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inRAx[®]
3170-MBS

Flex Platform
Modbus Slave Interface Module

October 18, 2010

USER MANUAL

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3170-MBS User Manual

October 18, 2010

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Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

- A** WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;
- B** WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES
- C** WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
- D** THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

MVI (Multi Vendor Interface) Modules

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DÉCONNECTER L'ÉQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Warnings

North America Warnings

- A** Warning - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.
- B** Warning - Explosion Hazard - When in Hazardous Locations, turn off power before replacing or rewiring modules.
Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.
- C** Suitable for use in Class I, division 2 Groups A, B, C and D Hazardous Locations or Non-Hazardous Locations.

ATEX Warnings and Conditions of Safe Usage:

Power, Input, and Output (I/O) wiring must be in accordance with the authority having jurisdiction

- A** Warning - Explosion Hazard - When in hazardous locations, turn off power before replacing or wiring modules.
- B** Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- C** These products are intended to be mounted in an IP54 enclosure. The devices shall provide external means to prevent the rated voltage being exceeded by transient disturbances of more than 40%. This device must be used only with ATEX certified backplanes.
- D** DO NOT OPEN WHEN ENERGIZED.

Warning: This module is not hot-swappable! Always remove power from the rack before inserting or removing this module, or damage may result to the module, the processor, or other connected devices.

Battery Life Advisory

The MVI46, MVI56, MVI56E, MVI69, and MVI71 modules use a rechargeable Lithium Vanadium Pentoxide battery to backup the real-time clock and CMOS. The battery should last for the life of the module. The module must be powered for approximately twenty hours before the battery becomes fully charged. After it is fully charged, the battery provides backup power for the CMOS setup and the real-time clock for approximately 21 days. When the battery is fully discharged, the module will revert to the default BIOS and clock settings.

Note: The battery is not user replaceable.

Markings

Electrical Ratings

- Backplane Current Load: 800 mA @ 5 Vdc
- Operating Temperature: 0°C to 60°C (32°F to 140°F)
- Storage Temperature: -40°C to 85°C (-40°F to 185°F)
- Shock: 30g Operational; 50g non-operational; Vibration: 5 g from 10 Hz to 150 Hz
- Relative Humidity 5% to 95% (without condensation)
- All phase conductor sizes must be at least 1.3 mm(squared) and all earth ground conductors must be at least 4mm(squared).

Label Markings

Agency Approvals and CertificationsANSI / ISA	ISA 12.12.01 Class I Division 2, GPs A, B, C, D
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CSA/cUL	C22.2 No. 213-1987
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CSA CB Certified	IEC61010
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ATEX	EN60079-0 Category 3, Zone 2 EN60079-15
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Contents

Your Feedback Please	2
How to Contact Us	2
ProSoft Technology® Product Documentation	2
Important Installation Instructions	3
MVI (Multi Vendor Interface) Modules	3
Warnings	3
Battery Life Advisory	3
Markings.....	4
1 Product Specifications	7
1.1 General Specifications	8
1.2 Modbus Specifications	9
2 Functional Overview	11
2.1 Modbus Addressing Concepts	11
2.2 The Data Space in the module.....	12
3 Module Configuration and Installation	13
3.1 Mounting on a DIN-rail before installing the terminal base units.....	14
3.2 Mounting (or Replacing) the module on an existing system	15
3.3 Wiring	16
3.3.1 RS-485 Tip	16
3.4 Setting the switches	17
4 Module Addressing	19
4.1 Reading Discrete Inputs	20
4.2 Writing Discrete Outputs	21
5 Status Information	23
5.1 Adapter Status Word	24
5.2 Module Status Words	25
5.3 Module Information.....	26
5.4 Modbus Function Counters	27
5.5 Modbus Status	28
5.5.1 Error Codes	28
6 Diagnostics and Troubleshooting	29
6.1 LED Indicators	30
6.2 Troubleshooting: General.....	31

7	Example Address Mapping	33
7.1	Application Example	34
7.2	Address Map.....	35
7.3	Function Code Address Ranges.....	37
7.4	Work Sheets	38
8	Support, Service & Warranty	45
	Contacting Technical Support	45
8.1	Return Material Authorization (RMA) Policies and Conditions.....	47
8.1.1	Returning Any Product.....	47
8.1.2	Returning Units Under Warranty.....	48
8.1.3	Returning Units Out of Warranty.....	48
8.2	LIMITED WARRANTY	49
8.2.1	What Is Covered By This Warranty	49
8.2.2	What Is Not Covered By This Warranty.....	50
8.2.3	Disclaimer Regarding High Risk Activities.....	50
8.2.4	Intellectual Property Indemnity	51
8.2.5	Disclaimer of all Other Warranties	51
8.2.6	Limitation of Remedies **	52
8.2.7	Time Limit for Bringing Suit.....	52
8.2.8	No Other Warranties.....	52
8.2.9	Allocation of Risks	52
8.2.10	Controlling Law and Severability	53
	Index	55

1 Product Specifications

In This Chapter

❖ General Specifications.....	8
❖ Modbus Specifications.....	9

The 3170-MBS Modbus Slave Communication Adapter can interface up to 8 Rockwell Automation FLEX and/or Integra I/O modules directly with any Modbus Master. The following functionality is available:

- Multi-drop on an RS-485 link with other Modbus compatible devices
- Interface Analog and/or Discrete I/O directly to a Host
- Add FLEX I/O into applications where other manufacturer's devices are already in use

The 3170-MBS module is simple to use, requiring only the setting of several dip-switch options. The Flex and Integra module data images are pre-mapped into Modbus addresses to simplify reading and writing using standard Modbus commands.

The 3170-MBS has read/write access to all Flex and Integra modules. This allows a Host system to perform all functions necessary to get all I/O modules functioning. All register data values can be accessed using Function Codes 3, 4, 6 and 16. Bit level Function Codes 1, 2, and 5 are also supported.

1.1 General Specifications

- I/O Capacity: 8 I/O modules (Flex and/or Integra)
- RS-485 Communication port - 3 screw termination
- Status LEDs
 - Power / Control Status
 - Serial TX, RX and ERROR Status
- Input Voltage: 24 VDC (19.2-31.2 VDC)
- Max Input Power: 8.6 W
- Max Backplane Output Current: 640 ma @ 5V
- Operating Temp.: 0 to 55°C
- Storage Temp.: -40 to 85°C
- Dimensions: 87x68x69 mm (3.4x2.7x2.7 inches)
- UL Class I Div 2 Groups A,B,C,D

1.2 Modbus Specifications

The 3170-MBS product support the following features:

- RTU mode (binary) with CRC-16 error checking
- ASCII 7 and 8-bit modes with LRC error checking
- Accepts broadcast commands from the Master
- Function codes:
 - 1: Read Output Coils (Horizontal addressing only)
 - 2: Read Discrete Inputs (Horizontal addressing only)
 - 3: Read Multiple Holding Registers
 - 4: Read Multiple Input Registers
 - 5: Force (Write) Single Coil (Horizontal addressing only)
 - 6: Preset (Write) Single Holding Register
 - 16: Preset (Write) Multiple Holding Registers
- Pre-assigned Modbus memory map
- Parameters configured via dip switches:
 - Address: 1 to 247
 - Parity: None, Odd or Even
 - Stop Bits: 1 or 2
 - Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400, 62500

2 Functional Overview

2.1 Modbus Addressing Concepts

Modicon developed the Modbus addressing scheme around the data table and I/O structure in Modicon PLCs. As a result, the Modbus protocol supports access to the various data spaces in the Modicon PLC.

