

# **FLEX-PRO<sup>®</sup>**

Peristaltic Metering Pump

*Advanced Communication Manual*

# MODBUS RTU



**ProSeries<sup>®</sup>**  
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PLEASE READ ENTIRE INSTRUCTION MANUAL PRIOR TO INSTALLATION AND USE.

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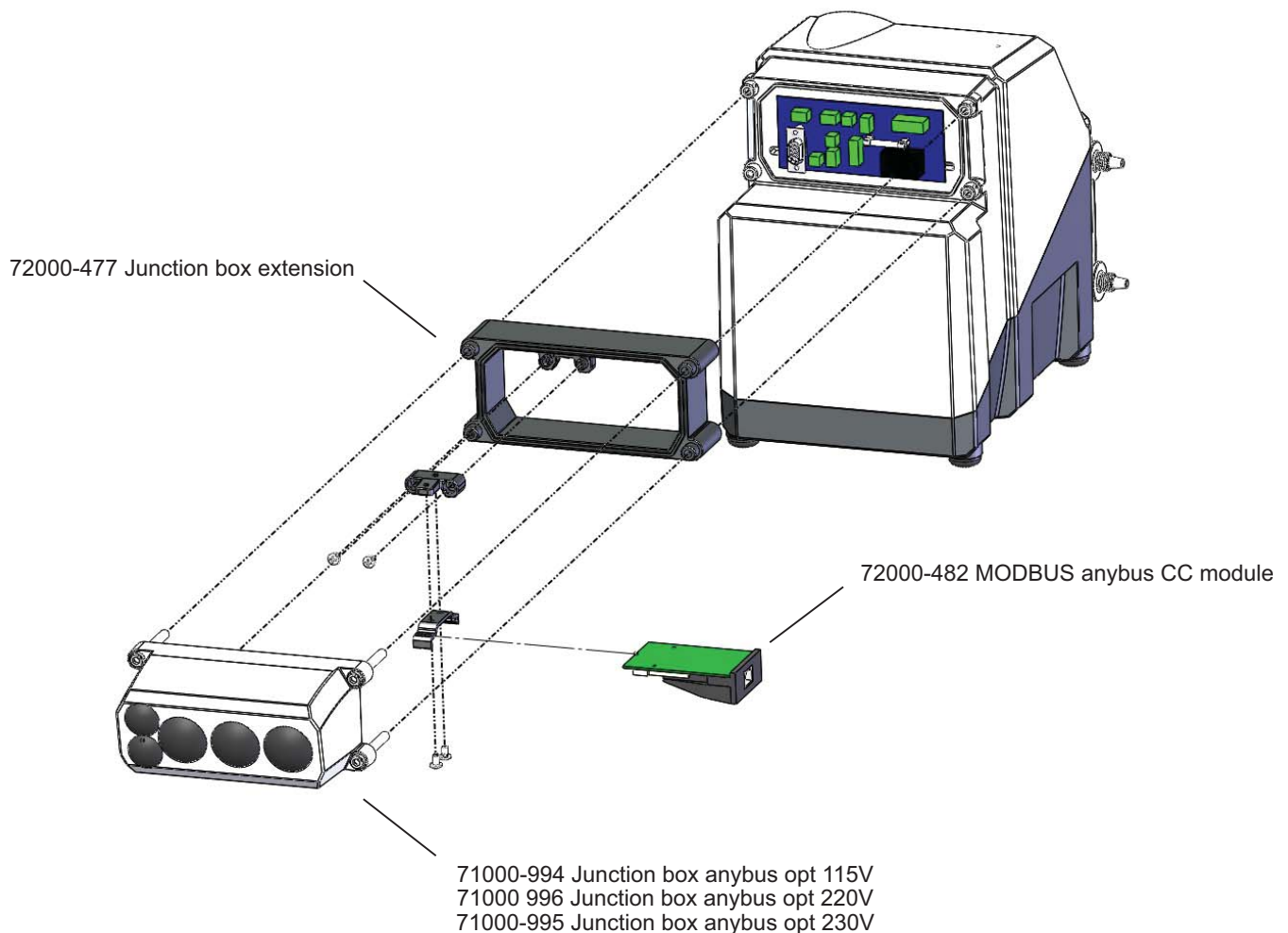
## 1.0 Introduction

Prior to installing your communication kit, please read instruction and operating instructions manual that shipped with your pump.

