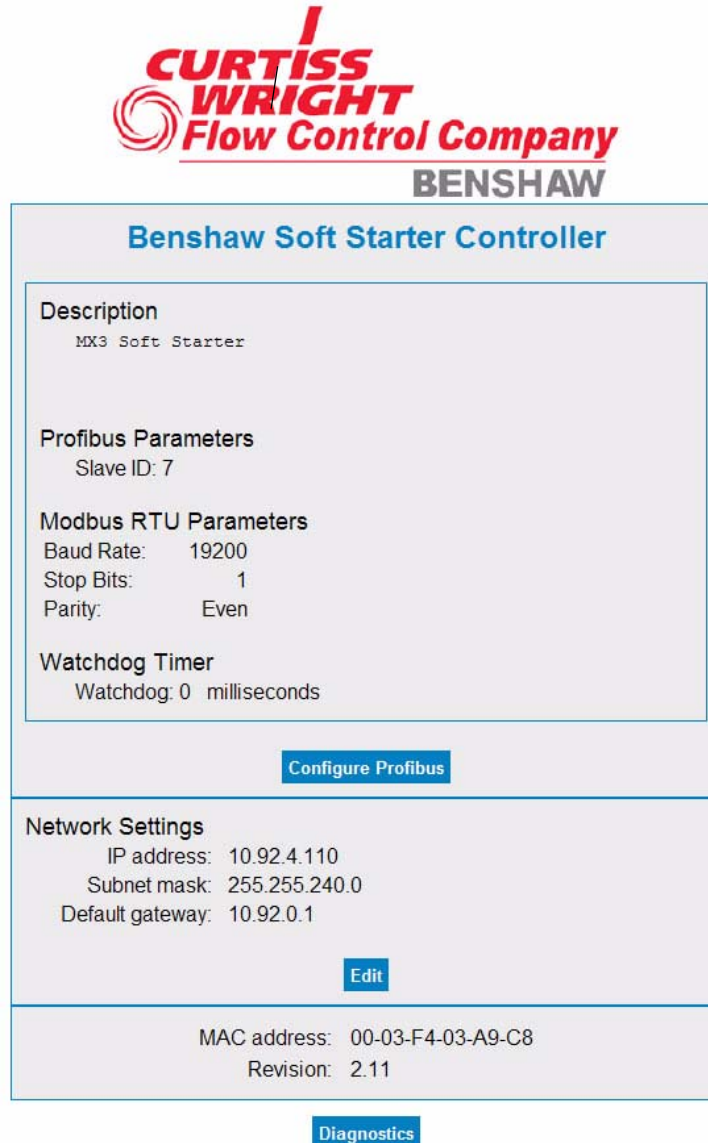


## Quickstart - Web Page Based Setup

### Web Page

The Web Page Based Setup tool is designed to make both monitoring and basic configuration intuitive and simple. Enter IP Address 192.168.0.100 (Default) into a connected web browser; the Benshaw Soft Starter Controller web-page shown below will be displayed.

**NOTE:** The MXPB3 must be connected to the starter, and a computer to the MXPB3 ethernet port before accessing the web based configuration tool.



**CURTISS  
WRIGHT**  
Flow Control Company

**BENSHAW**

### Benshaw Soft Starter Controller

**Description**  
MX3 Soft Starter

**Profibus Parameters**  
Slave ID: 7

**Modbus RTU Parameters**  
Baud Rate: 19200  
Stop Bits: 1  
Parity: Even

**Watchdog Timer**  
Watchdog: 0 milliseconds

[Configure Profibus](#)

**Network Settings**  
IP address: 10.92.4.110  
Subnet mask: 255.255.240.0  
Default gateway: 10.92.0.1

[Edit](#)

MAC address: 00-03-F4-03-A9-C8  
Revision: 2.11

[Diagnostics](#)

The Web Page Based Setup tool is divided into 4 sections: Profibus Configuration, Network Configuration, Device Info, and Diagnostics.

**Profibus Configuration**

Selecting the Configure Profibus button on the Home Page will enable the Profibus Configuration web-page below.

**Benshaw Soft Starter Controller**

## Configuration

**Description:**  
MX3 Soft Starter  
Enter up to 80 characters.

**Profibus Communication**  
Slave Address = 7  
Enter a value between 1 and 126

**Watchdog Configuration, PCCC and Modbus TCP**  
Watchdog = 0  
Enter a value between 0 and 30000 milliseconds.

Store parameters

Cancel Editing

The Profibus Configuration screen enables access to a Controller Description, Profibus Communication slave address, and Watchdog Configuration Timer.

To enter a description, click within the Description field and enter the new description. Specifying a new slave address number (1-31 or 1-126 with a repeater) is accomplished in the same manner. To change the Watchdog timer click in the box, enter a number between 0 and 30000 milliseconds. Click Store Parameters to save the changes.

## MXPB3 Profibus Communications Module

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### Ethernet Configuration

Click the Edit button within the Network Settings box on the home page to access the Network Setup web-page shown below.

### Benshaw Soft Starter Controller

**Network Setup**

IP Address:  
 .  .  .

Subnet Mask:  
 .  .  .

Default Gateway:  
 .  .  .

From the Network Setup screen the IP Address, Subnet Mask, and Default Gateway can be configured. Click within the first box of the parameter to be changed, erase the current value, then enter the required value. After the first three digits are entered, the next box will automatically highlight. Continue to enter new values to overwrite the current values, and each subsequent box will highlight when the current box is full. Conversely, double-clicking on any box enables overwriting of a current value. When changes are complete, click Store Parameters to save the changes and return to the Main screen.



**Diagnostics**

Clicking on the Diagnostics button at the bottom of the home page enables access to the Diagnostics web page below.

### Benshaw Soft Starter Controller

## Diagnostics

**Description**  
Enter a description .

**Modbus Timeout**

Enable:   
Enter a value, either 1 to enable or 0 to disable.

Timeout:   
Enter a value between 1 and 120 seconds

**Counters**

|                   |                   |                 |
|-------------------|-------------------|-----------------|
| Read Success: 124 | Read Timeouts: 0  | Read Errors: 0  |
| Write Success: 2  | Write Timeouts: 0 | Write Errors: 0 |

| Bit Number | Starter Control Register Name | Starter Control Register Value | Starter Status Register Name | Starter Status Register Value |
|------------|-------------------------------|--------------------------------|------------------------------|-------------------------------|
| Bit 0:     | Run/Stop                      | 0                              | Ready                        | 1                             |
| Bit 1:     | Fault Reset                   | 0                              | Running                      | 0                             |
| Bit 2:     | Emrg Overload Reset           | 0                              | UTS                          | 0                             |
| Bit 3:     | Local/Remote                  | 0                              | Alarm                        | 0                             |
| Bit 4:     | Heat Disable                  | 0                              | Fault                        | 0                             |
| Bit 5:     | Ramp Select                   | 0                              | Lockout                      | 0                             |
| Bit 6:     | Reserved                      | 0                              | Reserved                     | 0                             |
| Bit 7:     | Reserved                      | 0                              | Reserved                     | 0                             |
| Bit 8:     | Reserved                      | 0                              | Reserved                     | 0                             |
| Bit 9:     | Reserved                      | 0                              | Reserved                     | 0                             |
| Bit 10:    | Relay 6                       | 0                              | Reserved                     | 0                             |
| Bit 11:    | Relay 5                       | 0                              | Reserved                     | 0                             |
| Bit 12:    | Relay 4                       | 0                              | Reserved                     | 0                             |
| Bit 13:    | Relay 3                       | 0                              | Reserved                     | 0                             |
| Bit 14:    | Relay 2                       | 0                              | Reserved                     | 0                             |
| Bit 15:    | Relay 1                       | 0                              | Reserved                     | 0                             |

Information on the Diagnostics page pertains only to the RS485 Modbus connection between the MXPB3 and the starter.

The MXPB3 must be connected to the starter. Use the web page shown above to ensure that Enable is set to 1 and Timeout is set to 2 in the Modbus Timeout box.

In the Counters box, the current number of read/write successes, read/write timeouts and read/write errors can be monitored. A communications timeout occurs if there is no response within the timeout limit after a read or write is requested. On-screen data is not automatically updated, and must be refreshed by pressing F5 on the PC keyboard. Clicking on the Clear Counters button at the bottom of this screen will reset all counters to zero.

The current state of the Starter Control and Status Registers can be viewed in the Register Status box. The Starter Control Register provides the current states of various digital inputs and relay outputs. The Starter Status Register provides the current state of the starter. On-screen data is not automatically updated, and must be refreshed by pressing F5 on the PC keyboard.

Clicking on the Return to Main Page button will return the display to the Main page.



# 3 - Profibus Object Model

Table 4: Device ID

|  | Name                      | Data Type      | Data Value        | Access Rule |
|--|---------------------------|----------------|-------------------|-------------|
|  | Manufacturer ID           | UINT           | (From Benshaw)    | Get         |
|  | Order ID                  | SHORT STRING20 | 455PBS03          | Get         |
|  | Serial Number             | SHORT STRING16 |                   | Get         |
|  | Hardware Revision         | UINT           |                   | Get         |
|  | Software Revision         | USINT[4]       |                   | Get         |
|  | Revision Counter          | UINT           |                   | Get         |
|  | Profile ID                | UINT           | (none applicable) | Get         |
|  | Profile Specific Type     | UINT           | (none applicable) | Get         |
|  | I&M Version               | UINT           |                   | Get         |
|  | I&M Supported (bit array) | UINT           |                   | Get         |
|  | Tag Function              | SHORT STRING32 | 0x20              |             |
|  | Tag Location              | SHORT STRING22 | 0x20              |             |
|  | Installation Date         | SHORT STRING16 | 0x20              |             |
|  | Descriptor                | SHORT STRING54 | 0x20              |             |
|  | Signature                 | SHORT STRING54 | 0                 |             |

**Table 5: PROFIBUS-DP V0 Input Data (126 Bytes)**

| Byte | Description    | Range  | Units |
|------|----------------|--|-------|
| 0,1  | Starter Status | <i>Bit Description</i><br>0 Ready<br>1 Running<br>2 UTS<br>3 Alarm<br>4 Fault<br>5 Lockout<br>6 Reserved<br>7 Reserved<br>8 Reserved<br>9 Reserved<br>10 Reserved<br>11 Reserved<br>12 Reserved<br>13 Reserved<br>14 Reserved<br>15 Reserved   |       |
| 2,3  | Input Status   | <i>Bit Description</i><br>0 Start<br>1 DI 1<br>2 DI 2<br>3 DI 3<br>4 DI 4 (MX3 only)<br>5 DI 5 (MX3 only)<br>6 DI 6 (MX3 only)<br>7 DI 7 (MX3 only)<br>8 DI 8 (MX3 only)<br>9 Reserved<br>10 Reserved<br>11 Reserved<br>12 Reserved<br>13 Reserved<br>14 Reserved<br>15 Reserved   |       |
| 4,5  | Alarm Status 1 | <i>Bit Description</i><br>0 "A OL" – Motor overload<br>1 "A 5" – Motor PTC (MX3 only)<br>2 "A 6" – Stator RTD (MX3 only)<br>3 "A 7" – Bearing RTD (MX3 only)<br>4 "A 8" – Other RTD (MX3 only)<br>5 "A 10" – Phase rotation not ABC<br>6 "A 11" – Phase rotation not CBA<br>7 "A 12" – Low Line Frequency<br>8 "A 13" – High Line Frequency<br>9 "A 14" – Phase rotation not 1PH<br>10 "A 15" – Phase rotation not 3PH<br>11 "A 21" – Low line L1-L2<br>12 "A 22" – Low line L2-L3<br>13 "A 23" – Low line L3-L1<br>14 "A 24" – High line L1-L2<br>15 "A 25" – High line L2-L3 |       |

Table 5: PROFIBUS-DP V0 Input Data (126 Bytes) (Continued)

| Byte  | Description        | Range   | Units |
|-------|--------------------|---|-------|
| 6,7   | Alarm Status 2     | <i>Bit Description</i><br>0 "A 26" – High line L3-L1<br>1 "A 27" – Phase loss<br>2 "noL" – No line<br>3 "A 29" – PORT Timeout (MX3 only)<br>4 "A 31" – Overcurrent<br>5 "A 34" – Undercurrent<br>6 "A 35" – PF Too Leading (MX3 only)<br>7 "A 36" – PF Too Lagging (MX3 only)<br>8 "A 37" – Current imbalance<br>9 "A 38" – Ground fault<br>10 "A 47" – Stack overtemperature<br>11 "A 53" – Tach Loss (MX3 only)<br>12 "A 60" – DI 1<br>13 "A 61" – DI 2<br>14 "A 62" – DI 3<br>15 "A 63" – DI 4 (MX3 only)  |       |
| 8,9   | Alarm Status 3     | <i>Bit Description</i><br>0 "A 64" – DI 5 (MX3 only)<br>1 "A 65" – DI 6 (MX3 only)<br>2 "A 66" – DI 7 (MX3 only)<br>3 "A 67" – DI 8 (MX3 only)<br>4 "A 71" – Analog Input Trip<br>5 Reserved<br>6 Reserved<br>7 Reserved<br>8 Reserved<br>9 Reserved<br>10 Reserved<br>11 Reserved<br>12 Reserved<br>13 Reserved<br>14 Reserved<br>15 Reserved  |       |
| 10,11 | Lockout Status     | <i>Bit Description</i><br>0 "L OL" – Motor overload<br>1 "LPtc" – Motor PTC (MX3 only)<br>2 "Lrtd" – RTD Stator (MX3 only)<br>3 "Lrtd" – RTD Bearing (MX3 only)<br>4 "Lrtd" – RTD Other (MX3 only)<br>5 "L ri" – Run Interlock<br>6 "L dS" – Disconnect open<br>7 "L Ot" – Stack overtemperature<br>8 "L CP" – Control power<br>9 "Lrtd" – RTD Open/Short (MX3 only)<br>10 "LtbS" – Time between starts (MX3 only)<br>11 "L bS" – Backspin (MX3 only)<br>12 "LSph" – Starts per hour (MX3 only)<br>13 "Lrtd" – RTD Comm Loss (MX3 only)<br>14 Reserved<br>15 Reserved |       |
| 12,13 | Present Fault Code |   | -     |
| 14,15 | Average Current    |   | Arms  |
| 16,17 | L1 Current         |   | Arms  |
| 18,19 | L2 Current         |   | Arms  |
| 20,21 | L3 Current         |   | Arms  |
| 22,23 | Current Imbalance  |   | 0.1 % |

**Table 5: PROFIBUS-DP V0 Input Data (126 Bytes) (Continued)**

| Byte                | Description                                   | Range   | Units      |
|---------------------|---|---|------------|
| 24,25               | Residual Ground Fault Current                 |   | % FLA      |
| 26,27               | Zero Sequence Ground Fault Current (MX3 only) |   | 0.001 Arms |
| 28,29               | Average Voltage                               |   | Vrms       |
| 30,31               | L1-L2 Voltage                                 |   | Vrms       |
| 32,33               | L2-L3 Voltage                                 |   | Vrms       |
| 34,35               | L3-L1 Voltage                                 |   | Vrms       |
| 36,37               | Motor Overload                                |   | %          |
| 38,39               | Power Factor                                  | -99 - +100<br>(in 16-bit two's compliment signed format)    | 0.01       |
| 40,41,42,43         | Watts   | (in 32-bit unsigned integer format)                         | W          |
| 44,45,46,47         | VA  | (in 32-bit unsigned integer format)                         | VA         |
| 48,49,50,51         | vars  | (in 32-bit two's compliment signed integer format)          | var        |
| 52,53               | kW hours                                      | (in 32-bit unsigned integer format)                         | kWh        |
| 56,57               | Phase Order                                   | 0: no line<br>1: ABC<br>2: CBA<br>3: SPH                    |            |
| 58,59               | Line Frequency                                | 230 - 720, or 0 if no line                                  | 0.1 Hz     |
| 60,61               | Analog Input                                  | -1000 - +1000<br>(in 16-bit two's compliment signed format) | 0.1 %      |
| 62,63               | Analog Output                                 | -1000 - +1000<br>(in 16-bit two's compliment signed format) | 0.1 %      |
| 64,65               | Running Time                                  | 0 - 65535   | hours      |
| 66,67               | Running Time                                  | 0 - 59  | minutes    |
| 68,69               | Starts  |   | -          |
| 70,71               | TruTorque                                     |   | %          |
| 72,73               | Power   |   | %          |
| 74,75               | Peak Starting Current                         |   | Arms       |
| 76,77               | Last Starting Duration                        |   | 0.1 Sec    |
| 78,79<br>(MX3 only) | Hottest Stator RTD Temperature                | 0 -200  | °C         |
| 80,81<br>(MX3 only) | Hottest Bearing RTD Temperature               | 0 - 200   | °C         |
| 82,83<br>(MX3 only) | Hottest Other RTD Temperature                 | 0 - 200   | °C         |
| 84,85<br>(MX3 only) | RTD 1 Temperature                             | 0 - 200   | °C         |
| 86,87<br>(MX3 only) | RTD 2 Temperature                             | 0 - 200   | °C         |

**Table 5: PROFIBUS-DP V0 Input Data (126 Bytes) (Continued)**

| Byte                              | Description                  | Range   | Units |
|-----------------------------------|------------------------------|---|-------|
| 88,89<br>(MX3 only)               | RTD 3<br>Temperature         | 0 - 200   | °C    |
| 90,91<br>(MX3 only)               | RTD 4<br>Temperature         | 0 - 200   | °C    |
| 92,93<br>(MX3 only)               | RTD 5<br>Temperature         | 0 - 200   | °C    |
| 94,95<br>(MX3 only)               | RTD 6<br>Temperature         | 0 - 200   | °C    |
| 96,97<br>(MX3 only)               | RTD 7<br>Temperature         | 0 - 200   | °C    |
| 98,99<br>(MX3 only)               | RTD 8<br>Temperature         | 0 - 200   | °C    |
| 100,101<br>(MX3 only)             | RTD 9<br>Temperature         | 0 - 200   | °C    |
| 102,103<br>(MX3 only)             | RTD 10<br>Temperature        | 0 - 200   | °C    |
| 104,105<br>(MX3 only)             | RTD 11<br>Temperature        | 0 - 200   | °C    |
| 106,107<br>(MX3 only)             | RTD 12<br>Temperature        | 0 - 200   | °C    |
| 108,109<br>(MX3 only)             | RTD 13<br>Temperature        | 0 - 200   | °C    |
| 110,111<br>(MX3 only)             | RTD 14<br>Temperature        | 0 - 200   | °C    |
| 112,113<br>(MX3 only)             | RTD 15<br>Temperature        | 0 - 200   | °C    |
| 114,115<br>(MX3 only)             | RTD 16<br>Temperature        | 0 - 200   | °C    |
| 116,117<br>(MX3 only)             | RTDs with<br>Open Leads      | Bit Mask: Each of the sixteen bits represents an RTD. A 1 indicates the RTD has an open lead. |       |
| 118,119<br>(MX3 only)             | RTDs with<br>Shorted Leads   | Bit Mask: Each of the sixteen bits represents an RTD. A 1 indicates the RTD has shorted lead. |       |
| 120,121<br>(MX3 only)             | Remaining<br>Lockout Time    |   | Sec   |
| 122,123,<br>124,125<br>(MX3 only) | Date/Time<br>(lower 16 bits) | (in 32-bit unsigned integer format)   | Sec   |