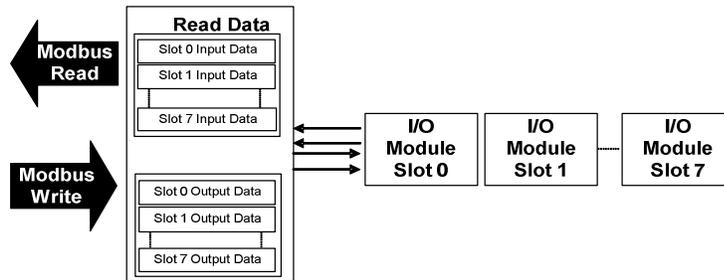
By far the most common data space used is the 4xxxx space using the Function Codes 3, 6 and 16. This space is used to transfer 16 bit register values and can be used to transfer bit mapped data. Using formal Modbus addressing terminology, this data space actually starts at address 40001.

Access to the different data spaces is determined by the Function Code that is used. The following chart shows the four different types of data spaces, the numerical range of these spaces, and the Function Codes that are used to execute read and write instructions within these data spaces. The following illustration shows the relationship between the Modbus Function Codes and the Modbus addressing scheme.

<u>Register Space</u>			<u>Read Command</u>	<u>Write Command</u>
0XXXX	Coils (Discrete Out)	1	1	5
		9999		
1XXXX	Inputs (Discrete In)	1	2	N/A
		9999		
3XXXX	Input Registers (Analog In)	1	4	N/A
		9999		
4XXXX	Holding Registers (Memory Regs)	1	3	6,16

2.2 The Data Space in the module

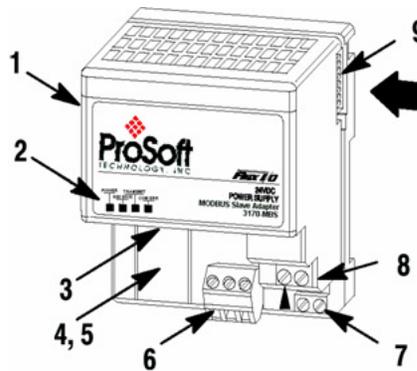
One of the concepts, which are important to develop an understanding of, is the relationship between the data space in the module and how this data can be moved between the module and the Modbus Master.



3 Module Configuration and Installation

In This Chapter

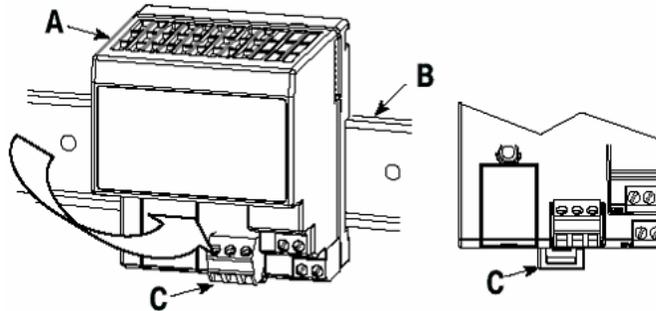
- ❖ Installation 14
- ❖ Mounting (or Replacing) the module on an existing system 15
- ❖ Wiring 16
- ❖ Setting the switches 17



Component Identification

1	Modbus Adapter Module
2	Indicators
3	Communication reset pushbutton (PRL)
4	Access door to switches S1 and S2
5	Switches S1 and S2 (behind access door)
6	Modbus cable connector
7	+24V dc connections
8	24V common connections
9	Flexbus connector

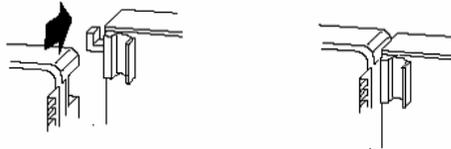
3.1 Mounting on a DIN-rail before installing the terminal base units



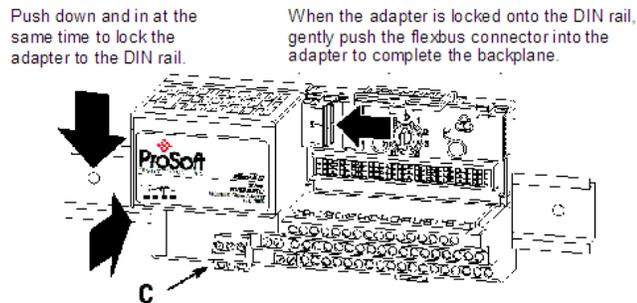
- 1 Position the Modbus adapter module **A** on a 35 X 7.5mm DIN-rail **B** (Rockwell Automation pt. no. 199-DR1: 46277-3; EN 50022) at a slight angle.
- 2 Hook the lip on the rear of the adapter (**A**) onto the top of the DIN-rail (**B**), and rotate the adapter module onto the rail.
- 3 Press the adapter module down onto the DIN-rail until flush. Locking tab (**C**) will snap into position and lock the adapter module to the DIN-rail.
- 4 If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter module flush onto the DIN-rail and release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.
- 5 Connect the adapter wiring as shown under "Wiring" later in this document.

3.2 Mounting (or Replacing) the module on an existing system

- 1 Remove the Modbus plug-in connector from the front of the adapter.
- 2 Disconnect any wiring jumpered to the adjacent terminal base.
- 3 Using a screwdriver or similar tool, open the lock and remove the module from the base unit to which the adapter will be attached.
- 4 Push the flexbus connector toward the right side of the terminal base to unplug the backplane connection.
- 5 Release the locking tab and remove the adapter.
- 6 Before installing the new adapter, notice the notch on the right rear of the adapter. This notch accepts the hook on the terminal base unit. The notch is open at the bottom. The hook and adjacent connection point keep the terminal base and adapter tight together, reducing the possibility of a break in communication over the backplane.
- 7 Complete the adapter mounting as shown below.