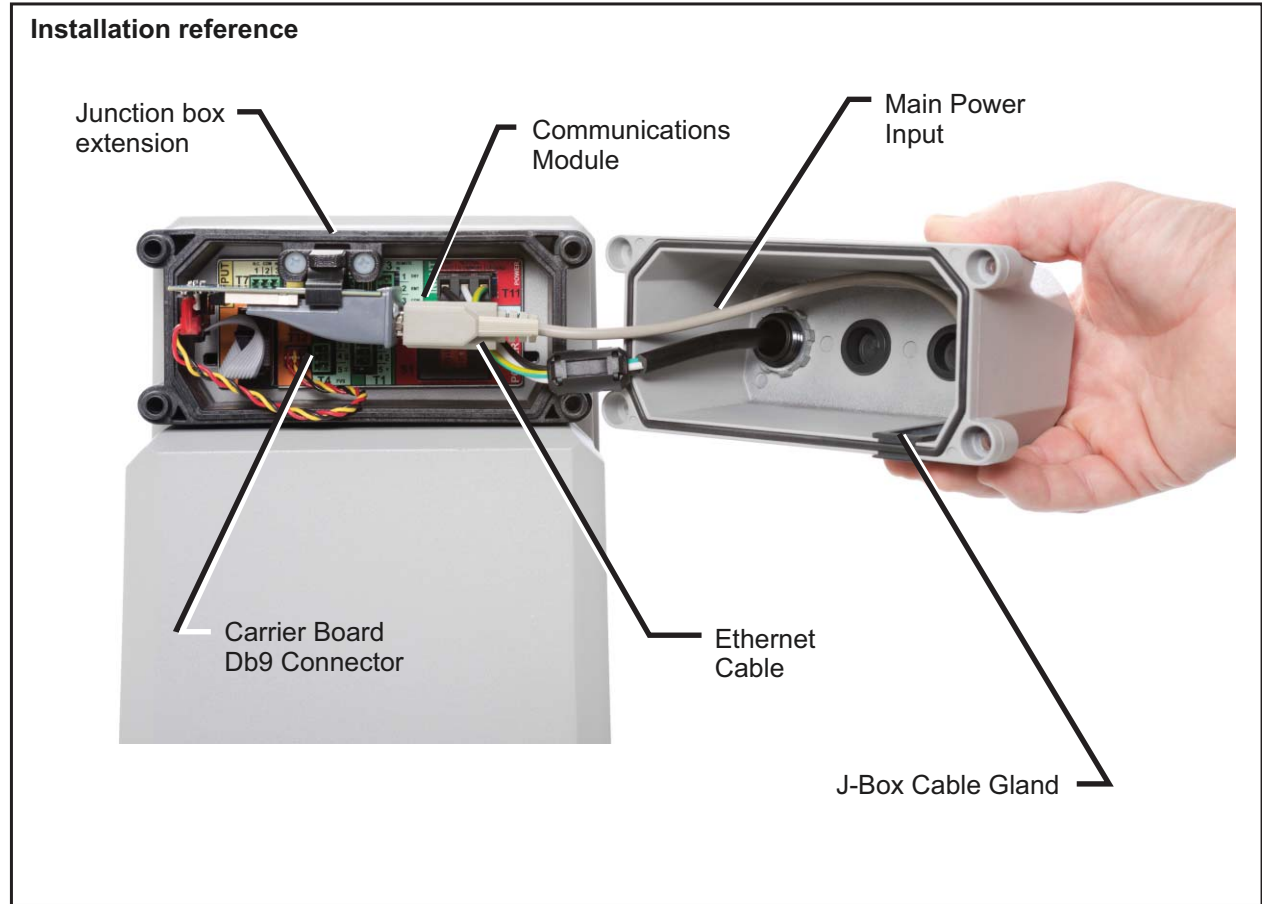
This manual describes how to install a MODBUS kit to your Flex-Pro® variable speed Peristaltic Metering Pump.