**Table 6: PROFIBUS-DP V0 Output Data (2 Bytes)**

| Byte | Modbus Register | Description     | Range   | Units |
|------|-----------------|-----------------|---|-------|
| 0,1  | 30020/40020     | Starter Control | <i>Bit Description</i><br>0 Run/Stop<br>1 Fault Reset<br>2 Emergency Overload Reset<br>3 Local/Remote<br>4 Heat Disable<br>5 Ramp Select<br>6 Reserved<br>7 Reserved<br>8 Reserved<br>9 Reserved<br>10 Relay 6 (MX3 only)<br>11 Relay 5 (MX3 only)<br>12 Relay 4 (MX3 only)<br>13 Relay 3<br>14 Relay 2<br>15 Relay 1 |       |



Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup>

| Slot Num | Index | Modbus Register | Description                               | Range  | Units   |
|----------|-------|-----------------|---|--|---------|
| 01       | 01    | 30101/40101     | Motor FLA                                 | 1 - 6400   | A rms   |
| 01       | 02    | 30102/40102     | Motor Service Factor                      | 100 - 199  | 0.01    |
| 01       | 03    | 30103/40103     | Independent Start/<br>Run Motor Overloads | 0 Disabled<br>1 Enabled  |         |
| 01       | 04    | 30104/40104     | Motor Overload<br>Running Enable          | 0 Disabled<br>1 Enabled  |         |
| 01       | 05    | 30105/40105     | Motor Overload<br>Running Class           | 1 - 40   |         |
| 01       | 06    | 30106/40106     | Motor Overload<br>Starting Enable         | 0 Disabled<br>1 Enabled  |         |
| 01       | 07    | 30107/40107     | Motor Overload<br>Starting Class          | 1 - 40   |         |
| 01       | 08    | 30108/40108     | Motor Overload<br>Hot/Cold Ratio          | 0 - 99   | %       |
| 01       | 09    | 30109/40109     | Motor Overload<br>Cooling Time            | 10 - 9999  | 0.1 Min |
| 01       | 10    | 30110/40110     | Local Source                              | 0 Keypad<br>1 Terminal<br>2 Serial   |         |
| 01       | 11    | 30111/40111     | Remote Source                             | 0 Keypad<br>1 Terminal<br>2 Serial   |         |
| 01       | 12    | 30112/40112     | Start Mode                                | 0 Open Loop Voltage Ramp<br>1 Closed Loop Current Ramp<br>2 TruTorque Ramp<br>3 Power Ramp<br>4 Tach Ramp (MX3 only) |         |
| 01       | 13    | 30113/40113     | Initial<br>Motor Current 1                | 50 - 600   | % FLA   |
| 01       | 14    | 30114/40114     | Maximum<br>Motor Current 1                | 100 - 800  | % FLA   |
| 01       | 15    | 30115/40115     | Ramp Time 1                               | 0 - 300  | Sec     |
| 01       | 16    | 30116/40116     | Initial<br>Motor Current 2                | 50 - 600   | % FLA   |
| 01       | 17    | 30117/40117     | Maximum<br>Motor Current 2                | 100 - 800  | % FLA   |
| 01       | 18    | 30118/40118     | Ramp Time 2                               | 0 - 300  | Sec     |
| 01       | 19    | 30119/40119     | UTS Time                                  | 1 - 900  | Sec     |
| 01       | 20    | 30120/40120     | Initial V/T/P                             | 1 - 100  | %       |
| 01       | 21    | 30121/40121     | Max T/P                                   | 10 - 325   | %       |
| 01       | 22    | 30122/40122     | Stop Mode                                 | 0 Coast<br>1 Voltage Decel<br>2 TruTorque Decel<br>3 DC Brake  |         |
| 01       | 23    | 30123/40123     | Decel Begin Level                         | 100 - 1  | %       |
| 01       | 24    | 30124/40124     | Decel End Level                           | 99 - 1   | %       |
| 01       | 25    | 30125/40125     | Decel Time                                | 1 - 180  | Sec     |

**Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Slot Num | Index | Modbus Register | Description                         | Range                            | Units    |
|----------|-------|-----------------|-------------------------------------|----------------------------------|----------|
| 01       | 26    | 30126/40126     | DC Brake Level                      | 10 - 100                         | %        |
| 01       | 27    | 30127/40127     | DC Brake Time                       | 1 - 180                          | Sec      |
| 01       | 28    | 30128/40128     | DC Brake Delay                      | 1 - 30                           | 100 mSec |
| 01       | 29    | 30129/40129     | Kick Enable 1                       | 0 Disabled<br>1 Enabled          |          |
| 01       | 30    | 30130/40130     | Kick Current Level 1                | 100 - 800                        | % FLA    |
| 01       | 31    | 30131/40131     | Kick Time 1                         | 1 - 100                          | 100 mSec |
| 01       | 32    | 30132/40132     | Kick Enable 2                       | 0 Disabled<br>1 Enabled          |          |
| 01       | 33    | 30133/40133     | Kick Current Level                  | 100 - 800                        | % FLA    |
| 01       | 34    | 30134/40134     | Kick Time 2                         | 1 - 100                          | 100 mSec |
| 01       | 35    | 30135/40135     | Slow Speed Enable 1                 | 0 Disabled<br>1 Enabled          |          |
| 01       | 36    | 30136/40136     | Slow Speed 1                        |                                  | %        |
| 01       | 37    | 30137/40137     | Slow Speed Current Level 1          | 10 - 100                         | % FLA    |
| 01       | 38    | 30138/40138     | Slow Speed Time Limit Enable        | 0 Disabled<br>1 Enabled          |          |
| 01       | 39    | 30139/40139     | Slow Speed Time Limit               | 1 - 900                          | Sec      |
| 01       | 40    | 30140/40140     | Slow Speed Kick Enable              | 0 Disabled<br>1 Enabled          |          |
| 01       | 41    | 30141/40141     | Slow Speed Kick Level               | 100 - 800                        | % FLA    |
| 01       | 42    | 30142/40142     | Slow Speed Kick Time                | 1 - 100                          | 100 mSec |
| 01       | 43    | 30143/40143     | Rated RMS Voltage                   |                                  | V rms    |
| 01       | 44    | 30144/40144     | Input Phase Sensitivity             | 0 Ins<br>1 ABC<br>2 CBA<br>3 SPH |          |
| 01       | 45    | 30145/40145     | Motor Rated Power Factor            | 1 - 100                          |          |
| 01       | 46    | 30146/40146     | Overcurrent Enable                  | 0 Disabled<br>1 Enabled          |          |
| 01       | 47    | 30147/40147     | Overcurrent Level                   | 50 - 800                         | % FLA    |
| 01       | 48    | 30148/40148     | Overcurrent Delay Time Enable       | 0 Disabled<br>1 Enabled          |          |
| 01       | 49    | 30149/40149     | Overcurrent Delay Time              | 1 - 900                          | 100 mSec |
| 01       | 50    | 30150/40150     | Undercurrent Trip Enable            | 0 Disabled<br>1 Enabled          |          |
| 01       | 51    | 30151/40151     | Undercurrent Trip Level             | 5 - 100                          | % FLA    |
| 01       | 52    | 30152/40152     | Undercurrent Trip Delay Time Enable | 0 Disabled<br>1 Enabled          |          |

Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Slot Num | Index | Modbus Register | Description                       | Range                   | Units    |
|----------|-------|-----------------|-----------------------------------|-------------------------|----------|
| 01       | 53    | 30153/40153     | Undercurrent Trip Delay Time      | 1 - 900                 | 100 mSec |
| 01       | 54    | 30154/40154     | Current Imbalance Trip Enable     | 0 Disabled<br>1 Enabled |          |
| 01       | 55    | 30155/40155     | Current Imbalance Trip Level      | 5 - 40                  | %        |
| 01       | 56    | 30156/40156     | Residual Ground Fault Trip Enable | 0 Disabled<br>1 Enabled |          |
| 01       | 57    | 30157/40157     | Residual Ground Fault Trip Level  | 5 - 100                 | % FLA    |
| 01       | 58    | 30158/40158     | Over Voltage Trip Enable          | 0 Disabled<br>1 Enabled |          |
| 01       | 59    | 30159/40159     | Over Voltage Trip Level           | 1 - 40                  | %        |
| 01       | 60    | 30160/40160     | Under Voltage Trip Enable         | 0 Disabled<br>1 Enabled |          |
| 01       | 61    | 30161/40161     | Under Voltage Trip Level          | 1 - 40                  | %        |
| 01       | 62    | 30162/40162     | Over/Under Voltage Delay Time     | 1 - 900                 | 100 mSec |
| 01       | 63    | 30163/40163     | Digital Input Trip Delay Time     | 1 - 900                 | 100 mSec |
| 01       | 64    | 30164/40164     | Auto Fault Reset Enable           | 0 Disabled<br>1 Enabled |          |
| 01       | 65    | 30165/40165     | Auto Fault Reset Delay Time       | 1 - 900                 | Sec      |
| 01       | 66    | 30166/40166     | Auto Fault Reset Count Enable     | 0 Disabled<br>1 Enabled |          |
| 01       | 67    | 30167/40167     | Auto Fault Reset Count            | 1 - 10                  |          |
| 01       | 68    | 30168/40168     | Controlled Fault Stop             | 0 Disabled<br>1 Enabled |          |

**Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Slot Num | Index | Modbus Register | Description                  | Range   | Units    |
|----------|-------|-----------------|------------------------------|---|----------|
| 01       | 69    | 30169/40169     | DI 1 Configuration           | <i>Value / Description</i><br>0 Off   |          |
| 01       | 70    | 30170/40170     | DI 2 Configuration           | 1 Stop<br>2 Fault High<br>3 Fault Low<br>4 Fault Reset<br>5 Disconnect<br>6 Inline Feedback (F49)<br>7 Bypass / 2M Feedback (F48)<br>8 Emergency Motor OL Reset<br>9 Local / Remote Control Source  |          |
| 01       | 71    | 30171/40171     | DI 3 Configuration           | 10 Heat Disable<br>11 Heat Enable<br>12 Ramp Select<br>13 Slow Speed Forward<br>14 Slow Speed Reverse<br>15 DC Brake Disable<br>16 DC Brake Enable<br>17 Run Enable<br>18 Run Disable<br>19 Speed Switch Normally Open (MX3 only)<br>20 Speed Switch Normally Closed (MX3 only)                         |          |
| 01       | 72    | 30172/40172     | R1 Configuration             | <i>Value / Description</i><br>0 Off   |          |
| 01       | 73    | 30173/40173     | R2 Configuration             | 1 Fault Fail Safe<br>2 Fault Non Fail Safe<br>3 Running<br>4 Up To Speed<br>5 Alarm<br>6 Ready<br>7 Locked Out<br>8 Over Current Alarm<br>9 Under Current Alarm<br>10 Overload Alarm<br>11 Shunt Trip Fail Safe<br>12 Shunt Trip Non Fail Safe<br>13 Faulted on Ground Fault<br>14 In Energy Saver Mode |          |
| 01       | 74    | 30174/40174     | R3 Configuration             | 15 Heating<br>16 Slow Speed<br>17 Slow Speed Forward<br>18 Slow Speed Reverse<br>19 DC Braking<br>20 Cooling Fan<br>21 PORT (MX3 only)<br>22 Tach Loss (MX3 only)<br>23 RTD Alarm (MX3 only)<br>24 RTD Trip (MX3 only)<br>25 RTD Fail (MX3 only)  |          |
| 01       | 75    | 30175/40175     | Analog Input Trip Enable     | 0 Disabled<br>1 Enabled   |          |
| 01       | 76    | 30176/40176     | Analog Input Trip Type       | 0 Fault below preset level<br>1 Fault above preset level  |          |
| 01       | 77    | 30177/40177     | Analog Input Trip Level      | 0 - 100   | %        |
| 01       | 78    | 30178/40178     | Analog Input Trip Delay Time | 1 - 900   | 100 mSec |
| 01       | 79    | 30179/40179     | Analog Input Span            | 1 - 100   | %        |
| 01       | 80    | 30180/40180     | Analog Input Offset          | 0 - 99  | %        |

Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Slot Num | Index | Modbus Register | Description            | Range   | Units    |
|----------|-------|-----------------|------------------------|---|----------|
| 01       | 81    | 30181/40181     | Analog Output Function | <i>Value / Description</i><br>0 Off (no output)<br>1 0–100% Current<br>2 0–200% Current<br>3 0–800% Current<br>4 0–150% Voltage<br>5 0–150% Overload<br>6 0–10kW<br>7 0–100kW<br>8 0–1MW<br>9 0–10MW<br>10 1–100% Analog Input<br>11 0–100% Firing<br>12 Calibration (full output)  | %        |
| 01       | 82    | 30182/40182     | Analog Output Span     | 1 - 150   | %        |
| 01       | 83    | 30183/40183     | Analog Output Offset   | 0 - 99  |          |
| 01       | 84    | 30184/40184     | Inline Enable          | 0 Disabled<br>1 Enabled   |          |
| 01       | 85    | 30185/40185     | Inline Delay Time      | 10 - 100  | 100 mSec |
| 01       | 86    | 30186/40186     | Bypass Feedback Time   | 1 - 50  | 100 mSec |
| 01       | 87    | 30187/40187     | Keypad Stop            | 0 Disabled<br>1 Enabled   |          |
| 01       | 88    | 30188/40188     | Modbus Timeout Enable  | 0 Disabled<br>1 Enabled   |          |
| 01       | 89    | 30189/40189     | Modbus Timeout         | 1 - 120   | Sec      |
| 01       | 90    | 30190/40190     | CT Ratio               | <i>Value / Description</i><br>0 72:1<br>1 96:1<br>2 144:1<br>3 288:1<br>4 864:1<br>5 2640:1<br>6 3900:1<br>7 5760:1<br>8 8000:1<br>9 14400:1<br>10 28800:1<br>11 50:5 (MX3 only)<br>12 150:5 (MX3 only)<br>13 250:5 (MX3 only)<br>14 400:5 (MX3 only)<br>15 600:5 (MX3 only)<br>16 800:5 (MX3 only)<br>17 2000:5 (MX3 only)<br>18 5000:5 (MX3 only) |          |
| 01       | 91    | 30191/40191     | Auto Start             | <i>Value / Description</i><br>0 Disabled<br>1 Start after power applied<br>2 Start after fault reset<br>3 Starter after power applied and after fault reset   |          |
| 01       | 92    | 30192/40192     | Energy Saver Enable    | 0 Disabled<br>1 Enabled   |          |

**Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Slot Num | Index | Modbus Register | Description                      | Range  | Units |
|----------|-------|-----------------|----------------------------------|--|-------|
| 01       | 93    | 30193/40193     | Heater /<br>Anti-Windmill Enable | 0 Disabled<br>1 Enabled  |       |
| 01       | 94    | 30194/40194     | Heater /<br>Anti-Windmill Level  | 1 - 40   | % FLA |
| 01       | 95    | 30195/40195     | Starter Type                     | <i>Value / Description</i><br>0 Normal (Outside Delta)<br>1 Inside Delta<br>2 Wye-Delta<br>3 Phase Controller<br>4 Current Follower<br>5 Across the Line (Full Voltage)  |       |
| 01       | 96    | 30196/40196     | LED Display Meter                | <i>Value / Description</i><br>0 Status<br>1 Avg. Current<br>2 L1 Current<br>3 L2 Current<br>4 L3 Current<br>5 Current Imbalance %<br>6 Residual Ground Current<br>7 Avg. Volts<br>8 L1-L2 Volts<br>9 L2-L3 Volts<br>10 L3-L1 Volts<br>11 Overload<br>12 Power Factor<br>13 Watts<br>14 VA<br>15 vars<br>16 kW hours<br>17 MW hours<br>18 Phase Order<br>19 Line Frequency<br>20 Analog Input<br>21 Analog Output<br>22 Running Days<br>23 Running Hours<br>24 Starts<br>25 TruTorque %<br>26 Power %<br>27 Peak Starting Current<br>28 Last Starting Duration<br>29 Zero Sequence Ground Current (MX3 only)<br>30 Hottest Stator RTD Temperature (MX3 only)<br>31 Hottest Bearing RTD Temperature (MX3 only)<br>32 Hottest Other RTD Temperature (MX3 only)<br>33 Hottest RTD Temperature (MX3 only) |       |