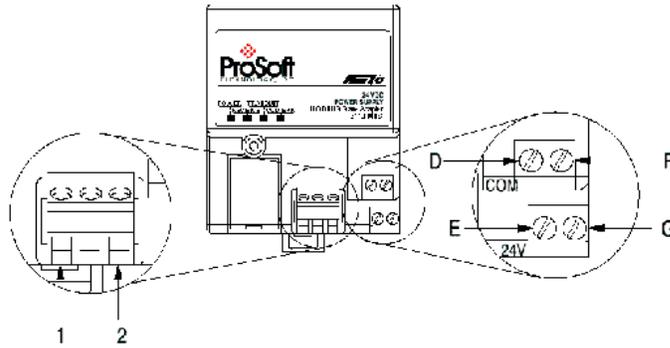


Attention: Make certain that the hook on the terminal base is properly hooked into the adapter. Failure to lock the hook into the adjacent base/adapter can result in loss of communication on the backplane.



- 8 If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab **C** down while pressing the adapter module flush onto the DIN-rail. Then release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.
- 9 Reinstall the module into the terminal base unit.

3.3 Wiring



Attention: When connecting wiring, torque terminal screws to 7 to 9 inch-pounds.

Connect	To
TxRxD-	1
TxRxD+	2

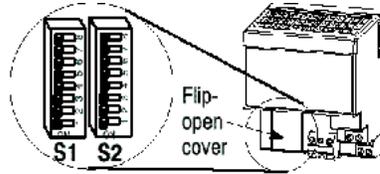
- 1 Connect the Modbus cable to the removable connector.
- 2 Connect +24V dc input to the left side of the lower connector, terminal **E**.
- 3 Connect 24V common to the left side of the upper connector, terminal **D**.
- 4 Connections **G** and **F** are used to pass 24V dc power (**G**) and 24V common (**F**) to the next module in the series (if required).

3.3.1 RS-485 Tip

If communication in the RS-485 mode does not work at first, despite all attempts, try switching termination polarities. Some manufacturers interpret + and -, or A and B, polarities differently.

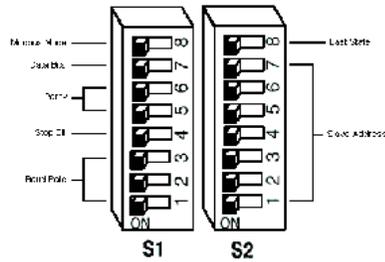
3.4 Setting the switches

The adapter switches are located under a flip-open cover on the front of the adapter. Set the switches as shown below.



- 1 Lift the hinged switch cover on the front of the adapter to expose the switches.
- 2 Set the switches as shown below.
- 3 Cycle power to the adapter after setting the switches.

Baud Rate	S1-1	S1-2	S1-3
1200	OFF	OFF	OFF
2400	ON	OFF	OFF
4800	OFF	ON	OFF
9600	ON	ON	OFF
19200	OFF	OFF	ON
38400	ON	OFF	ON
62.5K	OFF	ON	ON
Undefined(Defaults to 19200)	ON	ON	ON
Stop Bit	S1-4		
1	OFF		
2	ON		
Parity	S1-5	S1-6	
None	OFF	OFF	
Odd	ON	OFF	
Even	OFF	ON	
Data Bits	S1-7		
8	OFF		
7	ON		
Modbus Mode	S1-8		
RTU	OFF		
ASCII	ON		



Address	S2-1	S2-2	S2-3	S2-4	S2-5	S2-6	S2-7
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF
4	ON	OFF	ON	OFF	OFF	OFF	OFF
5	OFF	ON	ON	OFF	OFF	OFF	OFF
6	ON	ON	ON	OFF	OFF	OFF	OFF
127	ON	ON	ON	ON	ON	ON	ON
Last State	S2-8						
Off	OFF						
Hold	ON						

Address 0 - Test Mode - Puts unit into a transmit only mode. Connect a terminal at 19200 baud, 8N1 to view data.

Address 1 to 127 Valid Slave addresses.

4 Module Addressing

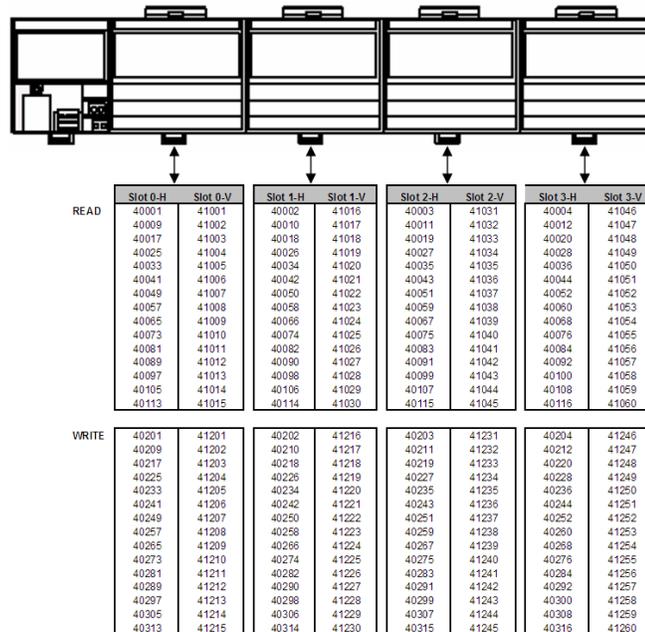
In This Chapter

- ❖ Reading Discrete Inputs20
- ❖ Writing Discrete Outputs.....21

Each Flex or Integra module has 60 words of address space. 30 Input or Read address and 30 Output or Write addresses. Data is mapped in two ways Horizontal and Vertical.

With Horizontal addressing the adapter address the first input and output word for each module incrementally. 40001 for module 0, 40002 for module 1 and so on.

Vertical addressing increments the words for each module. For example, the vertical read words for slot 0 start with 41001 and increment to 41015.

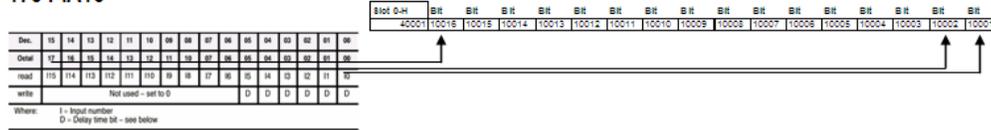


4.1 Reading Discrete Inputs

Each word address consists of 16 bits. These bits can be read as discrete inputs. Word address 40001 corresponds to discrete inputs 10001 to 10016. 40002 corresponds to discrete inputs 10017 to 10032.

Word	Bit															
40001	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	10016	10015	10014	10013	10012	10011	10010	10009	10008	10007	10006	10005	10004	10003	10002	10001

1794-IA16



((Address - 40001) X 16) + 10001 This will give you Input address 0 of the word.

4.2 Writing Discrete Outputs

Each word address consists of 16 bits. These bits can be written as discrete outputs. Word address 40201 corresponds to discrete outputs 3201 to 3216. 40202 corresponds to discrete outputs 3217 to 3232.