### What You'll Need - One of the following based on your electrical requirements:

- MODBUS Communication Kit #72000-504 For 115V 60Hz Power Cord (USA)
- MODBUS Communication Kit #72000-505 For 220V 50Hz Power Cord (EU)
- MODBUS Communication Kit #72000-506 For 230V 60Hz Power Cord (USA)



## 2.0 Junction box wiring and components



### 3.0 Installation instructions

#### Step 1

Loosen liquid-tight connector to allow slack for removal of junction box



#### Step 2

Unscrew and remove all junction box screws



#### Step 3

Remove old junction box



**Step 4**

Disconnect existing wiring by pulling out terminal connectors.

**Step 5**

Locate new junction box with cable gland slot.

**Step 6**

Prepare components for installation.

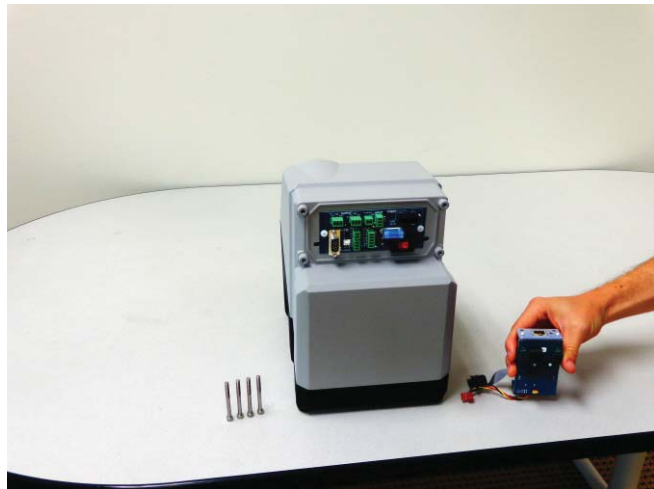


**Step 7**

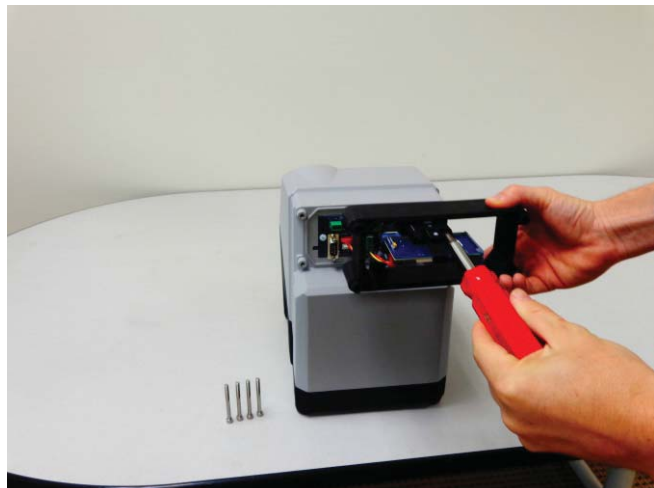
Install clip onto communication module.

**Step 8**

Clip should be mounted onto module as shown.

**Step 9**

Install Anybus module using clip mounting system.





**Step 10**

Connect power cable from communication carrier board to terminal board on pump.

**Step 11**

Install Anybus module using clip mounting system.

**Step 12**

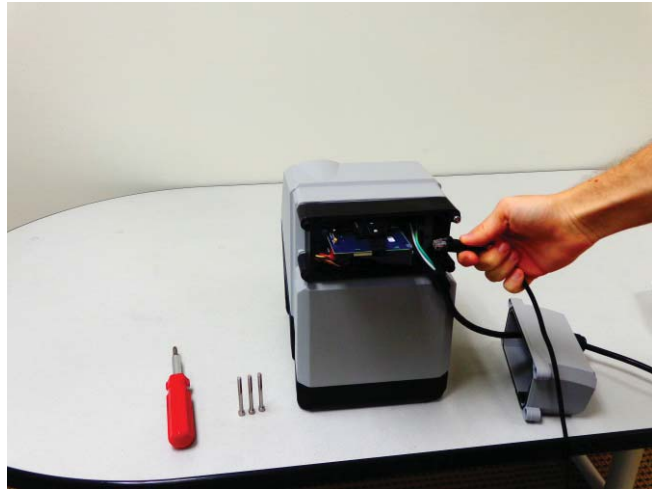
Connect power cable from communication carrier board to terminal board on pump.