Table 7: PROFIBUS-DP V1, Parameters - MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Slot Num | Index | Modbus Register | Description            | Range  | Units |
|----------|-------|-----------------|------------------------|--|-------|
| 01       | 97    | 30197/40197     | LCD Display Meter 1    | <i>Value / Description</i>   |       |
|          |       |                 |                        | 1 Avg. Current<br>2 L1 Current<br>3 L2 Current<br>4 L3 Current<br>5 Current Imbalance %<br>6 Residual Ground Current<br>7 Avg. Volts<br>8 L1-L2 Volts<br>9 L2-L3 Volts<br>10 L3-L1 Volts<br>11 Overload<br>12 Power Factor<br>13 Watts<br>14 VA<br>15 vars<br>16 kW hours<br>17 MW hours   |       |
| 01       | 98    | 30198/40198     | LCD Display Meter 2    | 18 Phase Order<br>19 Line Frequency<br>20 Analog Input<br>21 Analog Output<br>22 Running Days<br>23 Running Hours<br>24 Starts<br>25 TruTorque %<br>26 Power %<br>27 Peak Starting Current<br>28 Last Starting Duration<br>29 Zero Sequence Ground Current (MX3 only)<br>30 Stator RTD Temperature (MX3 only)<br>31 Bearing RTD Temperature (MX3 only)<br>32 Other RTD Temperature (MX3 only)<br>33 Hottest RTD Temperature (MX3 only) |       |
| 01       | 99    | 30199/40199     | Misc Commands          | <i>Value / Description</i><br>0 None<br>1 Standard BIST<br>2 Powered BIST<br>3 Reset Run Time<br>4 Reset kWh<br>5 Enter Reflash Mode<br>6 Store Parameters<br>7 Load Parameters<br>8 Factory Reset   |       |
| 01       | 100   | 30200/40200     | Bypass Feedback Enable | 0 Disabled<br>1 Enabled  |       |

**Table 8: PROFIBUS-DP V1, Parameters - Unique to MX<sup>3</sup>**

| Slot Num | Index | Modbus Register | Description                            | Range  | Units      |
|----------|-------|-----------------|--|--|------------|
| 02       | 01    | 30221/40221     | Acceleration Profile                   | 0 Linear<br>1 Squared<br>2 S-Curve   |            |
| 02       | 02    | 30222/40222     | Deceleration Profile                   |  |            |
| 02       | 03    | 30223/40223     | PORT Bypass Enable                     | 0 Disabled<br>1 Enabled  |            |
| 02       | 04    | 30224/40224     | PORT Bypass Delay Time                 | 1 - 50   | 100 mSec   |
| 02       | 05    | 30225/40225     | PORT Recovery Method                   |  |            |
| 02       | 06    | 30226/40226     | Tachometer Full Speed Voltage          | 100 - 1000   | 10 mV      |
| 02       | 07    | 30227/40227     | Tachometer Loss Delay Time             | 1 - 900  | 100 mSec   |
| 02       | 08    | 30228/40228     | Tachometer Loss Action                 | <i>Value / Description</i><br>0 Fault<br>1 Closed Loop Current Ramp<br>2 TruTorque Ramp<br>3 Power Ramp        |            |
| 02       | 09    | 30229/40229     | Time/Date Format                       | <i>Value / Description</i><br>0 mm/dd/yy<br>1 mm/dd/yy<br>2 yy/mm/dd<br>3 yy/mm/dd<br>4 dd/mm/yy<br>5 dd/mm/yy |            |
| 02       | 10    | 30230/40230     | Current Imbalance Delay Time           | 1 - 900  | 100 mSec   |
| 02       | 11    | 30231/40231     | Zero Sequence Ground Fault Trip Enable | 0 Disabled<br>1 Enabled  |            |
| 02       | 12    | 30232/40232     | Zero Sequence Ground Fault Trip Level  | 10 - 250   | 100 mA rms |
| 02       | 13    | 30233/40233     | Ground Fault Delay Time                | 1 - 900  | 100 mSec   |
| 02       | 14    | 30234/40234     | Phase Loss Delay Time                  | 1 - 50   | 100 mSec   |
| 02       | 15    | 30235/40235     | Over Frequency Trip Level              | 24 - 72  | Hz         |
| 02       | 16    | 30236/40236     | Under Frequency Trip Level             | 23 - 71  | Hz         |
| 02       | 17    | 30237/40237     | Over/Under Frequency Delay Time        | 1 - 900  | 100 mSec   |
| 02       | 18    | 30238/40238     | Power Factor Leading Trip Enable       | 0 Disabled<br>1 Enabled  |            |
| 02       | 19    | 30239/40239     | Power Factor Leading Trip Level        | 80 - 99 = -0.80 - -0.99 lag<br>100 - 199 = 1.00 - +0.01 lead   |            |



Table 8: PROFIBUS-DP V1, Parameters - Unique to MX<sup>3</sup> (Continued)

| Slot Num | Index | Modbus Register | Description                             | Range   | Units    |
|----------|-------|-----------------|---|---|----------|
| 02       | 20    | 30240/40240     | Power Factor Lagging Trip Enable        | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 21    | 30241/40241     | Power Factor Lagging Trip Level         | 1 - 99 = -0.01 - -0.99 lag<br>100 - 120 = 1.00 - +0.80 lead |          |
| 02       | 22    | 30242/40242     | Power Factor Delay Time                 | 1 - 900   | 100 mSec |
| 02       | 23    | 30243/40243     | Backspin Timer Enable                   | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 24    | 30244/40244     | Backspin Time                           | 1 - 180   | Min      |
| 02       | 25    | 30245/40245     | Time Between Starts Enable              | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 26    | 30246/40246     | Time Between Starts                     | 1 - 180   | Min      |
| 02       | 27    | 30247/40247     | Starts per Hour Enable                  | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 28    | 30248/40248     | Starts per Hour                         | 1 - 6   |          |
| 02       | 29    | 30249/40249     | Speed Switch Enable                     | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 30    | 30250/40250     | Speed Switch Delay Time                 | 1 - 250   | Sec      |
| 02       | 31    | 30251/40251     | Motor PTC Enable                        | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 32    | 30252/40252     | Motor PTC Delay Time                    | 1 - 5   | Sec      |
| 02       | 33    | 30253/40253     | PORT Trip Enable                        | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 34    | 30254/40254     | PORT Trip Delay Time                    | 1 - 900   | 100 mSec |
| 02       | 35    | 30255/40255     | Motor Overload Alarm Level              | 1 - 100   | %        |
| 02       | 36    | 30256/40256     | Motor Overload Lockout Level            | 1 - 99  | %        |
| 02       | 37    | 30257/40257     | Motor Overload Auto Lockout Calculation | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 38    | 30258/40258     | Motor Overload RTD Biasing Enable       | 0 Disabled<br>1 Enabled                                     |          |
| 02       | 39    | 30259/40259     | Motor Overload RTD Biasing Minimum      | 1 - 198   | °C       |
| 02       | 40    | 30260/40260     | Motor Overload RTD Biasing Middle       | 1 - 199   | °C       |
| 02       | 41    | 30261/40261     | Motor Overload RTD Biasing Maximum      | 105 - 200   | °C       |

**Table 8: PROFIBUS-DP V1, Parameters - Unique to MX<sup>3</sup> (Continued)**

| Slot Num | Index | Modbus Register | Description             | Range  | Units |
|----------|-------|-----------------|-------------------------|--|-------|
| 02       | 42    | 30262/40262     | DI 4 Configuration      | Same as DI 1 through DI 3 configuration in the Parameters Common to the MX2 andMX3 |       |
| 02       | 43    | 30263/40263     | DI 5 Configuration      |  |       |
| 02       | 44    | 30264/40264     | DI 6 Configuration      |  |       |
| 02       | 45    | 30265/40265     | DI 7 Configuration      |  |       |
| 02       | 46    | 30266/40266     | DI 8 Configuration      |  |       |
| 02       | 47    | 30267/40267     | R4 Configuration        | Same as R1 through R3 configuration in the Parameters Common to the MX2 andMX3     |       |
| 02       | 48    | 30268/40268     | R5 Configuration        |  |       |
| 02       | 49    | 30269/40269     | R6 Configuration        |  |       |
| 02       | 50    | 30270/40270     | RTD Module 1 Enable     | 0 Disabled<br>1 Enabled  |       |
| 02       | 51    | 30271/40271     | RTD Module 1 Address    | 16 - 23  |       |
| 02       | 52    | 30272/40272     | RTD Module 2 Enable     | 0 Disabled<br>1 Enabled  |       |
| 02       | 53    | 30273/40273     | RTD Module 2 Address    | 16 - 23  |       |
| 02       | 54    | 30274/40274     | RTD 1 Group             | <i>Value / Description</i><br>0 Off<br>1 Stator<br>2 Bearing<br>3 Other            |       |
| 02       | 55    | 30275/40275     | RTD 2 Group             |  |       |
| 02       | 56    | 30276/40276     | RTD 3 Group             |  |       |
| 02       | 57    | 30277/40277     | RTD 4 Group             |  |       |
| 02       | 58    | 30278/40278     | RTD 5 Group             |  |       |
| 02       | 59    | 30279/40279     | RTD 6 Group             |  |       |
| 02       | 60    | 30280/40280     | RTD 7 Group             |  |       |
| 02       | 61    | 30281/40281     | RTD 8 Group             |  |       |
| 02       | 62    | 30282/40282     | RTD 9 Group             |  |       |
| 02       | 63    | 30283/40283     | RTD 10 Group            |  |       |
| 02       | 64    | 30284/40284     | RTD 11 Group            |  |       |
| 02       | 65    | 30285/40285     | RTD 12 Group            |  |       |
| 02       | 66    | 30286/40286     | RTD 13 Group            |  |       |
| 02       | 67    | 30287/40287     | RTD 14 Group            |  |       |
| 02       | 68    | 30288/40288     | RTD 15 Group            |  |       |
| 02       | 69    | 30289/40289     | RTD 16 Group            |  |       |
| 02       | 70    | 30290/40290     | RTD Stator Alarm Level  | 1 - 200  | °C    |
| 02       | 71    | 30291/40291     | RTD Bearing Alarm Level |  |       |
| 02       | 72    | 30292/40292     | RTD Other Alarm Level   |  |       |
| 02       | 73    | 30293/40293     | RTD Stator Trip Level   |  |       |
| 02       | 74    | 30294/40294     | RTD Bearing Trip Level  |  |       |
| 02       | 75    | 30295/40295     | RTD Other Trip Level    |  |       |
| 02       | 76    | 30296/40296     | RTD Voting Enable       | 0 Disabled<br>1 Enabled  |       |

**Table 8: PROFIBUS-DP V1, Parameters - Unique to MX<sup>3</sup> (Continued)**

| Slot Num | Index | Modbus Register | Description                | Range  | Units |
|----------|-------|-----------------|----------------------------|--|-------|
| 02       | 77    | 30297/40297     | Slow Speed Enable 2        | 0 Disabled<br>1 Enabled  |       |
| 02       | 78    | 30298/40298     | Slow Speed 2               | Same as Slow Speed 1 in the Parameters Common to the MX2 and MX3 | %     |
| 02       | 79    | 30299/40299     | Slow Speed Current Level 2 | 10 - 400   | % FLA |

**Table 9: PROFIBUS-DP V1, Fault Log**

| Slot Num | Index | Modbus Register | Description    | Range  | Units |
|----------|-------|-----------------|----------------|--|-------|
| 10       | 1-9   | 30601/40601     | Fault Code     | (see below)  |       |
| 11       | 1-9   | 30611/40611     | System State   | Starter state when fault occurred:<br><i>State / Description</i><br>0 Initializing<br>1 Locked Out<br>2 Faulted<br>3 Stopped<br>4 Heating<br>5 Kicking<br>6 Ramping<br>7 Slow Speed<br>8 Not UTS<br>9 UTS<br>10 Phase Control / Current Follower<br>11 Decelerating<br>12 Braking<br>13 Wye<br>14 PORT<br>15 BIST<br>16 Shorted SCR Test<br>17 Open SCR Test |       |
| 12       | 1-9   | 30621/40621     | L1 Currents    | The current that the load is drawing from Line 1 when a fault occurs   | Amps  |
| 13       | 1-9   | 30631/40631     | L2 Currents    | The current that the load is drawing from Line 2 when a fault occurs   | Amps  |
| 14       | 1-9   | 30641/40641     | L3 Currents    | The current that the load is drawing from Line 3 when a fault occurs   | Amps  |
| 15       | 1-9   | 30651/40651     | L1-L2 Voltages | The line voltage that is present between Lines 1 and 2 when a fault occurs   | Volts |
| 16       | 1-9   | 30661/40661     | L2-L3 Voltages | The line voltage that is present between Lines 2 and 3 when a fault occurs   | Volts |
| 17       | 1-9   | 30671/40671     | L3-L1 Voltages | The line voltage that is present between Lines 3 and 1 when a fault occurs   | Volts |
| 18       | 1-9   | 30681/40681     | Kilowatts      | The power that the load is drawing when a fault occurs   | kW    |
| 19       | 1-9   | 30691/40691     | Line Periods   | The line period (1/frequency) that is present when a fault occurs  | uS    |
| 20       | 1-9   | 30701/40701     | Runtime Hours  | The value of the running time meter when a fault occurs  | Hr    |

**Table 10: Fault Codes**

| Fault Code | Description                                     |
|------------|---|
| 00         | No fault  |
| 01         | UTS Time Limit Expired                          |
| 02         | Motor Thermal Overload Trip                     |
| 03         | Slow Speed Time Limit Expired                   |
| 04         | Speed Switch                                    |
| 05         | Motor PTC                                       |
| 06         | Stator RTD                                      |
| 07         | Bearing RTD                                     |
| 08         | Other RTD                                       |
| 10         | Phase Rotation Error, not ABC                   |
| 11         | Phase Rotation Error, not CBA                   |
| 12         | Low Line Frequency                              |
| 13         | High Line Frequency                             |
| 14         | Input power not single phase                    |
| 15         | Input power not three phase                     |
| 21         | Low Line L1-L2                                  |
| 22         | Low Line L2-L3                                  |
| 23         | Low Line L3-L1                                  |
| 24         | High Line L1-L2                                 |
| 25         | High Line L2-L3                                 |
| 26         | High Line L3-L1                                 |
| 27         | Phase Loss                                      |
| 28         | No Line   |
| 29         | PORT Time Limit Expired                         |
| 30         | I.O.C.  |
| 31         | Overcurrent                                     |
| 34         | Undercurrent                                    |
| 35         | Power Factor Leading                            |
| 36         | Power Factor Lagging                            |
| 37         | Current Imbalance                               |
| 38         | Ground Fault                                    |
| 39         | No Current at Run                               |
| 40         | Shorted / Open SCR                              |
| 41         | Current at Stop                                 |
| 46         | Disconnect Open                                 |
| 47         | Stack Protection Fault (stack thermal overload) |
| 48         | Bypass Contactor Fault                          |

**Table 10: Fault Codes (Continued)**

| Fault Code | Description                                 |
|------------|---|
| 49         | Inline Contactor Fault                      |
| 50         | Control Power Low                           |
| 51         | Current Sensor Offset Error                 |
| 53         | Tachometer Loss                             |
| 54         | BIST Fault                                  |
| 55         | BIST CT Fault                               |
| 56         | Open or Shorted RTD                         |
| 60         | External Fault on DIN#1 Input               |
| 61         | External Fault on DIN#2 Input               |
| 62         | External Fault on DIN#3 Input               |
| 63         | External Fault on DIN#4 Input               |
| 64         | External Fault on DIN#5 Input               |
| 65         | External Fault on DIN#6 Input               |
| 66         | External Fault on DIN#7 Input               |
| 67         | External Fault on DIN#8 Input               |
| 71         | Analog Input Level Fault Trip               |
| 80         | RTD Communication Fault                     |
| 81         | Keypad Communication Fault                  |
| 82         | Modbus Timeout Fault                        |
| 84         | Interboard Communication Fault              |
| 85         | IO Card – SW Fault                          |
| 86         | IO Card – Current Sensor Offset Error       |
| 87         | IO Card – Real Time Clock Error             |
| 88         | IO Card – Illegal Instruction Trap          |
| 89         | IO Card – SW Watchdog Fault                 |
| 90         | IO Card – Spurious Interrupt                |
| 91         | IO Card – Program EPROM Checksum Fault      |
| 94         | CPU Error – SW Fault                        |
| 95         | CPU Error – Parameter EEPROM Checksum Fault |
| 96         | CPU Error – Illegal Instruction Trap        |
| 97         | CPU Error – SW Watchdog Fault               |
| 98         | CPU Error – Spurious Interrupt              |
| 99         | CPU Error – Program EPROM Checksum Fault    |

**Table 11: PROFIBUS-DP V1, Event Log**

| Slot Num | Index | Modbus Register | Description         | Range   | Units |
|----------|-------|-----------------|---------------------|---|-------|
| 30       | 1-99  | 30801/40801     | Event Code          | (see below)   |       |
| 31       | 1-99  | 30901/40901     | System State        | The state that the starter was in when an event occurs  |       |
| 32       | 1-99  | 31001/41001     | Time and Date Stamp | 32-bit unsigned integer representing the number of seconds elapsed since 12:00 AM on January 1st, 1972. |       |

**Table 12: Event Codes**

| Event Code | Description                     |
|------------|---------------------------------|
| 101        | Start Commanded                 |
| 102        | Slow Speed Commanded            |
| 103        | Up to Speed                     |
| 104        | Energy Saver Entered            |
| 105        | Energy Saver Exited             |
| 106        | Stop Commanded                  |
| 107        | Stop Complete                   |
| 110        | Motor Overload Warning          |
| 111        | Motor Overload Lockout Entered  |
| 112        | Motor Overload Lockout Cleared  |
| 113        | Stack Overload Warning          |
| 114        | Stack Overload Lockout Entered  |
| 115        | Stack Overload Lockout Cleared  |
| 116        | Emergency Overload Reset        |
| 117        | Stator RTD Warning              |
| 118        | Bearing RTD Warning             |
| 119        | Other RTD Warning               |
| 140        | Disconnect Opened               |
| 141        | Disconnect Closed               |
| 170        | PORT Entered due to Low Voltage |
| 171        | PORT Entered due to Low Current |
| 172        | PORT Bypass Contactor Opened    |
| 173        | PORT Power Returned             |
| 174        | PORT Recovery Completed         |
| 180        | Parameters Reset to Defaults    |
| 181        | Time/Date Changed               |
| 182        | Passcode Enabled                |
| 183        | Passcode Cleared                |

**Table 12: Event Codes (Continued)**

| Event Code | Description                |
|------------|----------------------------|
| 184        | Factory Passcode Entered   |
| 185        | Event Log Cleared          |
| 186        | Run Time Reset             |
| 187        | kWh Reset                  |
| 188        | Reflash Mode Entered       |
| 190        | System Powered Up          |
| 191        | System Powered Down        |
| 192        | Low Control Power Detected |
| 193        | Standard BIST Entered      |
| 194        | Powered BIST Entered       |
| 195        | BIST Passed                |