Word	Bit															
40201	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	3216	3215	3214	3213	3212	3211	3210	3209	3208	3207	3206	3205	3204	3203	3202	3201



((Address - 40001) X 16) + 1 This will give you the Output address 0 of the word.

5 Status Information

In This Chapter

❖ Adapter Status Word	24
❖ Module Status Words	25
❖ Module Information.....	26
❖ Modbus Function Counters	27
❖ Modbus Status	28

5.1 Adapter Status Word

																Address	
Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	40121
				Not Used				I/O State	Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	Slot 0	

The input status word consists of:

- I/O module fault bits - 1 status bit for each slot
- I/O Last state Dip Switch S2-8(See 3170-MBS installation manual)

Bit Description	Bit	Explanation
	0	This bit is set (1) when an error is detected in slot position 0.
	1	This bit is set (1) when an error is detected in slot position 1.
	2	This bit is set (1) when an error is detected in slot position 2.
I/O Module Fault	3	This bit is set (1) when an error is detected in slot position 3.
	4	This bit is set (1) when an error is detected in slot position 4.
	5	This bit is set (1) when an error is detected in slot position 5.
	6	This bit is set (1) when an error is detected in slot position 6.
	7	This bit is set (1) when an error is detected in slot position 7.
I/O Last State	8	= 1 for hold last state = 0 for off
	9 to 15	Not used set to 0

The adapter input status word bit descriptions are shown in the following table.

5.2 Module Status Words

- *Slot Status*: indicates the general health of the installed I/O module
- *Number of Words*: either 3 or 15 words indeterminate if slot is empty.
- *Number of Read Words*: the number of words which are to be read from the I/O module, indeterminate if slot is empty.

														Address			
Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	40122
		Status		Total Words		Read Words								Type Identity		to 40129	

- *Type ID*: a byte when combined with the Number of Words and Number of Read Words form the Module ID which uniquely identifies a specific module function, series and revision, indeterminate if slot is empty. **Note that all of bits 0 through 12 should be used in identifying a module.**

Bit 15 1 = No answer, empty slot or dead module
 Bit 14 1 = Either positive edge of bit 15 or bit 13 detected
 Bit 13 1 = Bit failure, bad data on SerBus
 Bit 12 1 = Number of words is 15, = 0 number of words is 3
 Bits 11 to 8 Value = number of read words
 Bits 7 to 0 Value = Type ID

5.3 Module Information

3170-MBS Information	Address
3170-MBS Product Revision Level	40154
3170-MBS Product Batch Number	40155

5.4 Modbus Function Counters

Modbus Port Function Code Counter	Address
Function Code 1	40156
Function Code 2	40157
Function Code 3	40158
Function Code 4	40159
Function Code 5	40160
Function Code 6	40161
Reserved	40162
Function Code 16	40163

Modbus Status	Address
Modbus Port: Responses to Host	40171
Modbus Port: No Responses to Host	40172
Modbus Port: Last Detected Error Condition	40173

5.5 Modbus Status

Responses to Host: This rollover counter increments every time a response is issued by the 3170-MBS. Note that this counter increments whether the response is a data response or an error code response.

No Responses to Host: This rollover counter increments every time a command is seen on the Modbus port, which is not for this slave. This counter may be used as a network activity counter.

Last Detected Error Condition: This value is the last error code transmitted to the master by the 3170-MBS.

5.5.1 Error Codes

Code	Name	Description
0	All OK	The port is operating as desired
1	Illegal Function	An illegal function code request is being attempted
2	Bad Data Address	The address, or the range of addresses, covered by a request from the host is not within allowed limits
3	Bad Data Value	The value in the data field of the command from the host is not allowed.
4	Incomplete Response Detected	This error indicates that an incomplete query was received from a host query. This indicates that the slave port is timing out too quickly (that is, application may require some Inter-character Timeout Delay) or that the host query is getting abbreviated, possibly by the transmitting modem (last character getting dropped).
10	Buffer Overflow	The receive buffer has overflowed and reset the character count to 0. If this condition occurs try reading fewer parameters at one time
254	Checksum Error	The slave determined that the message checksum was in error, and therefore discarded the message

6 Diagnostics and Troubleshooting

In This Chapter

❖ LED Indicators.....	30
❖ Troubleshooting: General.....	31

The module provides information on diagnostics and troubleshooting in the following forms:

- LED status indicators on the front of the module provide general information on the module's status.

Several hardware diagnostic capabilities have been implemented using the LED indicator lights on the front of the adapter module. The following topics explain the meaning of the individual LEDs and provide some troubleshooting tips.

6.1 LED Indicators

The following explains the operation of the LEDs.

LED	Color	Status	Indication
Power	Green	On	Normal state: The module is operating normally, with communications being detected on the link
		Blink	Modbus Communication Timeout: The port has not detected any communications on the link for over 1 second. If the HOLD LAST STATE dip switch is not set, the Input and Output images will be forced to zero(0). FLEX Backplane Communications Fail: The communication adapter either does not detect any I/O modules plugged into the backplane, or the backplane communications have failed.
Transmit	Green	Blink	The Modbus port is transmitting data.
Receive	Green	Blink	The Modbus port is receiving data. LED flashes on any character activity, valid or invalid.
COM ERR	Amber	Off	Normal State: When the error LED is off and the related port is actively transferring data, there are no communication errors
		Blink	Periodic communication errors are occurring during data communications. Error conditions that cause LED to blink include: <ul style="list-style-type: none"> ▪ Bad Function Code ▪ Invalid Register Address in command ▪ Invalid Count value in command ▪ Insufficient Characters in Modbus Packet ▪ Checksum Error detected in packet FLEX Backplane Communications Fail: The communication adapter either does not detect any I/O modules plugged into the backplane, or the backplane communications have failed
		On	This LED will stay on under several conditions: Configuration Error Recurring communication error