**Step 13**

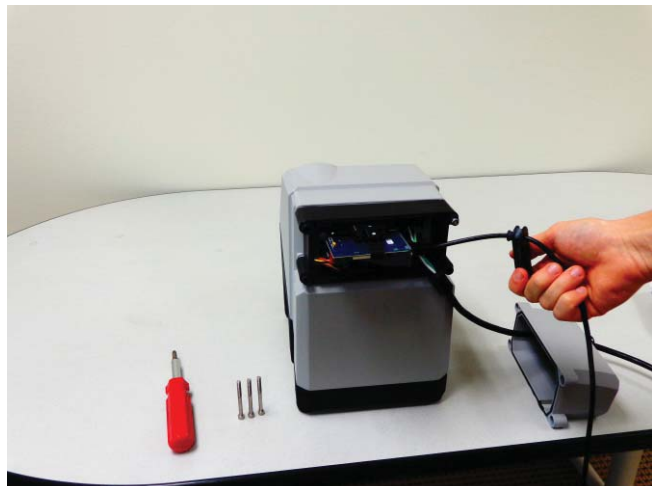
Connect external communications cable from communication carrier board to pump terminal board.

**Step 14**

External communications cable should be connected as shown.

**Step 15**

Remove installed cable gland and re-route wiring through it.



**Step 16**

Replace cable gland with re-routed wiring.



**Step 17**

Place junction box onto pump.



**Step 18**

Tighten liquid-tight connectors.



## 4.0 Setting up MODBUS

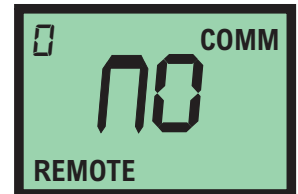
### Step 1

Press and release MODE button until you reach this screen.  
Press and hold MODE button



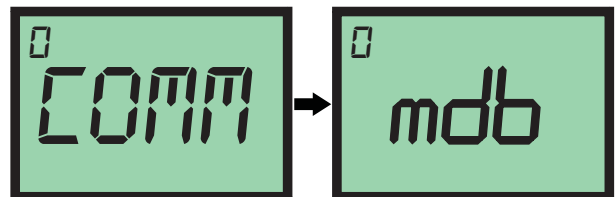
### Step 2

You should arrive at this screen. Notice Remote icon begins flashing. This indicates that you've entered Setup menu.



### Step 3

Press and release RIGHT ARROW button to scroll through menu until you see COMM briefly flash on screen. From here you can press UP or DOWN arrows to cycle through different communication protocols.



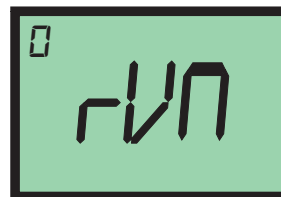
### Step 4

Pressing the mode button will select displayed protocol, in this case MODBUS. Upon selection you'll be asked to select a network ADDRESS for your pump. An ADDRESS will identify your pump by assigning it a number of your choice from 1 to 245. Select desired ADDRESS by pressing UP or DOWN and press RIGHT ARROW to confirm your selection.



### Step 5

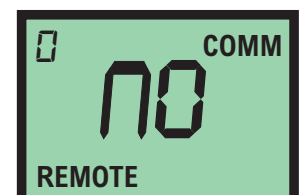
After you've made your selection press UP or DOWN arrows to select RUN or RESET. Whenever you select a new ADDRESS always select RESET to lock in your selection. Select reset then press RIGHT ARROW to confirm selection.



### Step 6

After you've pressed MODE button you should return to this screen.

Please note COMM will flash if there is no connection, COMM will remain solid once connection is made.