**Table 13: PROFIBUS-DP V1, Comm Settings**

| Slot Num | Index | Description                                       | Range   | Units           |
|----------|-------|---|---------|-----------------|
| 37       | 1     | Modbus Slave ID                                   | 1-247   |                 |
| 37       | 2     | <i>Baud Rate</i><br>0 4800<br>1 9600<br>2 19200   | 0-2     | Bits per second |
| 37       | 3     | <i>Parity</i><br>0 8N<br>1 8E<br>2 8O             | 0-2     |                 |
| 37       | 4     | <i>Stop Bits</i><br>0 1 Stop Bit<br>1 2 Stop Bits | 0-1     |                 |
| 37       | 5     | Communication Timeout                             | 10-1000 | mS              |



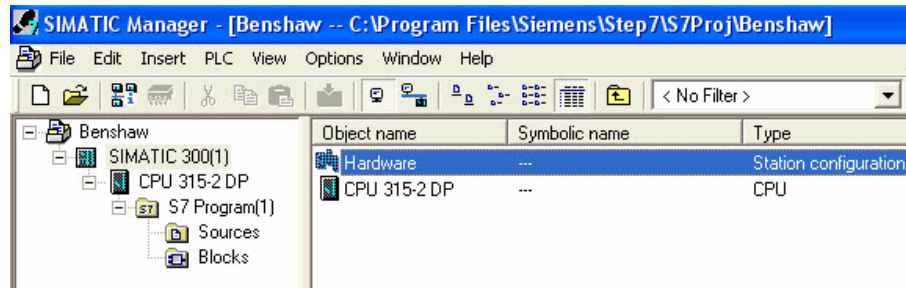


# 4 - Installing the Benshaw GSD File

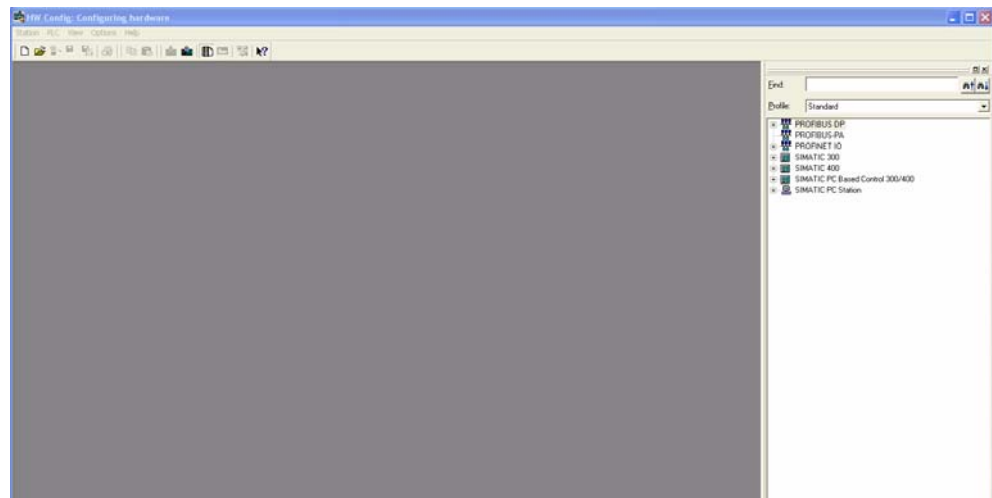
## Example

The Benshaw GSD file named “BENS0CFB.gsd” (the name cannot be changed) must be installed into the Siemens STEP 7 SIMATIC Manager application; the version of SIMATIC Manager used for this example is V5.4 + SP5 + HF1.

Open the SIMATIC Manager, then double-click the “Hardware” object as shown below.

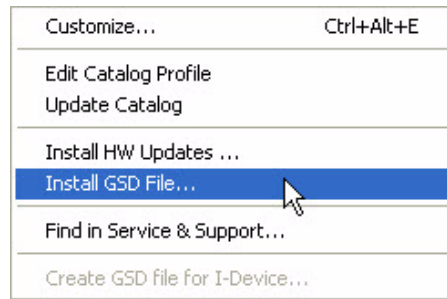


Once the HW-Config screen has opened, verify that there are NO active configurations open by selecting the “Station” drop down menu, then selecting “Close”. The HW-Config will then appear as shown below without an active hardware configuration displayed in the grey area.

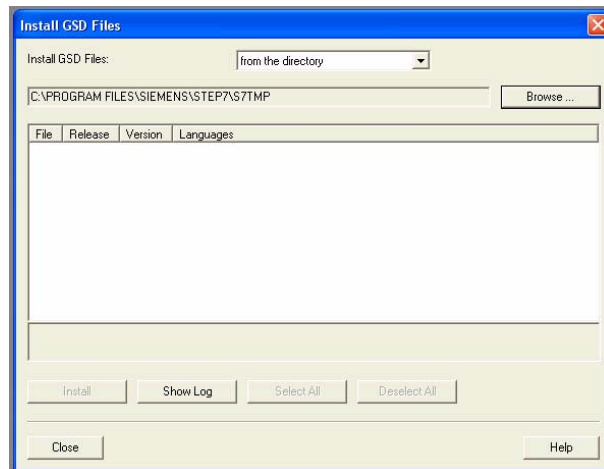


## MXPB3 Profibus Communications Module

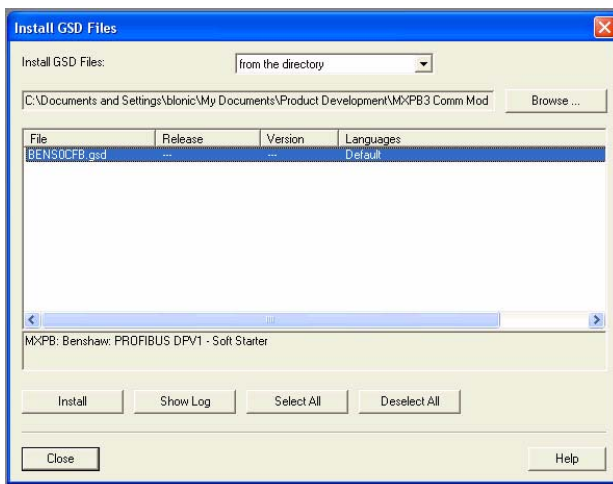
From the HW-Config screen, select “Install GSD File” from the “Options” drop down menu.



The “Install GSD File” option box will appear. Click on the “Browse” button then navigate to the folder where the “BENS0CFB.gsd” file is located on your computer.

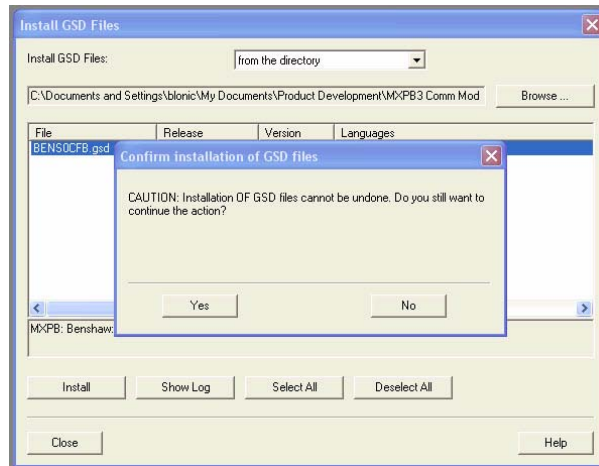


After selecting the directory where “BENS0CFB.gsd” is located, the file appears in the “Install GSD Files” dialog box as shown below. Click on the file, then click “Install”.

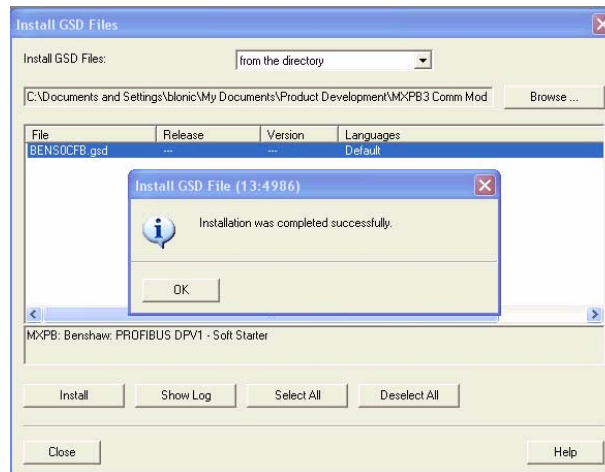


## 4 - Installing the Benshaw GSD File

After clicking the “Install” button, the “Confirm Installation of GSD Files” dialog box will be displayed. Click “Yes”.

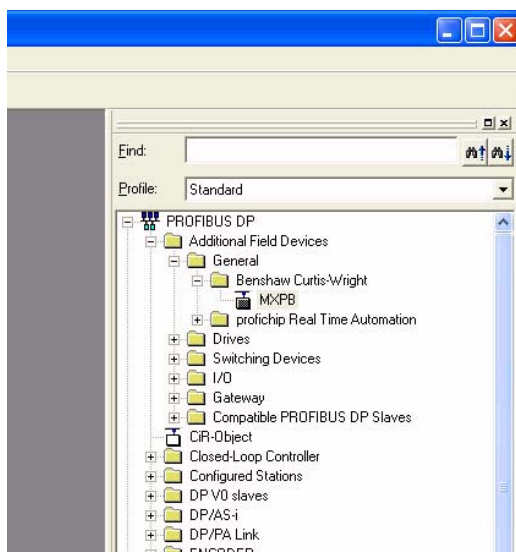


If the GSD file has previously been installed, or is being updated, it will be necessary to acknowledge overriding the existing file before the “Installation was completed successfully” dialog box will be displayed. Click “OK”.



## ***MXPB3 Profibus Communications Module***

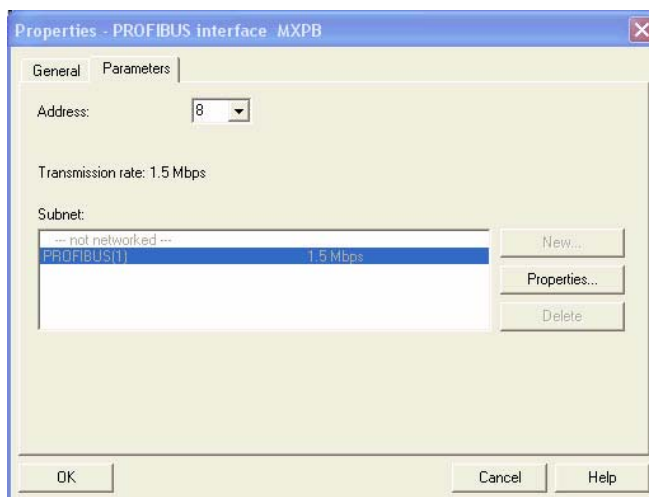
Close the HW-Config application and return to the SIMATIC Manager, then double-click the Hardware object. Inside the HW-Config application, access the catalog of PROFIBUS-DP devices. Locate the “MXPB” device under PROFIBUS-DP -- Additional Field Devices -- General -- Benshaw Curtiss-Wright.



Drag this device to the PROFIBUS-DP master network line; the following “Properties” dialog box will be displayed. Use the “Properties” dialog box to set the parameters for this instance of the MXPB:

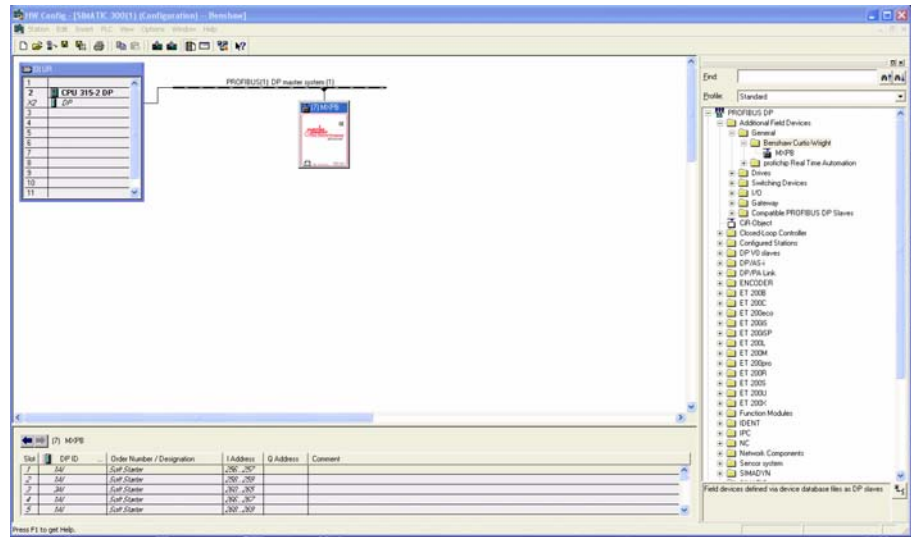
- Address ( 7 was used for this example)
- Transmission Rate

Once the parameters have been entered click “OK”.



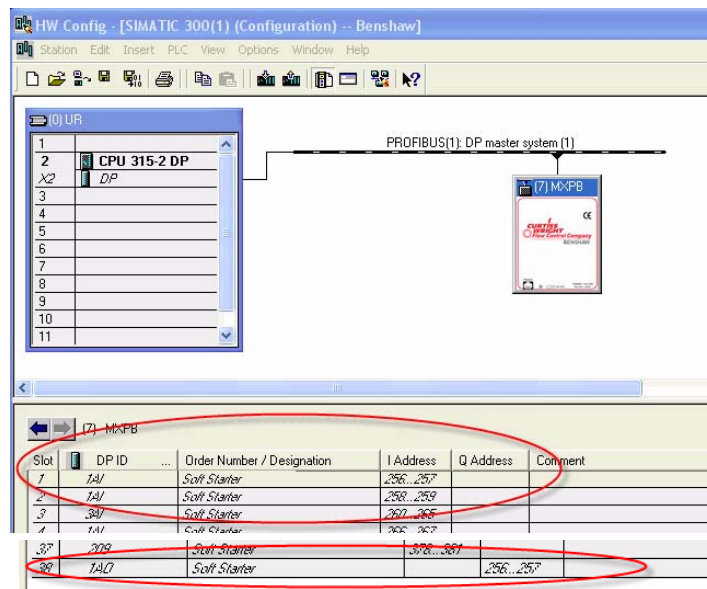
## 4 - Installing the Benshaw GSD File

After setting the MXPB parameters and clicking “OK”, the “HW-Config” shown below will be displayed. The instance (Address) of the MXPB has been added to the “HW-Config” and is ready for use. Click on the MXPB (7) to display the memory locations assigned in the CPU.



### Example: DP-V0

The MXPB3 contains 126 bytes of cyclic data. Once the MXPB has been added to the HW-Config network dialog box, the “I Address” and “Q Address” memory locations can be found and the bottom portion of the screen.



# MXPB3 Profibus Communications Module

The DP-V0 example moves the cyclic data to DB2. The following VAT\_1 example displays the results of some of the cyclic data being read during every bus scan. The first line of VAT\_1 displays a “READY” status of the soft starter in real time.

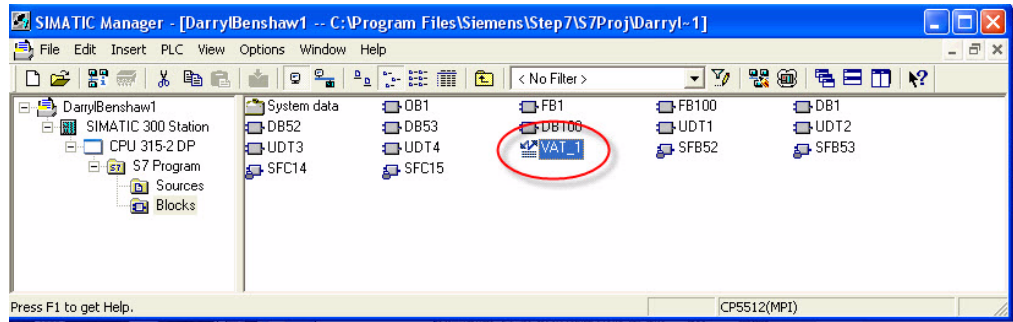
| Address | Symbol        | Display format                     | Status value | Modify value |
|---------|---------------|------------------------------------|--------------|--------------|
| 1       | DB2.DBX 5.0   | "SS_NO_1" STARTER_STATUS_READY     | BOOL true    |              |
| 2       | DB2.DBX 5.1   | "SS_NO_1" STARTER_STATUS_RUNNING   | BOOL false   |              |
| 3       | DB2.DBX 5.2   | "SS_NO_1" STARTER_STATUS_UTS       | BOOL false   |              |
| 4       | DB2.DBX 5.3   | "SS_NO_1" STARTER_STATUS_ALARM     | BOOL false   |              |
| 5       | DB2.DBX 5.4   | "SS_NO_1" STARTER_STATUS_FAULT     | BOOL false   |              |
| 6       | DB2.DBX 5.5   | "SS_NO_1" STARTER_STATUS_LOCKOUT   | BOOL false   |              |
| 7       | DB2.DBX 5.6   | "SS_NO_1" STARTER_STATUS_RES_BIT06 | BOOL false   |              |
| 8       | DB2.DBX 5.7   | "SS_NO_1" STARTER_STATUS_RES_BIT07 | BOOL false   |              |
| 9       | DB2.DBX 6.0   | "SS_NO_1" STARTER_STATUS_RES_BIT08 | BOOL false   |              |
| 10      | DB2.DBX 6.1   | "SS_NO_1" STARTER_STATUS_RES_BIT09 | BOOL false   |              |
| 11      | DB2.DBX 6.2   | "SS_NO_1" STARTER_STATUS_RES_BIT10 | BOOL false   |              |
| 12      | DB2.DBX 6.3   | "SS_NO_1" STARTER_STATUS_RES_BIT11 | BOOL false   |              |
| 13      | DB2.DBX 6.4   | "SS_NO_1" STARTER_STATUS_RES_BIT12 | BOOL false   |              |
| 14      | DB2.DBX 6.5   | "SS_NO_1" STARTER_STATUS_RES_BIT13 | BOOL false   |              |
| 15      | DB2.DBX 6.6   | "SS_NO_1" STARTER_STATUS_RES_BIT14 | BOOL false   |              |
| 16      | DB2.DBX 6.7   | "SS_NO_1" STARTER_STATUS_RES_BIT15 | BOOL false   |              |
| 17      | DB2.DBX 130.0 | "SS_NO_1" RES_CTRL_BIT_0           | BOOL false   |              |
| 18      | DB2.DBX 130.1 | "SS_NO_1" RES_CTRL_BIT_1           | BOOL false   |              |
| 19      | DB2.DBX 130.2 | "SS_NO_1" CTRL_RELAY_6             | BOOL false   |              |
| 20      | DB2.DBX 130.3 | "SS_NO_1" CTRL_RELAY_5             | BOOL false   |              |
| 21      | DB2.DBX 130.4 | "SS_NO_1" CTRL_RELAY_4             | BOOL false   |              |
| 22      | DB2.DBX 130.5 | "SS_NO_1" CTRL_RELAY_3             | BOOL false   |              |
| 23      | DB2.DBX 130.6 | "SS_NO_1" CTRL_RELAY_2             | BOOL false   |              |
| 24      | DB2.DBX 130.7 | "SS_NO_1" CTRL_RELAY_1             | BOOL false   |              |
| 25      | DB2.DBX 131.0 | "SS_NO_1" CTRL_RUN_STOP            | BOOL false   | false        |
| 26      | DB2.DBX 131.1 | "SS_NO_1" CTRL_FAULT_RESET         | BOOL false   |              |
| 27      | DB2.DBX 131.2 | "SS_NO_1" CTRL_EMER_OL_RESET       | BOOL false   |              |
| 28      | DB2.DBX 131.3 | "SS_NO_1" CTRL_LOC_REM             | BOOL false   |              |
| 29      | DB2.DBX 131.4 | "SS_NO_1" CTRL_HEAT_DISABLE        | BOOL false   |              |
| 30      | DB2.DBX 131.5 | "SS_NO_1" CTRL_RAMP_SEL            | BOOL false   |              |
| 31      | DB2.DBX 131.6 | "SS_NO_1" RES_CTRL_BIT_2           | BOOL false   |              |
| 32      | DB2.DBX 131.7 | "SS_NO_1" RES_CTRL_BIT_3           | BOOL false   |              |
| 33      | DB2.DBW 80    | "SS_NO_1" PARAM_STATUS_ARRAY_2[10] | HEX          |              |
| 34      |               |                                    |              |              |

Line 25 of the example below is used to “Start” the soft starter, the status of the start command is displayed in lines 1-3 (“READY”, “RUNNING”, and “UTS”).