6.2 Troubleshooting: General

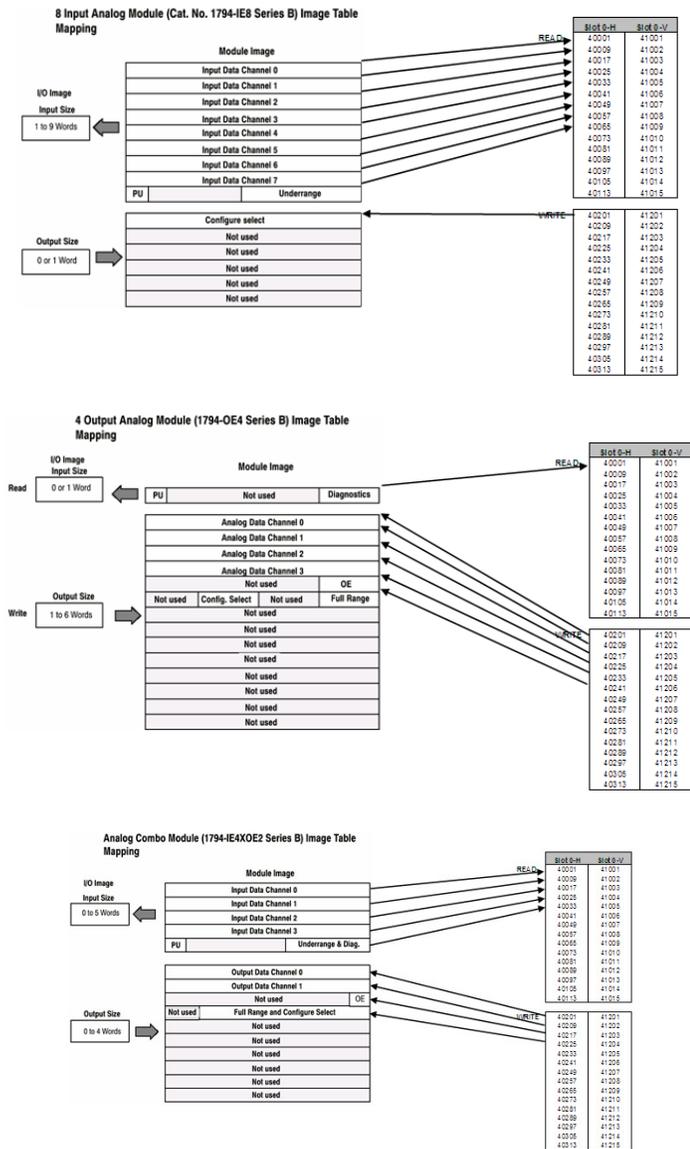
In order to assist in the troubleshooting of the adapter, the following table has been put together. Use the following table to assist in application of the module, but if additional questions or problems arise, please do not hesitate to contact us.

Problem Description	Steps to take
No communications with Host	<p>If connected to the host and no communications are occurring, verify the following:</p> <ul style="list-style-type: none"> ▪ Polarity of RS-485 cable connections (Either RX LED on continuously or not toggling at all) ▪ Slave Address: Valid addresses range from 1 to 127. Verify that the address is encoded into the dip switch correctly ▪ Baud Rate ▪ Stop Bits, Parity, and Modbus Mode. There are valid combinations of these parameters which are supported by the adapter hardware. Verify that the configuration is one of the following: <ul style="list-style-type: none"> Modbus RTU and ASCII Modes <ul style="list-style-type: none"> 8 Data Bits, No Parity, 1 Stop 8 Data Bits, No Parity, 2 Stop 8 Data Bits, Odd Parity, 1 Stop 8 Data Bits, Even Parity, 1 Stop Modbus ASCII Mode Only: <ul style="list-style-type: none"> 7 Data Bits, No Parity, 2 Stop 7 Data Bits, Odd Parity, 1 Stop 7 Data Bits, Even Parity, 1 Stop 7 Data Bits, Odd Parity, 2 Stop 7 Data Bits, Even Parity, 2 Stop <p>Modbus Mode: Verify that the host and the adapter are talking the same implementation of the protocol, either RTU or ASCII.</p>
RX LED on continuously	<p>Verify the polarity of the RS-485 communications connections. Not all manufacturers adhere to the same +/- and A/B labeling conventions. Do not be afraid to experiment with swapping the polarity, no damage will occur to the hardware.</p>
COMM ERR LED blinks periodically	<p>Periodic communication errors are occurring during data communications. Error conditions which cause LED to blink include:</p> <ul style="list-style-type: none"> ▪ Bad Function Code ▪ Invalid Register Address in command ▪ Invalid Count value in command ▪ Insufficient Characters in Modbus Packet ▪ Checksum Error detected in packet <p>FLEX Backplane Communications Fail: The communication adapter either does not detect any I/O modules plugged into the backplane, or the backplane communications have failed</p>
Outputs Toggle Off	<p>If the HOLD LAST STATE dip switch is not set, the Output Image (and the Input Image) in the adapter will be forced to zero whenever communications with the host has not been detected for over 1 second. The Outputs will be re-established by the adapter as soon as a valid write command is received from the host.</p> <p>To prevent the Toggling of the outputs, either set the HOLD LAST STATE dip switch (S2 position 8), and/or assure the reliability of the communications.</p>

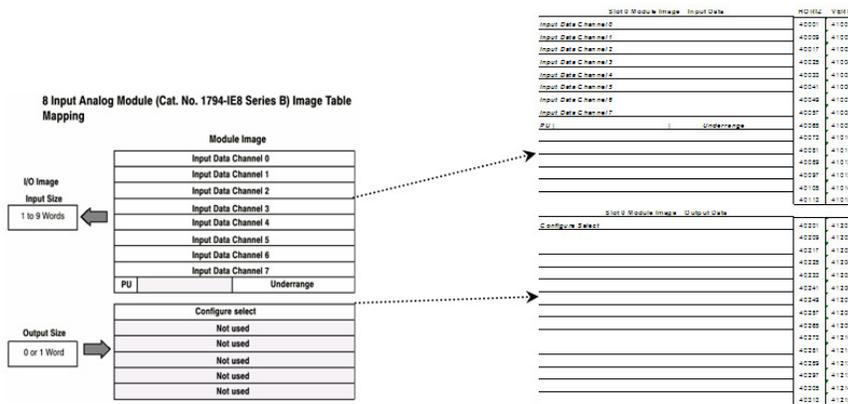
7 Example Address Mapping

In This Chapter

- ❖ Application Example..... 34
- ❖ Address Map..... 35
- ❖ Function Code Address Ranges..... 37
- ❖ Work Sheets..... 38



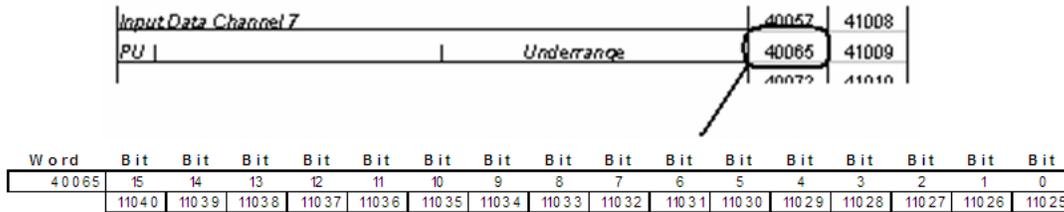
7.1 Application Example



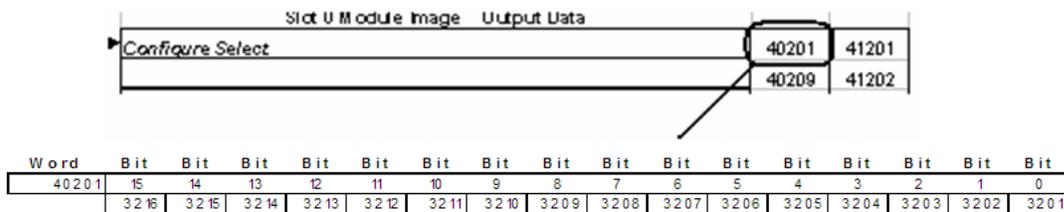
Use the information provided with your I/O to fill in the work sheets (page 38). This will help you to decide the best way to address each I/O block. In most applications Analog I/O will be addressed using the Vertical method. Discrete I/O must be addressed using the Horizontal method only.