**TIP: Pump will time out after 5 seconds of inactivity**

## 4.1 Troubleshooting Setup

These are possible conditions of the **COMM** icon regarding connection:

- Steady: a successful connection has been made.
  - Slow flashing (~1 second rate): Pump is idling, waiting to be connected to network master.
  - Fast flashing (~0.5 second rate): Incorrect communication module type was programmed in pump menu.
  - No **COMM** icon: Feature is disabled in menu or no ANYBUS module detected, or pump was programmed with a “conflict” IP address.
-

## 5.0 Anybus - Control and status mapping

### Control Word: Master to Pump

Modbus Data Address (Hex) ==>	Modbus Data Address (Hex)	Data type	Bit	Function Description																																							
0000	0000	Read/Write	bit 0	Start/Stop pump Transition 0->1 (Edge trigger) = START pump Transition 1->0 (Edge trigger) = STOP pump <u>Note:</u> A toggle of 0->1 of this bit is required to start pump; and a toggle of 1->0 of this bit is required to stop pump.																																							
			bit 1	Prime Transition 0->1 (Edge trigger) = Start a 60-second prime cycle @ max speed <u>Note:</u> A toggle of 0->1 of this bit is required to initiate a prime.																																							
			bit 2	Lock/Unlock START and STOP button(s) (0 = Unlocked, 1 = Locked)																																							
			bit 3	Lock/Unlock MODE button (0 = Unlocked, 1 = Locked)																																							
			bit 4	Lock/Unlock UP & DOWN buttons (0 = Unlocked, 1 = Locked)																																							
			bit 5	Reserved =====> set to 0																																							
			bit 6	Reserved =====> set to 0																																							
			bit 7	Clear all alarms Transition 0->1 (Edge trigger) = Clear all alarms <u>Note:</u> A toggle of 0->1 of this bit is required to clear alarm. If the source of the alarm has been cleared (e.g. DFD alarm) then this action will cause the pump to exit the alarm state. If the source of the alarm is still present, pump will immediately enter alarm state.																																							
			bit 8	Reserved =====> set to 0																																							
			bit 9	Reserved =====> set to 0																																							
			bit 10	Reserved =====> set to 0																																							
			bit 11	Reserved =====> set to 0																																							
			bit 12-15	Set Pump Operating (RUN) Mode: <u>Note:</u> Set pump to "OFF" before change pump operating mode.																																							
			<table border="1"> <thead> <tr> <th>Bit 15</th> <th>Bit 14</th> <th>Bit 13</th> <th>Bit 12</th> <th>Equiv. Hex value</th> <th>PUMP OPERATING MODE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0x0</td> <td>MANUAL SPEED (Mode 1)</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0x1</td> <td>4-20 mA INPUT (Mode 2)</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0x4</td> <td>0-1000 Hz FREQ INPUT (Mode 3)</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>0x5</td> <td>PULSE/BATCH (Mode 4)</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td></td> <td>Reserved</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td></td> <td>Reserved</td> </tr> </tbody> </table>		Bit 15	Bit 14	Bit 13	Bit 12	Equiv. Hex value	PUMP OPERATING MODE	0	0	0	0	0x0	MANUAL SPEED (Mode 1)	0	0	0	1	0x1	4-20 mA INPUT (Mode 2)	0	1	0	0	0x4	0-1000 Hz FREQ INPUT (Mode 3)	0	1	0	1	0x5	PULSE/BATCH (Mode 4)	x	x	x	x		Reserved	x	x	x
Bit 15	Bit 14	Bit 13	Bit 12	Equiv. Hex value	PUMP OPERATING MODE																																						
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x	x	x	x		Reserved																																						
x	x	x	x		Reserved																																						
0001	0001	Read/Write	16 bits	Numeric Value (unsigned interger, Pump Speed in Percent, Multiplied by 10) Valid Range = 10 to 1000 (1.0% to 100.0%). Min Speed 1.0% =====> 0010 (decimal value) = 0x000A (Hexadecimal value) Max Speed 100.0% =====> 1000 (decimal value) = 0x03E8 (Hexadecimal value) Eg: To set 67.3 %Speed, take 67.3 X 10 = 673 =====> Enter 0x02A1 (equivalent Hexadecimal value) Pump will run at the set speed until the motor speed is changed locally via the UP or DOWN button keys when they are unlocked.																																							
0002	0002	Read/Write	32 bits	Reserved =====> set to 0																																							
0003	0003																																										