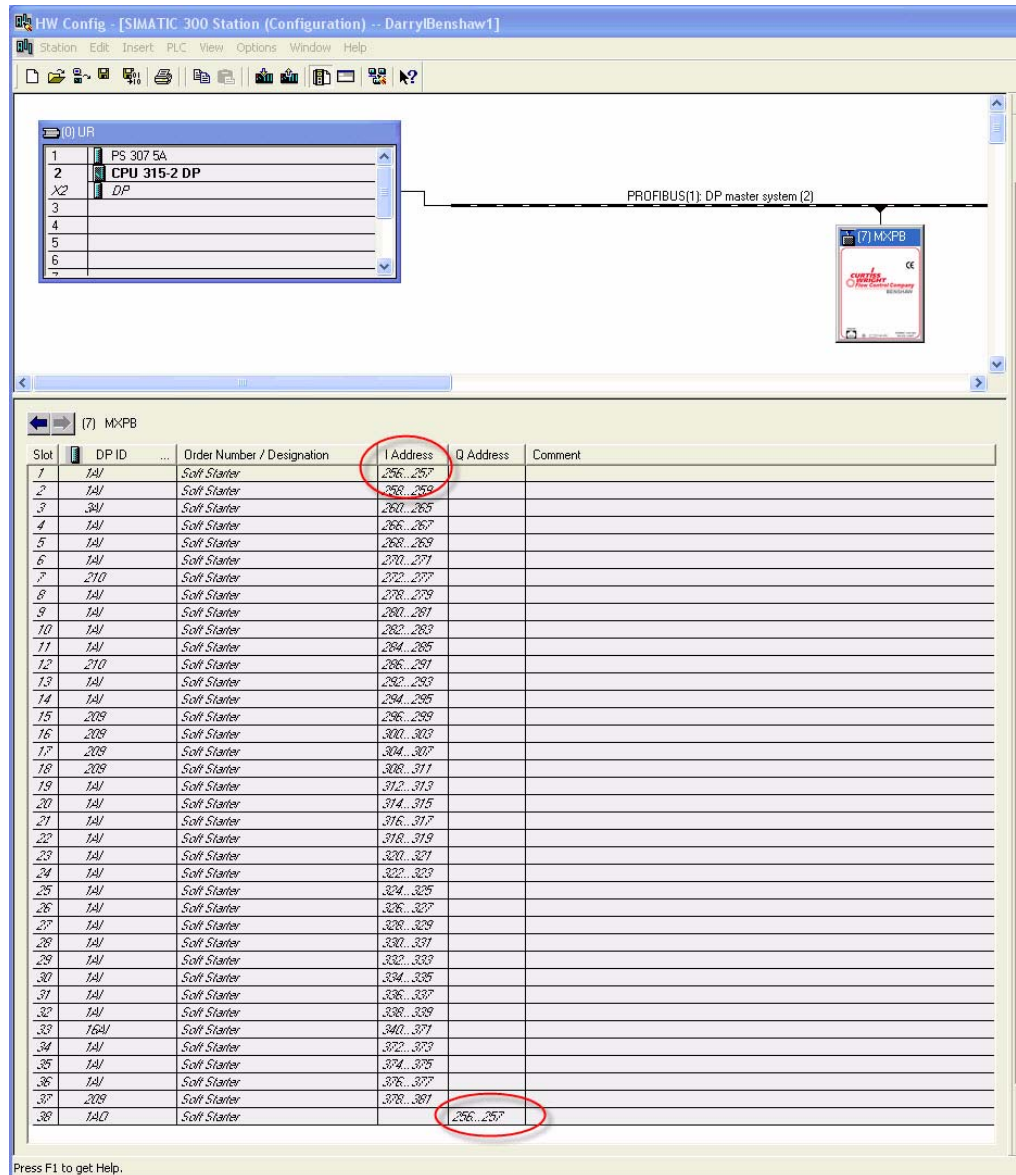
| Address | Symbol        | Display format                     | Status value | Modify value |
|---------|---------------|------------------------------------|--------------|--------------|
| 1       | DB2.DBX 5.0   | "SS_NO_1" STARTER_STATUS_READY     | BOOL true    |              |
| 2       | DB2.DBX 5.1   | "SS_NO_1" STARTER_STATUS_RUNNING   | BOOL true    |              |
| 3       | DB2.DBX 5.2   | "SS_NO_1" STARTER_STATUS_UTS       | BOOL true    |              |
| 4       | DB2.DBX 5.3   | "SS_NO_1" STARTER_STATUS_ALARM     | BOOL false   |              |
| 5       | DB2.DBX 5.4   | "SS_NO_1" STARTER_STATUS_FAULT     | BOOL false   |              |
| 6       | DB2.DBX 5.5   | "SS_NO_1" STARTER_STATUS_LOCKOUT   | BOOL false   |              |
| 7       | DB2.DBX 5.6   | "SS_NO_1" STARTER_STATUS_RES_BIT06 | BOOL false   |              |
| 8       | DB2.DBX 5.7   | "SS_NO_1" STARTER_STATUS_RES_BIT07 | BOOL false   |              |
| 9       | DB2.DBX 6.0   | "SS_NO_1" STARTER_STATUS_RES_BIT08 | BOOL false   |              |
| 10      | DB2.DBX 6.1   | "SS_NO_1" STARTER_STATUS_RES_BIT09 | BOOL false   |              |
| 11      | DB2.DBX 6.2   | "SS_NO_1" STARTER_STATUS_RES_BIT10 | BOOL false   |              |
| 12      | DB2.DBX 6.3   | "SS_NO_1" STARTER_STATUS_RES_BIT11 | BOOL false   |              |
| 13      | DB2.DBX 6.4   | "SS_NO_1" STARTER_STATUS_RES_BIT12 | BOOL false   |              |
| 14      | DB2.DBX 6.5   | "SS_NO_1" STARTER_STATUS_RES_BIT13 | BOOL false   |              |
| 15      | DB2.DBX 6.6   | "SS_NO_1" STARTER_STATUS_RES_BIT14 | BOOL false   |              |
| 16      | DB2.DBX 6.7   | "SS_NO_1" STARTER_STATUS_RES_BIT15 | BOOL false   |              |
| 17      | DB2.DBX 130.0 | "SS_NO_1" RES_CTRL_BIT_0           | BOOL false   |              |
| 18      | DB2.DBX 130.1 | "SS_NO_1" RES_CTRL_BIT_1           | BOOL false   |              |
| 19      | DB2.DBX 130.2 | "SS_NO_1" CTRL_RELAY_6             | BOOL false   |              |
| 20      | DB2.DBX 130.3 | "SS_NO_1" CTRL_RELAY_5             | BOOL false   |              |
| 21      | DB2.DBX 130.4 | "SS_NO_1" CTRL_RELAY_4             | BOOL false   |              |
| 22      | DB2.DBX 130.5 | "SS_NO_1" CTRL_RELAY_3             | BOOL false   |              |
| 23      | DB2.DBX 130.6 | "SS_NO_1" CTRL_RELAY_2             | BOOL false   |              |
| 24      | DB2.DBX 130.7 | "SS_NO_1" CTRL_RELAY_1             | BOOL false   |              |
| 25      | DB2.DBX 131.0 | "SS_NO_1" CTRL_RUN_STOP            | BOOL true    | true         |
| 26      | DB2.DBX 131.1 | "SS_NO_1" CTRL_FAULT_RESET         | BOOL false   |              |
| 27      | DB2.DBX 131.2 | "SS_NO_1" CTRL_EMER_OL_RESET       | BOOL false   |              |
| 28      | DB2.DBX 131.3 | "SS_NO_1" CTRL_LOC_REM             | BOOL false   |              |
| 29      | DB2.DBX 131.4 | "SS_NO_1" CTRL_HEAT_DISABLE        | BOOL false   |              |
| 30      | DB2.DBX 131.5 | "SS_NO_1" CTRL_RAMP_SEL            | BOOL false   |              |
| 31      | DB2.DBX 131.6 | "SS_NO_1" RES_CTRL_BIT_2           | BOOL false   |              |
| 32      | DB2.DBX 131.7 | "SS_NO_1" RES_CTRL_BIT_3           | BOOL false   |              |
| 33      | DB2.DBW 80    | "SS_NO_1" PARAM_STATUS_ARRAY_2[10] | HEX          |              |
| 34      |               |                                    |              |              |

## Example: DP-V1

From the SIMATIC Manager, select the variable VAT\_1.



Select the slot number by referencing the addresses listed in the HW Config for each slot.





# MXPB3 Profibus Communications Module

Note that this example references slot 1 (address 0x100=256 decimal). Index 7 is the Motor Overload Starting Class. Modify Slot, Index, and Length and set Request to FALSE, then press F9. Your selected values should be copied to the "Status Value" column and "Error" should remain FALSE.

The screenshot shows a SIMATIC Manager window titled "Var - [VAT\_1 -- DarrylBenshaw1\SIMATIC 300 Station\CPU 315-2 DP\57 Program]". The main area displays a table with the following data:

| Address | Symbol               | Displa | Status value | Modify value   |
|---------|----------------------|--------|--------------|----------------|
| 1       | /READ                |        |              |                |
| 2       | MW 100               | DEC    | 0            | 0              |
| 3       | M 0.0 "Request"      | BOOL   | false        | false          |
| 4       | M 20.0 "Valid"       | BOOL   |              |                |
| 5       | M 20.1 "Busy"        | BOOL   |              |                |
| 6       | M 20.2 "Error"       | BOOL   |              |                |
| 7       | MD 22 "Status"       | HEX    |              |                |
| 8       | MW 26 "Length"       | DEC    |              |                |
| 9       | MW 10 "Index"        | HEX    |              | VW#16#0001     |
| 10      | MW 12 "MLength"      | HEX    |              | VW#16#0002     |
| 11      | MD 40 "Slot"         | HEX    |              | DW#16#00000100 |
| 12      |                      |        |              |                |
| 13      | /WRITE               |        |              |                |
| 14      | MW 32                | DEC    | 6060         | 6060           |
| 15      | M 1.0 "Write"        | BOOL   | false        | false          |
| 16      | M 20.3 "Write_Done"  | BOOL   |              |                |
| 17      | M 20.4 "Write_Busy"  | BOOL   |              |                |
| 18      | M 20.5 "Write_Error" | BOOL   |              |                |
| 19      | MD 36 "Write_Stats"  | HEX    |              |                |
| 20      | MW 14 "Write_Index"  | HEX    |              | VW#16#0001     |
| 21      | MW 16 "Write_Length" | HEX    |              | VW#16#0002     |
| 22      | MD 44 "Write Slot"   | HEX    |              | DW#16#00000100 |
| 23      |                      |        |              |                |

At the bottom of the window, it says "Press F1 for help." and "Offline Abs < 5.2".

Now change the Read request to TRUE, then press ENTER, then F9 to activate. The read-data result should be displayed on Line 2.

The screenshot shows the same SIMATIC Manager window, but now titled "Var - [VAT\_1 -- @DarrylBenshaw1\SIMATIC 300 Station\CPU 315-2 DP\57 Program ONLINE]". The table data is updated as follows:

| Address | Symbol               | Displa | Status value   | Modify value   |
|---------|----------------------|--------|----------------|----------------|
| 1       | /READ                |        |                |                |
| 2       | MW 100               | DEC    | 10             | 0              |
| 3       | M 0.0 "Request"      | BOOL   | true           | true           |
| 4       | M 20.0 "Valid"       | BOOL   | false          |                |
| 5       | M 20.1 "Busy"        | BOOL   | false          |                |
| 6       | M 20.2 "Error"       | BOOL   | false          |                |
| 7       | MD 22 "Status"       | HEX    | DW#16#00700000 |                |
| 8       | MW 26 "Length"       | DEC    | 0              |                |
| 9       | MW 10 "Index"        | HEX    | VW#16#0007     | VW#16#0007     |
| 10      | MW 12 "MLength"      | HEX    | VW#16#0002     | VW#16#0002     |
| 11      | MD 40 "Slot"         | HEX    | DW#16#00000100 | DW#16#00000100 |
| 12      |                      |        |                |                |
| 13      | /WRITE               |        |                |                |
| 14      | MW 32                | DEC    | 6060           | 6060           |
| 15      | M 1.0 "Write"        | BOOL   | false          | false          |
| 16      | M 20.3 "Write_Done"  | BOOL   | false          |                |
| 17      | M 20.4 "Write_Busy"  | BOOL   | false          |                |
| 18      | M 20.5 "Write_Error" | BOOL   | false          |                |
| 19      | MD 36 "Write_Stats"  | HEX    | DW#16#00700000 |                |
| 20      | MW 14 "Write_Index"  | HEX    | VW#16#0001     | VW#16#0001     |
| 21      | MW 16 "Write_Length" | HEX    | VW#16#0002     | VW#16#0002     |
| 22      | MD 44 "Write Slot"   | HEX    | DW#16#00000100 | DW#16#00000100 |
| 23      |                      |        |                |                |

At the bottom of the window, it says "DarrylBenshaw1\SIMATIC 300 Station\...|57 Program" and "RUN Abs < 5.2".



## 4 - Installing the Benshaw GSD File

Similarly for write, ensure that "Write" is false, then enter the write data, with slot, index and length as before, then press F9.

The screenshot shows the SIMATIC Manager interface with a variable table. The table has columns for Address, Symbol, Display, Status value, and Modify value. The 'Write' variable at address M 1.0 is highlighted with a black border.

| Address | Symbol  | Display        | Status value       | Modify value   |
|---------|---------|----------------|--------------------|----------------|
| 1       | //READ  |                |                    |                |
| 2       | MW 100  | DEC            | 0                  | 0              |
| 3       | M 0.0   | "Request"      | BOOL false         | false          |
| 4       | M 20.0  | "Valid"        | BOOL false         |                |
| 5       | M 20.1  | "Busy"         | BOOL false         |                |
| 6       | M 20.2  | "Error"        | BOOL false         |                |
| 7       | MD 22   | "Status"       | HEX DW#16#00700000 |                |
| 8       | MW 26   | "Length"       | DEC 0              |                |
| 9       | MW 10   | "Index"        | HEX V#16#0007      | V#16#0007      |
| 10      | MW 12   | "MLength"      | HEX V#16#0002      | V#16#0002      |
| 11      | MD 40   | "Slot"         | HEX DW#16#00000100 | DW#16#00000100 |
| 12      |         |                |                    |                |
| 13      | //WRITE |                |                    |                |
| 14      | MW 32   | DEC            | 6060               | 6060           |
| 15      | M 1.0   | "Write"        | BOOL false         | false          |
| 16      | M 20.3  | "Write_Done"   | BOOL false         |                |
| 17      | M 20.4  | "Write_Busy"   | BOOL false         |                |
| 18      | M 20.5  | "Write_Error"  | BOOL false         |                |
| 19      | MD 36   | "Write_Stats"  | HEX DW#16#00700000 |                |
| 20      | MW 14   | "Write_Index"  | HEX V#16#0001      | V#16#0001      |
| 21      | MW 16   | "Write_Length" | HEX V#16#0002      | V#16#0002      |
| 22      | MD 44   | "Write Slot"   | HEX DW#16#00000100 | DW#16#00000100 |
| 23      |         |                |                    |                |



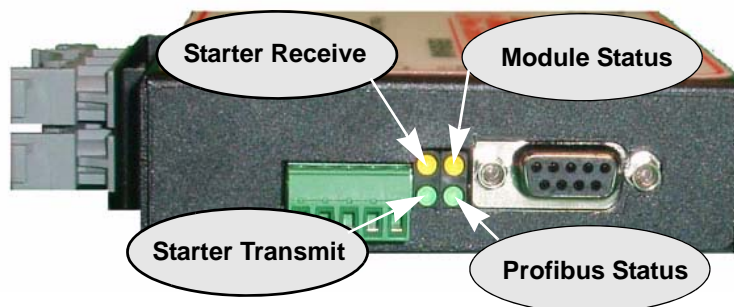
# 5 - Troubleshooting

## Communications Troubleshooting

**Table 14: Communications Troubleshooting**

| Condition                          | Possible Cause                                     | Possible Solutions   |
|------------------------------------|--|--|
| Unable to Communicate with Starter | Loose connection or damaged cable                  | Check all communication and power cables for loose connections or damage. Replace or correct.  |
|                                    | No power to device                                 | Device not getting power: Check Power LED and correct for absence of proper voltage.   |
|                                    | No Profibus-DP or Serial communication established | Check cables. Verify state of Profibus Master. Verify presence of control power to MXPB3 and Soft Starter.   |
|                                    | No Communication with Starter                      | Check Rx/Tx LEDs on MX <sup>2</sup> or MX <sup>3</sup> Card. LEDs should be blinking if communication is established between the starter and the MXPB3. Verify that the starter has control power. Verify that the starter has been configured for serial connections. |
| Unable to Access Web-Page Setup    | Incorrect IP Address                               | Verify correct IP Address  |

### Status LEDs



Starter Transmit LED (Green): Illuminated when messages are being transmitted to the Soft Starter.