Slot 0 Module Image	Input Data	HORIZ	VERT
Input Data Channel 0	40001		41001
Input Data Channel 1	40008		41002
Input Data Channel 2	40017		41003
Input Data Channel 3	40025		41004
Input Data Channel 4	40033		41005
Input Data Channel 5	40041		41006
Input Data Channel 6	40049		41007
Input Data Channel 7	40057		41008

The Input Data will be read vertically as holding registers



The Underrange bits will be read as inputs



The Configuration Selection bits will be written as coils.

7.2 Address Map

	Slot 0-H	Slot 0-V	Slot 1-H	Slot 1-V	Slot 2-H	Slot 2-V	Slot 3-H	Slot 3-V
READ	40001	41001	40002	41016	40003	41031	40004	41046
	40009	41002	40010	41017	40011	41032	40012	41047
	40017	41003	40018	41018	40019	41033	40020	41048
	40025	41004	40026	41019	40027	41034	40028	41049
	40033	41005	40034	41020	40035	41035	40036	41050
	40041	41006	40042	41021	40043	41036	40044	41051
	40049	41007	40050	41022	40051	41037	40052	41052
	40057	41008	40058	41023	40059	41038	40060	41053
	40065	41009	40066	41024	40067	41039	40068	41054
	40073	41010	40074	41025	40075	41040	40076	41055
	40081	41011	40082	41026	40083	41041	40084	41056
	40089	41012	40090	41027	40091	41042	40092	41057
	40097	41013	40098	41028	40099	41043	40100	41058
	40105	41014	40106	41029	40107	41044	40108	41059
	40113	41015	40114	41030	40115	41045	40116	41060

	Slot 4-H	Slot 4-V	Slot 5-H	Slot 5-V	Slot 6-H	Slot 6-V	Slot 7-H	Slot 7-V
READ	40005	41061	40006	41076	40007	41091	40008	41106
	40013	41062	40014	41077	40015	41092	40016	41107
	40021	41063	40022	41078	40023	41093	40024	41108
	40029	41064	40030	41079	40031	41094	40032	41109
	40037	41065	40038	41080	40039	41095	40040	41110
	40045	41066	40046	41081	40047	41096	40048	41111
	40053	41067	40054	41082	40055	41097	40056	41112
	40061	41068	40062	41083	40063	41098	40064	41113
	40069	41069	40070	41084	40071	41099	40072	41114
	40077	41070	40078	41085	40079	41100	40080	41115
	40085	41071	40086	41086	40087	41101	40088	41116
	40093	41072	40094	41087	40095	41102	40096	41117
	40101	41073	40102	41088	40103	41103	40104	41118
	40109	41074	40110	41089	40111	41104	40112	41119
	40117	41075	40118	41090	40119	41105	40120	41120

	Slot 0-H	Slot 0-V	Slot 1-H	Slot 1-V	Slot 2-H	Slot 2-V	Slot 3-H	Slot 3-V
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	Slot 0-H	Slot04-V	Slot 1-H	Slot 1-V	Slot 2-H	Slot 2-V	Slot 3-H	Slot 3-V
WRITE	40201	41201	40202	41216	40203	41231	40204	41246
	40209	41202	40210	41217	40211	41232	40212	41247
	40217	41203	40218	41218	40219	41233	40220	41248
	40225	41204	40226	41219	40227	41234	40228	41249
	40233	41205	40234	41220	40235	41235	40236	41250
	40241	41206	40242	41221	40243	41236	40244	41251
	40249	41207	40250	41222	40251	41237	40252	41252
	40257	41208	40258	41223	40259	41238	40260	41253
	40265	41209	40266	41224	40267	41239	40268	41254
	40273	41210	40274	41225	40275	41240	40276	41255
	40281	41211	40282	41226	40283	41241	40284	41256
	40289	41212	40290	41227	40291	41242	40292	41257
	40297	41213	40298	41228	40299	41243	40300	41258
	40305	41214	40306	41229	40307	41244	40308	41259
	40313	41215	40314	41230	40315	41245	40316	41260

	Slot 4-H	Slot 4-V	Slot 5-H	Slot 5-V	Slot 6-H	Slot 6-V	Slot 7-H	Slot 7-V
WRITE	40205	41261	40206	41276	40207	41291	40208	41306
	40294	41262	40214	41277	40215	41292	40216	41307
	40383	41263	40222	41278	40223	41293	40224	41308
	40472	41264	40230	41279	40231	41294	40232	41309
	40561	41265	40238	41280	40239	41295	40240	41310
	40650	41266	40246	41281	40247	41296	40248	41311
	40739	41267	40254	41282	40255	41297	40256	41312
	40828	41268	40262	41283	40263	41298	40264	41313
	40917	41269	40270	41284	40271	41299	40272	41314
	41006	41270	40278	41285	40279	41300	40280	41315
	41095	41271	40286	41286	40287	41301	40288	41316
	41184	41272	40294	41287	40295	41302	40296	41317
	41273	41273	40302	41288	40303	41303	40304	41318
	41362	41274	40310	41289	40311	41304	40312	41319
	41451	41275	40318	41290	40319	41305	40320	41320

7.3 Function Code Address Ranges

Function	Address Type	Horizontal Read	Modbus Address	Horizontal Write	Modbus Address	Vertical Read	Modbus Address	Vertical Write	Modbus Address
1	Bit	0 to 1919	40001 to 40120	N/A	N/A	N/A	N/A	N/A	N/A
	Bit	3200 to 5119	40200 to 40320	N/A	N/A	N/A	N/A	N/A	N/A
2	Bit	0 to 1919	40001 to 40120	N/A	N/A	N/A	N/A	N/A	N/A
	Bit	3200 to 5119	40200 to 40320	N/A	N/A	N/A	N/A	N/A	N/A
3	Register	0 to 119	40001 to 40120	N/A	N/A	1000 to 1119	41001 to 41120	N/A	N/A
	Register	200 to 319	40200 to 40320	N/A	N/A	1200 to 1319	41201 to 41320	N/A	N/A
4	Register	0 to 119	40001 to 40120	N/A	N/A	1000 to 1119	41001 to 41120	N/A	N/A
	Register	200 to 319	40200 to 40320	N/A	N/A	1200 to 1319	41201 to 41320	N/A	N/A
5	Bit	N/A	N/A	3200 to 5119	40201 to 40320	N/A	N/A	N/A	N/A
6	Register	N/A	N/A	200 to 319	40201 to 40320	N/A	N/A	1200 to 1319	41201 to 41320
16	Register	N/A	N/A	200 to 319	40201 to 40320	N/A	N/A	1200 to 1319	41201 to 41320