### Status Word: Pump to Master

Modbus Data Address (Hex)	Data type	Bit	Function Description				
0000	Read-Only	bit 0	Status of Motor On/Off (0 = Stop, 1 = Running)				
		bit 1	Status of Priming (0 = Not prime, 1 = Priming)				
		bit 2	Reserved				
		bit 3	Status of START& STOP buttons (0 = Unlocked, 1 = Locked)				
		bit 4	Status of MODE button (0 = Unlocked, 1 = Locked)				
		bit 5	Status of UP & DOWN buttons (0 = Unlocked, 1 = Locked)				
		bit 6	Reserved				
		bit 7	Reserved				
		bit 8	Reserved				
		bit 9	Reserved				
		bit 10	Reserved				
		bit 11	Reserved				
		0001	Read-Only	Status of Pump Operating (Run) Mode			
Bit 15	Bit 14			Bit 13	Bit 12	Equiv. Hex value	PUMP OPERATING MODE
0	0			0	0	0x0	MANUAL SPEED (Mode 1)
0	0			0	1	0x1	4-20 mA INPUT (Mode 2)
0	1			0	0	0x4	0-1000 Hz FREQ INPUT (Mode 3)
0	1			0	1	0x5	PULSE/BATCH (Mode 4)
X	X			X	X		Reserved
bit 0	Status of DFD (0 = Ok, 1 = Alarm)						
bit 1	Status of FVS (0 = Ok, 1 = Alarm)						
bit 2	Status of General Alarm (0 = Ok, 1 = Alarm)						
bit 3	Status of Output Relay (0 = Not energized, 1 = Energized)						
bit 4	Reserved						
bit 5	Reserved						
bit 6	Reserved						
bit 7	Reserved						
bit 8	Reserved						
bit 9	Status of "Out-Of-Range Speed request" 0 = Ok, requested speed was within range (from 1% to 100% speed) 1 = Error, requested speed was out-of-range						
bit 10	Status of "Mode change request while pump is running" 0 = Ok, Mode change requested while motor is off 1 = Error, Mode change requested while motor is on						
bit 11	Reserved						
bit 12	Reserved						
bit 13	Reserved						
bit 14	Reserved						
bit 15	Reserved						

## Status Word: Pump to Master (continued)

Input Registers (3x Reference) ==>	Modbus Data Address (Hex)	Data type	Bit	Function Description
	0000	Read-Only	16 bits	<b>Status of Motor Speed</b> Numeric Value (unsigned integer. Pump Speed in Percent, Multiplied by 10) Range = 10 to 1000 (for 1.0% to 100.0%) Min Speed 1.0% <=====> 0010 (decimal value) = 0x000A (Hexadecimal value) Max Speed 100.0% <=====> 1000 (decimal value) = 0x03E8 (Hexadecimal value)
	0003	Read-Only	16 bits	Reserved
	0004	Read-Only	32 bits	Reserved
	0005	Read-Only		
	0006	Read-Only	16 bits	Reserved
	0007	Read-Only	32 bits	Reserved
	0008	Read-Only		
	0009	Read-Only	16 bits	<b>Status of mA Input Signal</b> Numeric Value (unsigned integer. Analog input signal in mA, Multiplied by 100) Range = 400 to 2000 (for 4.00 mA to 20.00 mA) Min Input signal 4.00 mA <=====> 400 (Decimal value) = 0x0005 (Hexadecimal value) Max Input signal 20.00 mA <=====> 2000 (Decimal value) = 0x0D70 (Hexadecimal value)
	000A	Read-Only	16 bits	<b>Status of Hz Input Signal</b> Numeric Value (unsigned integer. Frequency input signal in Hz) Range = 0 to 1000 (for 0 to 1000 Hz) Min Input Frequency 0 Hz <=====> 0000 (Decimal value) = 0x0000 (Hexadecimal value) Max Input Frequency 1000 Hz <=====> 1000 (Decimal value) = 0x03E8 (Hexadecimal value)
	000B	Read-Only	16 bits	<b>Status of mA Output Signal</b> Numeric Value (unsigned integer. Analog Output signal in mA, Multiplied by 100) Range = 400 to 2000 (for 4.00 mA to 20.00 mA) Min Output signal 4.00 mA <=====> 400 (Decimal value) = 0x0005 (Hexadecimal value) Max Output signal 20.00 mA <=====> 2000 (Decimal value) = 0x0D70 (Hexadecimal value)
	000C	Read-Only	16 bits	Reserved
	000D	Read-Only	16 bits	Pump SW version - Ex: 2.0 (a decimal value with 1 decimal point)
	000E		16 bits	Pump Model - Ex: MC3, MC2, C3V, C2V (ASCII characters)
	000F	Read-Only	32 bits	Reserved
	0010			