Starter Receive LED (Yellow): illuminated when response data is being received from the Soft Starter.

Profibus LED (Green): Illuminated during data exchange, and flashing during parameterization. This LED is driven directly by the Profibus chip.

Module Status LED (Yellow): Flashing at 1 Hz when the Modbus is communication, and the Profibus is in Data Exchange.



Status LED 1:

- Flashes Red during Profibus parameterization
- Alternates Red-Green during Profibus configuration
- Is illuminated Green during Profibus data exchange.

Status LED 2:

- Flashes Red when the Modbus RTU is *not* communicating with the Soft Starter
- Is illuminated Green when the Modbus RTU is communicating with the Soft Starter.

### ***Advanced PROFIBUS-DP Troubleshooting***

#### **Network Voltage Requirements (V+ to V-)**

Verify that the MXPB3 device has been provided the proper voltage, and that the power indicator is illuminated.

#### **Network Health**

A good indicator of the health of the PROFIBUS-DP network is the number of “retries”. Ideally, this number should be zero.

The physical layer is the most common source of network problems. There are two approaches to testing the physical layer, with best practices utilizing both.

1. Utilize a variety of diagnostic devices designed to verify the physical layer.
2. Use an oscilloscope. Although the oscilloscope lacks the more modern analytical approach to diagnostics, it can provide the experienced user with a great deal of valuable information.

#### **Test for Termination Resistors**

Verify that the first and last node of the PROFIBUS-DP network connectors have the resistors set to the ON position.

#### **Diagnostic References**

[Catching the Process Fieldbus - An Introduction to PROFIBUS for Process Automation](#)

*By James Powell, P. Eng. and Henry Vandelinde, PhD.*

[The New Rapid Way to PROFIBUS DP From DP-V0 to DP-V2](#)

*By Manfred Popp*



# Appendix A - Modbus Registers

**Starter Status and Control Common to the MX<sup>2</sup> and MX<sup>3</sup>**

The following set of registers contains status and control information that exists in both the MX<sup>2</sup> and MX<sup>3</sup>. All of these registers are read-only, with the exception of the Starter Control register.

**Table 15: Modbus Registers - Starter Status & Control**

| Absolute Register Address | Description     | Range   | Units |
|---------------------------|-----------------|---|-------|
| 30020/40020               | Starter Control | Bit Mask:<br>Bit 0: Run/Stop<br>Bit 1: Fault Reset<br>Bit 2: Emergency Overload Reset<br>Bit 3: Local/Remote<br>Bit 4: Heat Disable<br>Bit 5: Ramp Select<br>Bit 10: Relay 6 ( <i>MX<sup>3</sup> only</i> )<br>Bit 11: Relay 5 ( <i>MX<sup>3</sup> only</i> )<br>Bit 12: Relay 4 ( <i>MX<sup>3</sup> only</i> )<br>Bit 13: Relay 3<br>Bit 14: Relay 2<br>Bit 15: Relay 1  | -     |
| 30021/40021               | Starter Status  | Bit Mask:<br>Bit 0: Ready<br>Bit 1: Running<br>Bit 2: UTS<br>Bit 3: Alarm<br>Bit 4: Fault<br>Bit 5: Lockout   | -     |
| 30022/40022               | Input Status    | Bit Mask:<br>Bit 0: Start<br>Bit 1: DI 1<br>Bit 2: DI 2<br>Bit 3: DI 3<br>Bit 4: DI 4 ( <i>MX<sup>3</sup> only</i> )<br>Bit 5: DI 5 ( <i>MX<sup>3</sup> only</i> )<br>Bit 6: DI 6 ( <i>MX<sup>3</sup> only</i> )<br>Bit 7: DI 7 ( <i>MX<sup>3</sup> only</i> )<br>Bit 8: DI 8 ( <i>MX<sup>3</sup> only</i> )  | -     |
| 30023/40023               | Alarm Status 1  | Bit Mask:<br>Bit 0: "A OL" - Motor Overload<br>Bit 1: "A 5" - Motor PTC ( <i>MX<sup>3</sup> only</i> )<br>Bit 2: "A 6" - RTD Stator ( <i>MX<sup>3</sup> only</i> )<br>Bit 3: "A 7" - RTD Bearing ( <i>MX<sup>3</sup> only</i> )<br>Bit 4: "A 8" - RTD Other ( <i>MX<sup>3</sup> only</i> )<br>Bit 5: "A 10" - Phase Rotation not ABC<br>Bit 6: "A 11" - Phase Rotation not CBA<br>Bit 7: "A 12" - Low Line Frequency<br>Bit 8: "A 13" - High Line Frequency<br>Bit 9: "A 14" - Phase Rotation not 1PH<br>Bit 10: "A 15" - Phase Rotation not 3PH<br>Bit 11: "A 21" - Low Line L1 L2<br>Bit 12: "A 22" - Low Line L2 L3<br>Bit 13: "A 23" - Low Line L3 L1<br>Bit 14: "A 24" - High Line L1 L2<br>Bit 15: "A 25" - High Line L2 L3 | -     |

## Table 15: Modbus Registers - Starter Status & Control (Continued)

| Absolute Register Address | Description   | Range  | Units      |
|---------------------------|---|--|------------|
| 30024/40024               | Alarm Status 2  | Bit Mask:<br>Bit 0: "A 26" - High Line L3-L1<br>Bit 1: "A 27" - Phase Loss<br>Bit 2: "noL" - No Line<br>Bit 3: "A 29" - PORT Timeout ( <i>MX<sup>3</sup> only</i> )<br>Bit 4: "A 31" - Overcurrent<br>Bit 5: "A 34" - Undercurrent<br>Bit 6: "A 35" - PF Too Leading ( <i>MX<sup>3</sup> only</i> )<br>Bit 7: "A 36" - PF Too Lagging ( <i>MX<sup>3</sup> only</i> )<br>Bit 8: "A 37" - Current Imbalance<br>Bit 9: "A 38" - Ground Fault<br>Bit 10: "A 47" - Stack Overtemperature<br>Bit 11: "A 53" - Tach Loss ( <i>MX<sup>3</sup> only</i> )<br>Bit 12: "A 60" - DI 1<br>Bit 13: "A 61" - DI 2<br>Bit 14: "A 62" - DI 3<br>Bit 15: "A 63" - DI 4 ( <i>MX<sup>3</sup> only</i> )  | -          |
| 30025/40025               | Alarm Status 3  | Bit Mask:<br>Bit 0: "A 64" - DI 5 ( <i>MX<sup>3</sup> only</i> )<br>Bit 1: "A 65" - DI 6 ( <i>MX<sup>3</sup> only</i> )<br>Bit 2: "A 66" - DI 7 ( <i>MX<sup>3</sup> only</i> )<br>Bit 3: "A 67" - DI 8 ( <i>MX<sup>3</sup> only</i> )<br>Bit 4: "A 71" - Analog Input Trip   | -          |
| 30026/40026               | Lockout Status  | Bit Mask:<br>Bit 0: "L OL" - Motor Overload<br>Bit 1: "LPtc" - Motor PTC ( <i>MX<sup>3</sup> only</i> )<br>Bit 2: "Lrtd" - RTD Stator ( <i>MX<sup>3</sup> only</i> )<br>Bit 3: "Lrtd" - RTD Bearing ( <i>MX<sup>3</sup> only</i> )<br>Bit 4: "Lrtd" - RTD Other ( <i>MX<sup>3</sup> only</i> )<br>Bit 5: "L rl" - Run Interlock<br>Bit 6: "L dS" - Disconnect Open<br>Bit 7: "L Ot" - Stack Overtemperature<br>Bit 8: "L CP" - Control Power<br>Bit 9: "Lrtd" - RTD Open/Short ( <i>MX<sup>3</sup> only</i> )<br>Bit 10: "LtbS" - Time Between Starts ( <i>MX<sup>3</sup> only</i> )<br>Bit 11: "L bS" - Backspin ( <i>MX<sup>3</sup> only</i> )<br>Bit 12: "LSph" - Starts per Hour ( <i>MX<sup>3</sup> only</i> )<br>Bit 13: "Lrtd" - RTD Comm Loss ( <i>MX<sup>3</sup> only</i> ) |            |
| 30027/40027               | Present Fault Code  |  |            |
| 30028/40028               | Average Current   |  | Arms       |
| 30029/40029               | L1 Current  |  | Arms       |
| 30030/40030               | L2 Current  |  | Arms       |
| 30031/40031               | L3 Current  |  | Arms       |
| 30032/40032               | Current Imbalance   |  | 0.1%       |
| 30033/40033               | Residual Ground Fault Current                                     |  | % FLA      |
| 30034/40034               | Zero Sequence Ground Fault Current ( <i>MX<sup>3</sup> only</i> ) |  | 0.001 Arms |
| 30035/40035               | Average Voltage   |  | Vrms       |
| 30036/40036               | L1-L2 Voltage   |  | Vrms       |
| 30037/40037               | L2-L3 Voltage   |  | Vrms       |
| 30038/40038               | L3-L1 Voltage   |  | Vrms       |
| 30039/40039               | Motor Overload  |  | 0.01       |



**Table 15: Modbus Registers - Starter Status & Control (Continued)**

| Absolute Register Address | Description              | Range  | Units   |
|---------------------------|--------------------------|--|---------|
| 30040/40040               | Power Factor             | -99 - +100<br>(in 16-bit two's compliment signed format)   | 0.01    |
| 30041/40041               | Watts (lower 16 bits)    | (in 32-bit unsigned integer format)                        | W       |
| 30042/40042               | Watts (upper 16 bits)    |  |         |
| 30043/40043               | VA (lower 16 bits)       | (in 32-bit unsigned integer format)                        | VA      |
| 30044/40044               | VA (upper 16 bits)       |  |         |
| 30045/40045               | vars (lower 16 bits)     | (in 32-bit two's compliment signed integer format)         | var     |
| 30046/40046               | vars (upper 16 bits)     |  |         |
| 30047/40047               | kW hours (lower 16 bits) | (in 32-bit unsigned integer format)                        | kWh     |
| 30048/40048               | kW hours (upper 16 bits) |  |         |
| 30049/40049               | Phase Order              | 0: no line<br>1: ABC<br>2: CBA<br>3: SPH                   | -       |
| 30050/40050               | Line Frequency           | 230 - 720, or 0 if no line                                 | 0.1 Hz  |
| 30051/40051               | Analog Input %           | 1000 - +1000<br>(in 16-bit two's compliment signed format) | 0.1%    |
| 30052/40052               | Analog Output %          |  | 0.1%    |
| 30053/40053               | Running Time             | 0 - 1000   | hours   |
| 30054/40054               | Running Time             | 0 - 65535  | minutes |
| 30055/40055               | Starts                   | 0 - 59   | -       |
| 30056/40056               | TruTorque %              |  | %       |
| 30057/40057               | Power %                  |  | %       |
| 30058/40058               | Peak Starting Current    |  | Arms    |
| 30059/40059               | Last Starting Duration   |  | 0.1 Sec |

**Table 16: Starter Control Register**

|                                  |   |
|----------------------------------|---|
| Bit 0 - Run/Stop                 | 0 - Stop<br>1 - Run                           |
| Bit 1 - Fault Reset              | 0 - No action<br>1 - Fault Reset              |
| Bit 2 - Emergency Overload Reset | 0 - No Action<br>1 - Emergency Overload Reset |
| Bit 3 - Local/Remote             | 0 - Local<br>1 - Remote                       |
| Bit 4 - Heat Disable             | 0 - Heat Enabled<br>1 - Heat Disabled         |
| Bit 5 - Ramp Select              | 0 - Ramp 1<br>1 - Ramp 2                      |

**Table 16: Starter Control Register (Continued)**

|                  |                                 |
|------------------|---------------------------------|
| Bit 10 - Relay 6 | 0 - De-energize<br>1 - Energize |
| Bit 11 - Relay 5 |                                 |
| Bit 12 - Relay 4 |                                 |
| Bit 13 - Relay 3 |                                 |
| Bit 14 - Relay 2 |                                 |
| Bit 15 - Relay 1 |                                 |

**Starter Status and Control Unique to the MX<sup>3</sup>**

The following set of registers contains status and control information that exists only in the MX<sup>3</sup>. All of these registers are read-only with the exception of the Date and Time registers.

**Table 17: Starter Status and Control (Unique to the MX<sup>3</sup>)**

| Absolute Register Address | Description                     | Range  | Units |
|---------------------------|---------------------------------|--|-------|
| 30060/40060               | Hottest Stator RTD Temperature  | 0 - 200  | °C    |
| 30061/40061               | Hottest Bearing RTD Temperature | 0 - 200  | °C    |
| 30062/40062               | Hottest Other RTD Temperature   | 0 - 200  | °C    |
| 30063/40063               | RTD 1 Temperature               | 0 - 200  | °C    |
| 30064/40064               | RTD 2 Temperature               | 0 - 200  | °C    |
| 30065/40065               | RTD 3 Temperature               | 0 - 200  | °C    |
| 30066/40066               | RTD 4 Temperature               | 0 - 200  | °C    |
| 30067/40067               | RTD 5 Temperature               | 0 - 200  | °C    |
| 30068/40068               | RTD 6 Temperature               | 0 - 200  | °C    |
| 30069/40069               | RTD 7 Temperature               | 0 - 200  | °C    |
| 30070/40070               | RTD 8 Temperature               | 0 - 200  | °C    |
| 30071/40071               | RTD 9 Temperature               | 0 - 200  | °C    |
| 30072/40072               | RTD 10 Temperature              | 0 - 200  | °C    |
| 30073/40073               | RTD 11 Temperature              | 0 - 200  | °C    |
| 30074/40074               | RTD 12 Temperature              | 0 - 200  | °C    |
| 30075/40075               | RTD 13 Temperature              | 0 - 200  | °C    |
| 30076/40076               | RTD 14 Temperature              | 0 - 200  | °C    |
| 30077/40077               | RTD 15 Temperature              | 0 - 200  | °C    |
| 30078/40078               | RTD 16 Temperature              | 0 - 200  | °C    |
| 30079/40079               | RTDs Enabled                    | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD is enabled. Bit 0 represents RTD 1. Bit 15 represents RTD 16. | -     |
| 30080/40080               | RTDs Assigned as Stator         | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD is assigned to the Stator group.                              | -     |

**Table 17: Starter Status and Control (Unique to the MX<sup>3</sup>) (Continued)**

| Absolute Register Address | Description               | Range  | Units |
|---------------------------|---------------------------|--|-------|
| 30081/40081               | RTDs Assigned as Bearing  | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD is assigned to the Bearing Group. | -     |
| 30082/40082               | RTDs Assigned as Other    | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD is assigned to the Other group.   | -     |
| 30083/40083               | RTDs with Open Leads      | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD has an open lead.                 | -     |
| 30084/40084               | RTDs with Shorted Leads   | Bit Mask:<br>Each of the sixteen bits represents an RTD. A 1 indicates the RTD has a shorted lead.               | -     |
| 30085/40085               | Remaining Lockout Time    |  | Sec   |
| 30086/40086               | Date/Time (lower 16 bits) | (in unsigned integer format)   | Sec   |
| 30087/40087               | Date/Time (upper 16 bits) |  |       |

**Date/Time Registers** Date and Time are expressed as the number of seconds elapsed since 12:00 AM on January 1st, 1972 in an unsigned 32 bit number.

**Parameters Common to the MX<sup>2</sup> and MX<sup>3</sup>** The following set of registers contains parameters that exist both in the MX<sup>2</sup> and the MX<sup>3</sup>, some of which may have differing ranges between the systems.

All parameter registers are both readable and writable. Certain parameters may not be written to while the starter is running.