7.4 Work Sheets

Slot 0 Module Image Input Data	HORIZ	VERT
	40001	41001
	40009	41002
	40017	41003
	40025	41004
	40033	41005
	40041	41006
	40049	41007
	40057	41008
	40065	41009
	40073	41010
	40081	41011
	40089	41012
	40097	41013
	40105	41014
	40113	41015

Slot 0 Module Image Output Data	HORIZ	VERT
	40201	41201
	40209	41202
	40217	41203
	40225	41204
	40233	41205
	40241	41206
	40249	41207
	40257	41208
	40265	41209
	40273	41210
	40281	41211
	40289	41212
	40297	41213
	40305	41214
	40313	41215

Slot 1 Module Image Input Data	HORIZ	VERT
	40002	41016
	40010	41017
	40018	41018
	40026	41019

Slot 1 Module Image Input Data	HORIZ	VERT
	40034	41020
	40042	41021
	40050	41022
	40058	41023
	40066	41024
	40074	41025
	40082	41026
	40090	41027
	40098	41028
	40106	41029
	40114	41030

Slot 1 Module Image Output Data	HORIZ	VERT
	40202	41216
	40210	41217
	40218	41218
	40226	41219
	40234	41220
	40242	41221
	40250	41222
	40258	41223
	40266	41224
	40274	41225
	40282	41226
	40290	41227
	40298	41228
	40306	41229
	40314	41230

Slot 2 Module Image Input Data	HORIZ	VERT
	40003	41031
	40011	41032
	40019	41033
	40027	41034
	40035	41035
	40043	41036
	40051	41037
	40059	41038
	40067	41039
	40075	41040

Slot 2 Module Image Input Data	HORIZ	VERT
	40083	41041
	40091	41042
	40099	41043
	40107	41044
	40115	41045

Slot 2 Module Image Output Data	HORIZ	VERT
	40203	41231
	40211	41232
	40219	41233
	40227	41234
	40235	41235
	40243	41236
	40251	41237
	40259	41238
	40267	41239
	40275	41240
	40283	41241
	40291	41242
	40299	41243
	40307	41244
	40315	41245

Slot 3 Module Image Input Data	HORIZ	VERT
	40004	41046
	40012	41047
	40020	41048
	40028	41049
	40036	41050
	40044	41051
	40052	41052
	40060	41053
	40068	41054
	40076	41055
	40084	41056
	40092	41057
	40100	41058
	40108	41059
	40116	41060

Slot 3 Module Image Output Data	HORIZ	VERT
	40204	41246
	40212	41247
	40220	41248
	40228	41249
	40236	41250
	40244	41251
	40252	41252
	40260	41253
	40268	41254
	40276	41255
	40284	41256
	40292	41257
	40300	41258
	40308	41259
	40316	41260

Slot 4 Module Image Input Data	HORIZ	VERT
	40005	41061
	40013	41062
	40021	41063
	40029	41064
	40037	41065
	40045	41066
	40053	41067
	40061	41068
	40069	41069
	40077	41070
	40085	41071
	40093	41072
	40101	41073
	40109	41074
	40117	41075

Slot 4 Module Image Output Data	HORIZ	VERT
	40205	41261
	40213	41262
	40221	41263
	40229	41264
	40237	41265
	40245	41266

Slot 4 Module Image Output Data	HORIZ	VERT
	40253	41267
	40261	41268
	40269	41269
	41277	41270
	41285	41271
	41293	41272
	41301	41273
	41309	41274
	41317	41275

Slot 5 Module Image Input Data	HORIZ	VERT
	40006	41076
	40014	41077
	40022	41078
	40030	41079
	40038	41080
	40046	41081
	40054	41082
	40062	41083
	40070	41084
	40078	41085
	40086	41086
	40094	41087
	40102	41088
	40110	41089
	40118	41090

Slot 5 Module Image Output Data	HORIZ	VERT
	40206	41276
	40214	41277
	40222	41278
	40230	41279
	40238	41280
	40246	41281
	40254	41282
	40262	41283
	40270	41284
	40278	41285
	40286	41286
	40294	41287

Slot 5 Module Image Output Data	HORIZ	VERT
	40302	41288
	40310	41289
	40318	41290

Slot 6 Module Image Input Data	HORIZ	VERT
	40007	41091
	40015	41092
	40023	41093
	40031	41094
	40039	41095
	40047	41096
	40055	41097
	40063	41098
	40071	41099
	40079	41100
	40087	41101
	40095	41102
	40103	41103
	40111	41104
	40119	41105

Slot 6 Module Image Output Data	HORIZ	VERT
	40207	41291
	40215	41292
	40223	41293
	40231	41294
	40239	41295
	40247	41296
	40255	41297
	40263	41298
	40271	41299
	40279	41300
	40287	41301
	40295	41302
	40303	41303
	40311	41304
	40319	41305

Slot 7 Module Image Input Data	HORIZ	VERT
	40008	41106
	40016	41107
	40024	41108
	40032	41109
	40040	41110
	40048	41111
	40056	41112
	40064	41113
	40072	41114
	40080	41115
	40088	41116
	40096	41117
	40104	41118
	40112	41119
	40120	41120

Slot 7 Module Image Output Data	HORIZ	VERT
	40208	41306
	40216	41307
	40224	41308
	40232	41309
	40240	41310
	40248	41311
	40256	41312
	40264	41313
	40272	41314
	40280	41315
	40288	41316
	40296	41317
	40304	41318
	40312	41319
	40320	41320

8 Support, Service & Warranty

In This Chapter

- ❖ Contacting Technical Support 45
- ❖ Return Material Authorization (RMA) Policies and Conditions..... 47
- ❖ LIMITED WARRANTY..... 49

Contacting Technical Support

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

- 1 Product Version Number
- 2 System architecture
- 3 Network details

If the issue is hardware related, we will also need information regarding:

- 1 Module configuration and associated ladder files, if any
- 2 Module operation and any unusual behavior
- 3 Configuration/Debug status information
- 4 LED patterns
- 5 Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers.