## Supported Function Codes

Code / Hex	Description
04 (0x04)	Read INPUT Registers (registers # 3x)
03 (0x03)	Read Holding Registers (registers # 4x)
06 (0x06)	Write Single Holding Registers (registers # 4x)
16 (0x10)	Write Multiple Holding Registers (registers # 4x)
23 (0x17)	Read/Write Multiple Registers (registers # 4x)



### LIMITED WARRANTY

Your new Clem-Pro pump is a quality product and is warranted for 24 months from date of purchase (proof of purchase is required). The pump will be repaired or replaced at our discretion.

### WHAT IS NOT COVERED

- **Pump diaphragm and rubber components – They are perishable and require periodic replacement.**
- **Pump removal, or re-installation, and any related labor charge.**
- **Freight to the factory, or ProSeries service center.**
- **Pumps that have been tampered with, or in pieces.**
- **Damage to the pump that results from misuse, carelessness such as chemical spills on the enclosure, abuse, lack of maintenance, or alteration which is out of our control.**
- **Pumps damaged by faulty wiring, power surges or acts of nature.**

Blue-White Industries does not assume responsibility for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products. Failure must have occurred due to defect in material or workmanship and not as a result of operation of the product other than in normal operation as defined in the pump manual.

Warranty status is determined by the pump's serial label and the sales invoice or receipt. The serial label must be on the pump and legible. The warranty status of the pump will be verified by Blue-White Industries or a factory authorized service center.

### OTHER IMPORTANT WARRANTY INFORMATION

Please be advised; injection and metering devices are not intended as a means of treating water to render it suitable for human consumption. When used as hypochlorinators, they are meant to destroy bacteria and algae contamination, before its removal by filtration. Acid and soda injectors are used for PH control (balance). Blue-White Industries injectors are factory tested with water only for pressure and performance. Installers and operators of these devices must be well informed and aware of the precautions to be taken when injecting various chemicals -especially those considered hazardous or dangerous, eye protection must be worn when working around this product or any other metering type of pump.

Should it become necessary to return the pump for repair or service, you must attach information regarding the chemical used as some residue may be present within the unit which could be a hazard to service personnel.

Blue-White Industries will not be liable for any damage that may result by the use of chemicals with their injectors and its components. Thank you.

### PROCEDURE FOR IN WARRANTY REPAIR

Contact the factory to obtain a RMA (Return Material Authorization) number. Carefully pack the pump to be repaired. It is recommended to include foot strainer and injection/check valve fitting since these devices may be clogged and part of the problem. Please enclose a brief description of the problem as well as the original invoice or sales receipt, or copy showing the date of purchase. Prepay all shipping costs. COD shipments will not be accepted. Warranty service must be performed by the factory or an authorized ProSeries service center. Damage caused by improper packaging is the responsibility of the sender. When In-Warranty repair or replacement is completed, the factory pays for return shipping to the dealer or customer.



Users of electrical and electronic equipment (EEE) with the WEEE marking per Annex IV of the WEEE Directive must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, recovery of WEEE and minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. The WEEE marking applies only to countries within the European Union (EU) and Norway. Appliances are labeled in accordance with European Directive 2002/96/EC. Contact your local waste recovery agency for a *Designated Collection Facility* in your area.

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