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup>**

| Absolute Register Address | Description                           | Range                     | Units |
|---------------------------|---------------------------------------|---------------------------|-------|
| 30101/40101               | Motor FLA                             | 1 - 6400                  | Arms  |
| 30102/40102               | Motor Service Factor                  | 100 - 199                 | 0.01  |
| 30103/40103               | Independent Start/Run Motor Overloads | 0: Disabled<br>1: Enabled | -     |
| 30104/40104               | Motor Overload Running Enable         | 0: Disabled<br>1: Enabled | -     |
| 30105/40105               | Motor Overload Running Class          | 1 - 40                    | -     |
| 30106/40106               | Motor Overload Starting Enable        | 0: Disabled<br>1: Enabled | -     |
| 30107/40107               | Motor Overload Starting Class         | 1 - 40                    | -     |
| 30108/40108               | Motor Overload Hot/Cold Ratio         | 0 - 99                    | %     |

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Absolute Register Address | Description                 | Range   | Units    |
|---------------------------|-----------------------------|---|----------|
| 30109/40109               | Motor Overload Cooling Time | 10 - 9999   | 0.1 min  |
| 30110/40110               | Local Source                | 0: Keypad<br>1: Terminal  | -        |
| 30111/40111               | Remote Source               | 2: Serial   | -        |
| 30112/40112               | Start Mode                  | 0: Open Loop Voltage Ramp<br>1: Closed Loop Current Ramp<br>2: TruTorque Ramp<br>3: Power Ramp<br>4: Tach Ramp ( <i>MX<sup>3</sup> only</i> ) | -        |
| 30113/40113               | Initial Motor Current 1     | 50 - 600  | % FLA    |
| 30114/40114               | Maximum Motor Current 1     | 100 - 800   | % FLA    |
| 30115/40115               | Ramp Time 1                 | 0 - 300   | Sec      |
| 30116/40116               | Initial Motor Current 2     | 50 - 600  | % FLA    |
| 30117/40117               | Maximum Motor Current 2     | 100 - 800   | % FLA    |
| 30118/40118               | Ramp Time 2                 | 0 - 300   | Sec      |
| 30119/40119               | UTS Time                    | 1 - 900   | Sec      |
| 30120/40120               | Initial V/T/P               | 1 - 100   | %        |
| 30121/40121               | Max T/P                     | 10 - 325  | %        |
| 30122/40122               | Stop Mode                   | 0: Coast<br>1: Voltage Decel<br>2: TruTorque Decel<br>3: DC Brake   | -        |
| 30123/40123               | Decel Begin Level           | 100 - 1   | %        |
| 30124/40124               | Decel End Level             | 99 - 1  | %        |
| 30125/40125               | Decel Time                  | 1 - 180   | Sec      |
| 30126/40126               | DC Brake Level              | 10 - 100  | %        |
| 30127/40127               | DC Brake Time               | 1 - 180   | Sec      |
| 30128/40128               | DC Brake Delay              | 1 - 30  | 100 mSec |
| 30129/40129               | Kick Enable 1               | 0: Disabled<br>1: Enabled   | -        |
| 30130/40130               | Kick Current Level 1        | 100 - 800   | % FLA    |
| 30131/40131               | Kick Time 1                 | 1 - 100   | 100 mSec |
| 30132/40132               | Kick Enable 2               | 0: Disabled<br>1: Enabled   | -        |
| 30133/40133               | Kick Current Level 2        | 100 - 800   | %FLA     |
| 30134/40134               | Kick Time 2                 | 1-100   | 100 mSec |
| 30135/40105               | Slow Speed Enable 1         | 0: Disabled<br>1: Enabled   | -        |

Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Absolute Register Address | Description                  | Range                     |  | Units    |
|---------------------------|------------------------------|---------------------------|--|----------|
|                           |                              | MX <sup>2</sup>           | MX <sup>3</sup>  |          |
| 30136/40136               | Slow Speed 1                 | 0: 7.1<br>1: 14.3         | 0: 1.0<br>1: 1.5<br>2: 1.6<br>3: 1.7<br>4: 1.9<br>5: 2.0<br>6: 2.5<br>7: 2.6<br>8: 2.8<br>9: 2.9<br>10: 3.1<br>11: 3.3<br>12: 3.5<br>13: 3.8<br>14: 4.2<br>15: 4.5<br>16: 5.0<br>17: 5.5<br>18: 6.2<br>19: 7.1<br>20: 8.3<br>21: 9.1<br>22: 10.0<br>23: 11.1<br>24: 12.5<br>25: 14.3<br>26: 16.7<br>27: 20.0<br>28: 25.0<br>29: 33.3<br>30: 37.5<br>31: 40.0 | %        |
|                           |                              |                           |  |          |
| 30137/40137               | Slow Speed Current Level 1   | 10 - 400                  |  | % FLA    |
| 30138/40138               | Slow Speed Time Limit Enable | 0: Disabled<br>1: Enabled |  | -        |
| 30139/40139               | Slow Speed Time Limit        | 1 - 900                   |  | Sec      |
| 30140/40140               | Slow Speed Kick Enable       | 0: Disabled<br>1: Enabled |  | -        |
| 30141/40141               | Slow Speed Kick Level        | 100 - 800                 |  | % FLA    |
| 30142/40142               | Slow Speed Kick Time         | 1 - 100                   |  | 100 mSec |

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Absolute Register Address | Description                         | Range  | Units    |
|---------------------------|-------------------------------------|--|----------|
| 30143/40143               | Rated RMS Voltage                   | 0: 100<br>1: 110<br>2: 120<br>3: 200<br>4: 208<br>5: 220<br>6: 230<br>7: 240<br>8: 350<br>9: 380<br>10: 400<br>11: 415<br>12: 440<br>13: 460<br>14: 480<br>15: 500<br>16: 525<br>17: 575<br>18: 600<br>19: 660<br>20: 690<br>21: 800<br>22: 1000<br>23: 1140<br>24: 2200 (MX <sup>3</sup> only)<br>25: 2300 (MX <sup>3</sup> only)<br>26: 2400 (MX <sup>3</sup> only)<br>27: 3300 (MX <sup>3</sup> only)<br>28: 4160 (MX <sup>3</sup> only)<br>29: 4600 (MX <sup>3</sup> only)<br>30: 4800 (MX <sup>3</sup> only)<br>31: 6000 (MX <sup>3</sup> only)<br>32: 6600 (MX <sup>3</sup> only)<br>33: 6900 (MX <sup>3</sup> only)<br>34: 10000 (MX <sup>3</sup> only)<br>35: 11000 (MX <sup>3</sup> only)<br>36: 11500 (MX <sup>3</sup> only)<br>37: 12000 (MX <sup>3</sup> only)<br>38: 12470 (MX <sup>3</sup> only)<br>39: 13200 (MX <sup>3</sup> only)<br>40: 13800 (MX <sup>3</sup> only) | Vrms     |
| 30144/40144               | Input Phase Sensitivity             | 0: Ins<br>1: ABC<br>2: CBA<br>3: SPH   | -        |
| 30145/40145               | Motor Rated Power Factor            | 1 - 100  | -        |
| 30146/40146               | Overcurrent Enable                  | 0: Disabled<br>1: Enabled  | -        |
| 30147/40147               | Overcurrent Level                   | 50 - 800   | -        |
| 30148/40148               | Overcurrent Delay Time Enable       | 0: Disabled<br>1: Enabled  | -        |
| 30149/40149               | Overcurrent Delay Time              | 1 - 900  | 100 mSec |
| 30150/40150               | Undercurrent Trip Enable            | 0: Disabled<br>1: Enabled  | -        |
| 30151/40151               | Undercurrent Trip Level             | 5 - 100  | % FLA    |
| 30152/40152               | Undercurrent Trip Delay Time Enable | 0: Disabled<br>1: Enabled  | -        |

Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Absolute Register Address | Description                       | Range   | Units    |
|---------------------------|-----------------------------------|---|----------|
| 30153/40153               | Undercurrent Trip Delay Time      | 1 - 900   | 100 mSec |
| 30154/40154               | Current Imbalance Trip Enable     | 0: Disabled<br>1: Enabled   | -        |
| 30155/40155               | Current Imbalance Trip Level      | 5 - 100   | % FLA    |
| 30156/40156               | Residual Ground Fault Trip Enable | 0: Disabled<br>1: Enabled   | -        |
| 30157/40157               | Residual Ground Fault Trip Level  | 5 - 100   | % FLA    |
| 30158/40158               | Over Voltage Trip Enable          | 0: Disabled<br>1: Enabled   | -        |
| 30159/40159               | Over Voltage Trip Level           | 1 - 40  | %        |
| 30160/40160               | Under Voltage Trip Enable         | 0: Disabled<br>1: Enabled   | -        |
| 30161/40161               | Under Voltage Trip Level          | 1 - 40  | %        |
| 30162/40162               | Over/Under Voltage Delay Time     | 1 - 900   | 100 mSec |
| 30163/40163               | Digital Input Trip Delay Time     | 1 - 900   | 100 mSec |
| 30164/40164               | Auto Fault Reset Enable           | 0: Disabled<br>1: Enabled   | -        |
| 30165/40165               | Auto Fault Reset Delay Time       | 1 - 900   | Sec      |
| 30166/40166               | Auto Fault Reset Count Enable     | 0: Disabled<br>1: Enabled   | -        |
| 30167/40167               | Auto Fault Reset Count            | 1 - 10  | -        |
| 30168/40168               | Controlled Fault Stop             | 0: Disabled<br>1: Enabled   | -        |
| 30169/40169               | DI 1 Configuration                | 0: Off<br>1: Stop<br>2: Fault High<br>3: Fault Low<br>4: Fault Reset<br>5: Disconnect<br>6: Inline Feedback (F29)<br>7: Bypass / 2M Feedback (F48)<br>8: Emergency Motor OL Reset<br>9: Local / Remote Control Source<br>10: Heat Disable<br>11: Heat Enable<br>12: Ramp Select<br>13: Slow Speed Forward<br>14: Slow Speed Reverse<br>15: DC Brake Disable<br>16: DC Brake Enable<br>17: Run Enable<br>18: Run Disable<br>19: Speed Switch Normally Open (MX <sup>3</sup> only)<br>20: Speed Switch Normally Closed (MX <sup>3</sup> only) | -        |
| 30170/40170               | DI 2 Configuration                |   |          |
| 30171/40171               | DI 3 Configuration                |   |          |
|                           |                                   |   |          |

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Absolute Register Address | Description                  | Range  | Units    |
|---------------------------|------------------------------|--|----------|
| 30172/40172               | R1 Configuration             | 0: Off<br>1: Fault Fail Safe<br>2: Fault Non Fail Safe<br>3: Running<br>4: Up To Speed<br>5: Alarm<br>6: Ready<br>7: Locked Out<br>8: Over Current Alarm<br>9: Under Current Alarm<br>10: Overload Alarm<br>11: Shunt Trip Fail Safe<br>12: Shunt Trip Non Fail Safe<br>13: Faulted on Ground Fault<br>14: In Energy Saver Mode<br>15: Heating<br>16: Slow Speed<br>17: Slow Speed Forward<br>18: Slow Speed Reverse<br>19: DC Braking<br>20: Cooling Fan<br>21: PORT ( <i>MX<sup>3</sup> only</i> )<br>22: Tach Loss ( <i>MX<sup>3</sup> only</i> ) | -        |
| 30173/40173               | R2 Configuration             |  |          |
| 30174/40174               | R3 Configuration             |  |          |
| 30175/40175               | Analog Input Trip Enable     | 0: Disabled<br>1: Enabled  | -        |
| 30176/40176               | Analog Input Trip Type       | 0: Low - Fault below preset level<br>1: High - Fault above preset level  | -        |
| 30177/40177               | Analog Input Trip Level      | 0 - 100  | %        |
| 30178/40178               | Analog Input Trip Delay Time | 1 - 900  | 100 mSec |
| 30179/40179               | Analog Input Span            | 1 - 100  | %        |
| 30180/40180               | Analog Input Offset          | 0 - 99   | %        |
| 30181/40181               | Analog Output Function       | 0: Off (no output)<br>1: 0 - 100% Current<br>2: 0 - 200% Current<br>3: 0 - 800% Current<br>4: 0 - 150% Voltage<br>5: 0 - 150% Overload<br>6: 0 - 10kW<br>7: 0 - 100kW<br>8: 0 - 1MW<br>9: 0 - 10MW<br>10: 1 - 100% Analog Input<br>11: 0 - 100% Firing<br>12: Calibration (full output)  | -        |
| 30182/40182               | Analog Output Span           | 1 - 125  | %        |
| 30183/40183               | Analog Output Offset         | 0 - 99   | %        |
| 30184/40184               | Inline Enable                | 0: Disabled<br>1: Enabled  | -        |
| 30185/40185               | Inline Delay Time            | 10 - 100   | 100 mSec |
| 30186/40186               | Bypass Feedback Time         | 1 - 50   | 100 mSec |
| 30187/40187               | Keypad Stop                  | 0: Disabled<br>1: Enabled  | -        |



Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)

| Absolute Register Address | Description                   | Range  | Units |
|---------------------------|-------------------------------|--|-------|
| 30188/40188               | Modbus Timeout Enable         | 0: Disabled<br>1: Enabled  | -     |
| 30189/40189               | Modbus Timeout                | 1 - 120  | Sec   |
| 30190/40190               | CT Ratio                      | 0: 72:1<br>1: 96:1<br>2: 144:1<br>3: 288:1<br>4: 864:1<br>5: 2640:1<br>6: 3900:1<br>7: 5760:1<br>8: 8000:1<br>9: 14400:1<br>10: 28800:1<br>11: 50:5<br>12: 150:5<br>13: 250:5<br>14: 400:5<br>15: 600:5<br>16: 800:5<br>17: 2000:5<br>18: 5000:5 | -     |
| 30191/40191               | Auto Start                    | 0: Disabled<br>1: Start after power applied<br>2: Start after fault reset<br>3: Start after power applied and fault reset  | -     |
| 30192/40192               | Energy Saver Enable           | 0: Disabled<br>1: Enabled  | -     |
| 30193/40193               | Heater / Anti-Windmill Enable | 0: Disabled<br>1: Enabled  | -     |
| 30194/40194               | Heater / Anti-Windmill Level  | 1 - 40   | % FLA |
| 30195/40195               | Starter Type                  | 0: Normal (Outside Delta)<br>1: Inside Delta<br>2: Wye-Delta<br>3: Phase Controller<br>4: Current Follower<br>5: Across the Line (Full Voltage)  | -     |

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Absolute Register Address | Description         | Range  | Units |
|---------------------------|---------------------|--|-------|
| 30196/40196               | LED Display Meter   | 0: Status<br>1: Avg Current<br>2: L1 Current<br>3: L2 Current<br>4: L3 Current<br>5: Current Imbalance %<br>6: Residual Ground Current<br>7: Avg Volts<br>8: L1-L2 Volts<br>9: L2-L3 Volts<br>10: L3-L1 Volts<br>11: Overload<br>12: Power Factor<br>13: Watts<br>14: VA<br>15: vars<br>16: kW hours<br>17: MW hours<br>18: Phase Order<br>19: Line Frequency<br>20: Analog Input<br>21: Analog Output<br>22: Running Days<br>23: Running Hours<br>24: Starts<br>25: TruTorque %<br>26: Power %<br>27: Peak Starting Current<br>28: Last Starting Duration<br>29: Zero Sequence Ground Current ( <i>MX<sup>3</sup> only</i> )<br>30: Hottest Stator RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>31: Hottest Bearing RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>32: Hottest Other RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>33: Hottest RTD Temperature ( <i>MX<sup>3</sup> only</i> ) | -     |
| 30197/40197               | LCD Display Meter 1 | 1: Avg Current<br>2: L1 Current<br>3: L2 Current<br>4: L3 Current<br>5: Current Imbalance %<br>6: Residual Ground Current<br>7: Avg Volts<br>8: L1-L2 Volts<br>9: L2-L3 Volts<br>10: L3-L1 Volts<br>11: Overload<br>12: Power Factor<br>13: Watts<br>14: VA<br>15: vars<br>16: kW hours<br>17: MW hours<br>18: Phase Order<br>19: Line Frequency<br>20: Analog Input<br>21: Analog Output<br>22: Running Days<br>23: Running Hours<br>24: Starts<br>25: TruTorque %<br>26: Power %<br>27: Peak Starting Current<br>28: Last Starting Duration<br>29: Zero Sequence Ground Current ( <i>MX<sup>3</sup> only</i> )<br>30: Hottest Stator RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>31: Hottest Bearing RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>32: Hottest Other RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>33: Hottest RTD Temperature ( <i>MX<sup>3</sup> only</i> )              | -     |
| 30198/40198               | LCD Display Meter 2 | 1: Avg Current<br>2: L1 Current<br>3: L2 Current<br>4: L3 Current<br>5: Current Imbalance %<br>6: Residual Ground Current<br>7: Avg Volts<br>8: L1-L2 Volts<br>9: L2-L3 Volts<br>10: L3-L1 Volts<br>11: Overload<br>12: Power Factor<br>13: Watts<br>14: VA<br>15: vars<br>16: kW hours<br>17: MW hours<br>18: Phase Order<br>19: Line Frequency<br>20: Analog Input<br>21: Analog Output<br>22: Running Days<br>23: Running Hours<br>24: Starts<br>25: TruTorque %<br>26: Power %<br>27: Peak Starting Current<br>28: Last Starting Duration<br>29: Zero Sequence Ground Current ( <i>MX<sup>3</sup> only</i> )<br>30: Hottest Stator RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>31: Hottest Bearing RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>32: Hottest Other RTD Temperature ( <i>MX<sup>3</sup> only</i> )<br>33: Hottest RTD Temperature ( <i>MX<sup>3</sup> only</i> )              | -     |

**Table 18: Parameters Common to MX<sup>2</sup> and MX<sup>3</sup> (Continued)**

| Absolute Register Address | Description    | Range   | Units |
|---------------------------|----------------|---|-------|
| 30199/40199               | Misc. Commands | 0: None<br>1: Standard BIST<br>2: Powered BIST<br>3: Reset Run Time<br>4: Reset kWh<br>5: Enter Reflash Mode<br>6: Store Parameters<br>7: Load Parameters<br>8: Factory Reset | -     |

**Misc Command**

The Misc Command register allows various commands to be performed. Writing a value of 0 to the register has no effect. Writing any other value to the register causes the command to execute. Reading the register always returns a value of 0.

- Writing a 1 to the register causes the Standard BIST mode to be entered.
- Writing a 2 to the register causes the Powered BIST mode to be entered.
- Writing a 3 to the register causes the run time meter to be reset to 0. Note that in addition to the resettable run time meters, a non-resettable run time meter also exists in the factory register space.
- Writing a 4 to the register causes the kWh and MWh meters to be reset to 0.
- Writing a 5 to the register causes the starter to enter the re-flash mode.
- Writing a 6 to the register causes the current set of parameter values to be stored in a secondary storage area.
- Writing a 7 to the register causes the parameter values to be loaded from data previously stored in the secondary storage area. This may only be done when the starter is stopped.
- Writing an 8 to the register causes the User parameter values to be restored to factory defaults. *Factory parameters will not be restored.*

## MXPB3 Profibus Communications Module

**Parameters Unique to the MX<sup>3</sup>** The following set of registers contains parameters that are unique to the MX<sup>3</sup>. All parameter registers are both readable and writable. Certain parameters may not be written to while the starter is running.