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Asia Pacific (location in Malaysia)	Tel: +603.7724.2080, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Asia Pacific (location in China)	Tel: +86.21.5187.7337 x888, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Europe (location in Toulouse, France)	Tel: +33 (0) 5.34.36.87.20, E-mail: support.EMEA@prosoft-technology.com Languages spoken include: French, English
Europe (location in Dubai, UAE)	Tel: +971-4-214-6911, E-mail: mea@prosoft-technology.com Languages spoken include: English, Hindi
North America (location in California)	Tel: +1.661.716.5100, E-mail: support@prosoft-technology.com Languages spoken include: English, Spanish
Latin America (Oficina Regional)	Tel: +1-281-2989109, E-Mail: latinam@prosoft-technology.com Languages spoken include: Spanish, English
Latin America (location in Puebla, Mexico)	Tel: +52-222-3-99-6565, E-mail: soporte@prosoft-technology.com Languages spoken include: Spanish
Brasil (location in Sao Paulo)	Tel: +55-11-5083-3776, E-mail: brasil@prosoft-technology.com Languages spoken include: Portuguese, English

8.1 Return Material Authorization (RMA) Policies and Conditions

The following Return Material Authorization (RMA) Policies and Conditions (collectively, "RMA Policies") apply to any returned product. These RMA Policies are subject to change by ProSoft Technology, Inc., without notice. For warranty information, see Limited Warranty (page 49). In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

8.1.1 Returning Any Product

- a) In order to return a Product for repair, exchange, or otherwise, the Customer must obtain a Return Material Authorization (RMA) number from ProSoft Technology and comply with ProSoft Technology shipping instructions.
- b) In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above (page 45). A Technical Support Engineer will request that you perform several tests in an attempt to isolate the problem. If after completing these tests, the Product is found to be the source of the problem, we will issue an RMA.
- c) All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft Technology, and be accompanied by proof of purchase and receipt date. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft Technology using a shipment method other than that specified by ProSoft Technology, or shipped without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
- d) A 10% restocking fee applies to all warranty credit returns, whereby a Customer has an application change, ordered too many, does not need, etc. Returns for credit require that all accessory parts included in the original box (i.e.; antennas, cables) be returned. Failure to return these items will result in a deduction from the total credit due for each missing item.

8.1.2 Returning Units Under Warranty

A Technical Support Engineer must approve the return of Product under ProSoft Technology's Warranty:

- a) A replacement module will be shipped and invoiced. A purchase order will be required.
- b) Credit for a product under warranty will be issued upon receipt of authorized product by ProSoft Technology at designated location referenced on the Return Material Authorization
 - i. If a defect is found and is determined to be customer generated, or if the defect is otherwise not covered by ProSoft Technology's warranty, there will be no credit given. Customer will be contacted and can request module be returned at their expense;
 - ii. If defect is customer generated and is repairable, customer can authorize ProSoft Technology to repair the unit by providing a purchase order for 30% of the current list price plus freight charges, duties and taxes as applicable.

8.1.3 Returning Units Out of Warranty

- a) Customer sends unit in for evaluation to location specified by ProSoft Technology, freight prepaid.
- b) If no defect is found, Customer will be charged the equivalent of \$100 USD, plus freight charges, duties and taxes as applicable. A new purchase order will be required.
- c) If unit is repaired, charge to Customer will be 30% of current list price (USD) plus freight charges, duties and taxes as applicable. A new purchase order will be required or authorization to use the purchase order submitted for evaluation fee.

The following is a list of non-repairable units:

- 3150 - All
- 3750
- 3600 - All
- 3700
- 3170 - All
- 3250
- 1560 - Can be repaired, only if defect is the power supply
- 1550 - Can be repaired, only if defect is the power supply
- 3350
- 3300
- 1500 - All

8.2 LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software, and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft Technology, Incorporated (ProSoft), and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

8.2.1 What Is Covered By This Warranty

- a) *Warranty On New Products:* ProSoft warrants, to the original purchaser, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires three (3) years from the date of shipment for Product purchased **on or after** January 1st, 2008, or one (1) year from the date of shipment for Product purchased **before** January 1st, 2008 (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 39 months from date of original shipment. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or remanufactured replacement parts. ProSoft reserves the right, and at its sole discretion, may replace unrepairable units with new or remanufactured equipment. All replacement units will be covered under warranty for the 3 year period commencing from the date of original equipment purchase, not the date of shipment of the replacement unit. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft.
- b) *Warranty On Services:* Materials and labor performed by ProSoft to repair a verified malfunction or defect are warranted in the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

8.2.2 What Is Not Covered By This Warranty

- a) ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.
- b) This Warranty does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3, "C" or any variant of "C" programming languages) not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges; or (viii) disasters such as fire, flood, earthquake, wind and lightning.
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- f) **Additional Restrictions Relating To Software And Other Intellectual Property**

In addition to compliance with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

8.2.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 49) are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

8.2.6 Limitation of Remedies **

In no event will ProSoft or its Dealer be liable for any special, incidental or consequential damages based on breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Damages that ProSoft or its Dealer will not be responsible for include, but are not limited to: Loss of profits; loss of savings or revenue; loss of use of the product or any associated equipment; loss of data; cost of capital; cost of any substitute equipment, facilities, or services; downtime; the claims of third parties including, customers of the Purchaser; and, injury to property.

** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas, the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

8.2.7 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 39 months following shipment of the Product.

8.2.8 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

8.2.9 Allocation of Risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

8.2.10 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

Index

A

Adapter Status Word • 24
Address Map • 35
Allocation of Risks • 52
Application Example • 34

B

Battery Life Advisory • 3

C

Contacting Technical Support • 45, 47
Controlling Law and Severability • 53

D

Diagnostics and Troubleshooting • 29
Disclaimer of all Other Warranties • 51
Disclaimer Regarding High Risk Activities • 50

E

Error Codes • 28
Example Address Mapping • 33

F

Function Code Address Ranges • 37
Functional Overview • 11

G

General Specifications • 8

H

How to Contact Us • 2

I

Important Installation Instructions • 3
Installation • 14
Intellectual Property Indemnity • 51

L

LED Indicators • 30
Limitation of Remedies ** • 52
LIMITED WARRANTY • 47, 49

M

Markings • 4
Modbus Addressing Concepts • 11
Modbus Function Counters • 27
Modbus Specifications • 9
Modbus Status • 28
Module Addressing • 19
Module Configuration and Installation • 13
Module Information • 26

Module Status Words • 25
Mounting (or Replacing) the module on an existing system • 15
Mounting on a DIN-rail before installing the terminal base units • 14
MVI (Multi Vendor Interface) Modules • 3

N

No Other Warranties • 52

P

Pinouts • 3, 14, 15, 16
Product Specifications • 7
ProSoft Technology® Product Documentation • 2

R

Reading Discrete Inputs • 20
Return Material Authorization (RMA) Policies and Conditions • 47
Returning Any Product • 47
Returning Units Out of Warranty • 48
Returning Units Under Warranty • 48
RS-485 and RS-422 Tip • 16

S

Setting the switches • 17
Status Information • 23
Support, Service & Warranty • 45

T

The Data Space in the module • 12
Time Limit for Bringing Suit • 52
Troubleshooting
 General • 31

W

Warnings • 3
What Is Covered By This Warranty • 49, 51
What Is Not Covered By This Warranty • 50
Wiring • 16
Work Sheets • 34, 38
Writing Discrete Outputs • 21

Y

Your Feedback Please • 2