**Table 19: Unique MX<sup>3</sup> Parameters**

| Absolute Register Address | Description                            | Range  | Units     |
|---------------------------|--|--|-----------|
| 30221/40221               | Acceleration Profile                   | 0: Linear<br>1: Squared  | -         |
| 30222/40222               | Deceleration Profile                   | 2: S-Curve   | -         |
| 30223/40223               | PORT Bypass Enable                     | 0: Disabled<br>1: Enabled  | -         |
| 30224/40224               | PORT Bypass Delay Time                 | 1 - 50   | 100 mSec  |
| 30225/40225               | PORT Recovery Method                   | 0: Voltage Ramp<br>1: Fast Recover<br>2: Current Ramp<br>3: Current Ramp 2<br>4: Ramp Select<br>5: Tach Ramp                                 | -         |
| 30226/40226               | Tachometer Full Speed Voltage          | 100-1000   | 10 mV     |
| 30227/40227               | Tachometer Loss Delay Time             | 1-900  | 100 mSec  |
| 30228/40228               | Tachometer Loss Action                 | 0: Fault<br>1: Closed Loop Current Ramp<br>2: TruTorque Ramp<br>3: Power Ramp  | -         |
| 30229/40229               | Time/Date Format                       | 0: mm/dd/yy, 12 Hour<br>1: mm/dd/yy, 24 Hour<br>2: yy/mm/dd, 12 Hour<br>3: yy/mm/dd, 24 Hour<br>4: dd/mm/yy, 12 Hour<br>5: dd/mm/yy, 24 Hour | -         |
| 30230/40230               | Current Imbalance Delay Time           | 1 - 900  | 100 mSec  |
| 30231/40231               | Zero Sequence Ground Fault Trip Enable | 0: Disabled<br>1: Enabled  | -         |
| 30232/40232               | Zero Sequence Ground Fault Trip Level  | 10 - 250   | 100 mArms |
| 30233/40233               | Ground Fault Delay Time                | 1 - 900  | 100 mSec  |
| 30234/40234               | Phase Loss Delay Time                  | 1 - 50   | 100 mSec  |
| 30235/40235               | Over Frequency Trip Level              | 24 - 72  | Hz        |
| 30236/40236               | Under Frequency Trip Level             | 23 - 71  | Hz        |
| 30237/40237               | Over/Under Frequency Delay Time        | 1 - 900  | 100 mSec  |
| 30238/40238               | Power Factor Leading Trip Enable       | 0: Disabled<br>1: Enabled  | -         |
| 30239/40239               | Power Factor Leading Trip Level        | 80 - 99 = -0.80 - -0.99 lag<br>100 - 199 = 1.00 - +0.01 lead   | -         |
| 30240/40240               | Power Factor Lagging Trip Enable       | 0: Disabled<br>1: Enabled  | -         |
| 30241/40241               | Power Factor Lagging Trip Level        | 1 - 99 = -0.01 - -0.99 lag<br>100 - 120 = 1.00 - +0.80 lead  | -         |

Table 19: Unique MX<sup>3</sup> Parameters (Continued)

| Absolute Register Address | Description                             | Range   | Units    |
|---------------------------|---|---|----------|
| 30242/40242               | Power Factor Delay Time                 | 1 - 900   | 100 mSec |
| 30243/40243               | Backspin Timer Disable                  | 0: Disabled<br>1: Enabled   | -        |
| 30244/40244               | Backspin Time                           | 1 - 180   | Min      |
| 30245/40245               | Time Between Starts Enable              | 0: Disabled<br>1: Enabled   | -        |
| 30246/40246               | Time Between Starts                     | 1 - 180   | Min      |
| 30247/40247               | Starts per Hour Enable                  | 0: Disabled<br>1: Enabled   | -        |
| 30248/40248               | Starts per Hour                         | 1 - 6   | -        |
| 30249/40249               | Speed Switch Enable                     | 0: Disabled<br>1: Enabled   | -        |
| 30250/40250               | Speed Switch Delay Time                 | 1 - 250   | Sec      |
| 30251/40251               | Motor PTC Enable                        | 0: Disabled<br>1: Enabled   | -        |
| 30252/40252               | Motor PTC Delay Time                    | 1 - 5   | Sec      |
| 30253/40253               | PORT Trip Enable                        | 0: Disabled<br>1: Enabled   | -        |
| 30254/40254               | PORT Trip Delay Time                    | 1 - 900   | 100 mSec |
| 30255/40255               | Motor Overload Alarm Level              | 1 - 100   | %        |
| 30256/40256               | Motor Overload Lockout Level            | 1 - 99  | %        |
| 30257/40257               | Motor Overload Auto Lockout Calculation | 0: Disabled<br>1: Enabled   | -        |
| 30258/40258               | Motor Overload RTD Biasing Enable       | 0: Disabled<br>1: Enabled   | -        |
| 30259/40259               | Motor Overload RTD Biasing Minimum      | 0 - 198   | °C       |
| 30260/40260               | Motor Overload RTD Biasing Middle       | 1 - 199   | °C       |
| 30261/40261               | Motor Overload RTD Biasing Maximum      | 105 - 200   | °C       |
| 30262/40262               | DI 4 Configuration                      | Same as DI 1 through DI 3 configuration in the Parameters Common to the MX <sup>2</sup> and MX <sup>3</sup> | -        |
| 30263/40263               | DI 5 Configuration                      |   |          |
| 30264/40264               | DI 6 Configuration                      |   |          |
| 30265/40265               | DI 7 Configuration                      |   |          |
| 30266/40266               | DI 8 Configuration                      |   |          |
| 30267/40267               | R4 Configuration                        | Same as R1 through R3 configuration in the Parameters Common to the MX <sup>2</sup> and MX <sup>3</sup>     | -        |
| 30268/40268               | R5 Configuration                        |   |          |
| 30269/40269               | R6 Configuration                        |   |          |
| 30270/40270               | RTD Module 1 Enable                     | 0: Disabled<br>1: Enabled   | -        |
| 30271/40271               | RTD Module 1 Address                    | 16 - 23   | -        |

## Table 19: Unique MX<sup>3</sup> Parameters (Continued)

| Absolute Register Address | Description                | Range  | Units |
|---------------------------|----------------------------|--|-------|
| 30272/40272               | RTD Module 2 Enable        | 0: Disabled<br>1: Enabled  | -     |
| 30273/40273               | RTD Module 2 Address       | 16 - 23  | -     |
| 30274/40274               | RTD 1 Group                | 0: Off<br>1: Stator<br>2: Bearing<br>3: Other  | -     |
| 30275/40275               | RTD 2 Group                |  |       |
| 30276/40276               | RTD 3 Group                |  |       |
| 30277/40277               | RTD 4 Group                |  |       |
| 30278/40278               | RTD 5 Group                |  |       |
| 30279/40279               | RTD 6 Group                |  |       |
| 30280/40280               | RTD 7 Group                |  |       |
| 30281/40281               | RTD 8 Group                |  |       |
| 30282/40282               | RTD 9 Group                |  |       |
| 30283/40283               | RTD 10 Group               |  |       |
| 30284/40284               | RTD 11 Group               |  |       |
| 30285/40285               | RTD 12 Group               |  |       |
| 30286/40286               | RTD 13 Group               |  |       |
| 30287/40287               | RTD 14 Group               |  |       |
| 30288/40288               | RTD 15 Group               |  |       |
| 30289/40289               | RTD 16 Group               |  |       |
| 30290/40290               | RTD Stator Alarm Level     | 1 - 200  | °C    |
| 30291/40291               | RTD Bearing Alarm Level    |  |       |
| 30292/40292               | RTD Other Alarm Level      |  |       |
| 30293/40293               | RTD Stator Trip Level      |  |       |
| 30294/40294               | RTD Bearing Trip Level     |  |       |
| 30295/40295               | RTD Other Trip Level       |  |       |
| 30296/40296               | RTD Voting Enable          | 0: Disabled<br>1: Enabled  | -     |
| 30297/40297               | Slow Speed Enable 2        | 0: Disabled<br>1: Enabled  | -     |
| 30298/40298               | Slow Speed 2               | Same as Slow Speed 1 in the Parameters Common to the MX <sup>2</sup> and MX <sup>3</sup> | -     |
| 30299/40299               | Slow Speed Current Level 2 | 10 - 400   | % FLA |

### Fault Log and Data

The fault log and data associated with each fault is 9 records deep. As new faults occur, the oldest fault in the log is lost.

**Fault Codes**

The fault codes may be read from 30601/40601 (most recent) through 30609/40609 (oldest).

**Table 20: Fault Codes**

| <b>Fault Code</b> | <b>Description</b>            |
|-------------------|-------------------------------|
| 0                 | No Fault                      |
| 1                 | UTS Time Limit Expired        |
| 2                 | Motor Thermal Overload Trip   |
| 3                 | Slow Speed Time Limit Expired |
| 4                 | Speed Switch                  |
| 5                 | Motor PTC                     |
| 6                 | Stator RTD                    |
| 7                 | Bearing RTD                   |
| 8                 | Other RTD                     |
| 10                | Phase Rotation Error, not ABC |
| 11                | Phase Rotation Error, not CBA |
| 12                | Low Line Frequency            |
| 13                | High Line Frequency           |
| 14                | Input Power Not Single Phase  |
| 15                | Input Power Not Three Phase   |
| 21                | Low Line L1-L2                |
| 22                | Low Line L2-L3                |
| 23                | Low Line L3-L1                |
| 24                | High Line L1-L2               |
| 25                | High Line L2-L3               |
| 26                | High Line L3-L1               |
| 27                | Phase Loss                    |
| 28                | No Line                       |
| 29                | PORT Time Limit Exceeded      |
| 30                | I.O.C.                        |
| 31                | Overcurrent                   |
| 34                | Undercurrent                  |
| 35                | Power Factor Leading          |
| 36                | Power Factor Lagging          |
| 37                | Current Imbalance             |
| 38                | Ground Fault                  |
| 39                | No Current at Run             |
| 40                | Shorted / Open SCR            |
| 41                | Current at Stop               |
| 46                | Disconnect Open               |

**Table 20: Fault Codes (Continued)**

| Fault Code | Description                                 |
|------------|---|
| 47         | Stack Protection                            |
| 48         | Bypass Contactor Fault                      |
| 49         | Inline Contactor Fault                      |
| 50         | Control Power Low                           |
| 51         | Current Sensor Offset Error                 |
| 53         | Tachometer Loss                             |
| 54         | BIST Fault                                  |
| 55         | BIST CT Fault                               |
| 56         | Open or Shorted RTD                         |
| 60         | External Fault on DIN#1 Input               |
| 61         | External Fault on DIN#2 Input               |
| 62         | External Fault on DIN#3 Input               |
| 63         | External Fault on DIN#4 Input               |
| 64         | External Fault on DIN#5 Input               |
| 65         | External Fault on DIN#6 Input               |
| 66         | External Fault on DIN#7 Input               |
| 67         | External Fault on DIN#8 Input               |
| 71         | Analog Input Level Fault Trip               |
| 80         | RTD Communication Fault                     |
| 81         | Keypad Communication Fault                  |
| 82         | Modbus Timeout Fault                        |
| 84         | Interboard Communication Fault              |
| 85         | IO Card - SW Fault                          |
| 86         | IO Card - Current Sensor Offset Error       |
| 87         | IO Card - Real Time Clock Error             |
| 88         | IO Card - Illegal Instruction Trap          |
| 89         | IO Card - SW Watchdog Fault                 |
| 90         | IO Card - Spurious Interrupt                |
| 91         | IO Card - Program EPROM Checksum Fault      |
| 94         | CPU Error - SW Fault                        |
| 95         | CPU Error - Parameter EEPROM Checksum Fault |
| 96         | CPU Error - Illegal Instruction Trap        |
| 97         | CPU Error - SW Watchdog Fault               |
| 98         | CPU Error - Spurious Interrupt              |
| 99         | CPU Error - Program EPROM Checksum Fault    |



### System States

The state that the starter was in when a fault occurs is recorded along with each fault. System States may be read from 30611/40611 (most recent) through 30619/40619 (oldest).

**Table 21: System States**

| System State | Description                      |
|--------------|----------------------------------|
| 0            | Initializing                     |
| 1            | Locked Out                       |
| 2            | Faulted                          |
| 3            | Stopped                          |
| 4            | Heating                          |
| 5            | Kicking                          |
| 6            | Ramping                          |
| 7            | Slow Speed                       |
| 8            | Not UTS                          |
| 9            | UTS                              |
| 10           | Phase Control / Current Follower |
| 11           | Decelerating                     |
| 12           | Braking                          |
| 13           | Wye                              |
| 14           | PORT                             |
| 15           | BIST                             |
| 16           | Shorted SCR Test                 |
| 17           | Open SCR Test                    |

### L1 Currents

Current drawn from Line 1 when a fault occurs is recorded along with each fault. The current (in Amps) may be read from 30621/40621 (most recent) through 30629/40629 (oldest).

### L2 Currents

Current drawn from Line 2 when a fault occurs is recorded along with each fault. The current (in Amps) may be read from 30631/40631 (most recent) through 30639/40639 (oldest).

### L3 Currents

Current drawn from Line 3 when a fault occurs is recorded along with each fault. The current (in Amps) may be read from 30641/40641 (most recent) through 30649/40649 (oldest).

### L1-L2 Voltages

Line voltage present between Lines 1 and 2 when a fault occurs is recorded along with each fault. The voltage (in Volts) may be read from 30651/40651 (most recent) through 30659/40659 (oldest).

### L2-L3 Voltages

Line voltage present between Lines 2 and 3 when a fault occurs is recorded along with each fault. The voltage (in Volts) may be read from 30661/40661 (most recent) through 30669/40669 (oldest).

### L3-L1 Voltages

Line voltage present between Lines 3 and 1 when a fault occurs is recorded along with each fault. The voltage (in Volts) may be read from 30671/40671 (most recent) through 30679/40679 (oldest).

### Kilowatts

Power drawn by the load when a fault occurs is recorded along with each fault. The power (in kilowatts) may be read from 30681/40681 (most recent) through 30689/40689 (oldest).

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- Line Periods** The line period (1/frequency) present when a fault occurs is recorded along with each fault. Line periods (in microseconds) may be read from 30691/40691 (most recent) through 30699/40699 (oldest).
- Run Time Hours** The value of the running time meter when a fault occurs is recorded along with each fault. Running time (in hours) may be read from 30701/40701 (most recent) through 30709/40709 (oldest).
- Event Log (MX<sup>3</sup> Only)** The event log is 99 records deep. As new events occur, the oldest event in the log is lost. Faults are also stored in the event log. Each event is time and date stamped.
- Event Codes** Event Codes may be read from 30801/40801 (most recent) through 30899/40899 (oldest). Each of the 99 registers within this range contains a code for one event in the log.
- Since the event log contains both events (such as Start, Stop, Up To Speed, etc.) and faults, bit 15 indicates whether a record is an event or a fault. A 1 indicates a fault, and a 0 indicates an event. The remaining 15 bits contain either the event code or fault code.
- The faults codes are identical to those reported by the fault log and are defined in Table 85: Fault Log Object: Fault Codes.

**Table 22: Event Codes**

| Event Code | Description                     |
|------------|---------------------------------|
| 101        | Start Commanded                 |
| 102        | Slow Speed Commanded            |
| 103        | Up to Speed                     |
| 104        | Energy Saver Entered            |
| 105        | Energy Saver Exited             |
| 106        | Stop Commanded                  |
| 107        | Stop Complete                   |
| 110        | Motor Overload Warning          |
| 111        | Motor Overload Lockout Entered  |
| 112        | Motor Overload Lockout Cleared  |
| 113        | Stack Overload Warning          |
| 114        | Stack Overload Lockout Entered  |
| 115        | Stack Overload Lockout Cleared  |
| 116        | Emergency Overload Reset        |
| 117        | Stator RTD Warning              |
| 118        | Bearing RTD Warning             |
| 119        | Other RTD Warning               |
| 140        | Disconnect Opened               |
| 141        | Disconnect Closed               |
| 170        | PORT Entered due to Low Voltage |
| 171        | PORT Entered due to Low Current |
| 172        | PORT Bypass Contactor Opened    |
| 173        | PORT Power Returned             |
| 174        | PORT Recovery Completed         |

**Table 22: Event Codes (Continued)**

| Event Code | Description                 |
|------------|-----------------------------|
| 180        | Parameters Reset to Default |
| 181        | Time/Date Changed           |
| 182        | Passcode Enabled            |
| 183        | Passcode Cleared            |
| 184        | Factory Passcode Entered    |
| 185        | Event Log Cleared           |
| 186        | Run Time Reset              |
| 187        | kWh Reset                   |
| 188        | Reflash Mode Entered        |
| 190        | System Powered Up           |
| 191        | System Powered Down         |
| 192        | Low Control Power Detected  |
| 193        | Standard BIST Entered       |
| 194        | Powered BIST Entered        |
| 195        | BIST Passed                 |

**System States**

The System State when an event or fault occurred may be read from 30901/40901 (most recent) through 30999/40999 (oldest). System States are identical to those reported by the fault log and are defined in Table 99: Fault Codes, Page 115.

**Event Time and Date Stamp**

The event time and date stamp may be read from 31001/41001 (most recent) through 31198/41198 (oldest). The Time and Date stamp is stored as a 32 bit unsigned integer in two consecutive Modbus registers. Time and Date is expressed as the number of seconds elapsed since 12:00 AM on January 1st, 1972.

**Table 23: Time and Date Stamp Registers**

| Absolute Register Address | Description                                     |
|---------------------------|---|
| 31001/41001               | Date/Time (lower 16 bits) for most recent event |
| 31002/41002               | Date/Time (upper 16 bits) for most recent event |
| 31003/41003               | Date/Time (lower 16 bits)                       |
| 31004/41004               | Date/Time (upper 16 bits)                       |
| 31197/41197               | Date/Time (lower 16 bits) for oldest event      |
| 31198/41198               | Date/Time (upper 16 bits) for oldest event      |



# ***Appendix B - Reference Documents***

**Reference documents** The following publications include technical details about PROFIBUS-DP. For a complete list of PROFIBUS-DP documentation, refer to:

<http://www.us.profibus.com/resources.aspx?pagetype=books>

Catching the Process Fieldbus - An Introduction to PROFIBUS for Process Automation

*By James Powell, P. Eng. and Henry Vandelinde, PhD.*

The New Rapid Way to PROFIBUS DP From DP-V0 to DP-V2

*By Manfred Popp*

Modbus-RTU Technical Publication

Standard Protocol Implementation as defined under "Modicon Modbus Reference Guide"  
PI-MBUS-300. Refer to [www.modbus.org](http://www.modbus.org).



| Revision | Date            | ECO   | Description     |
|----------|-----------------|-------|-----------------|
| 02-00    | Ocother 5, 2010 | E2860 | Initial Release |
|          |                 |       |                 |
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|          |                 |       |                 |



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