

*Advanced Communication Manual*

# PROFIBUS



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

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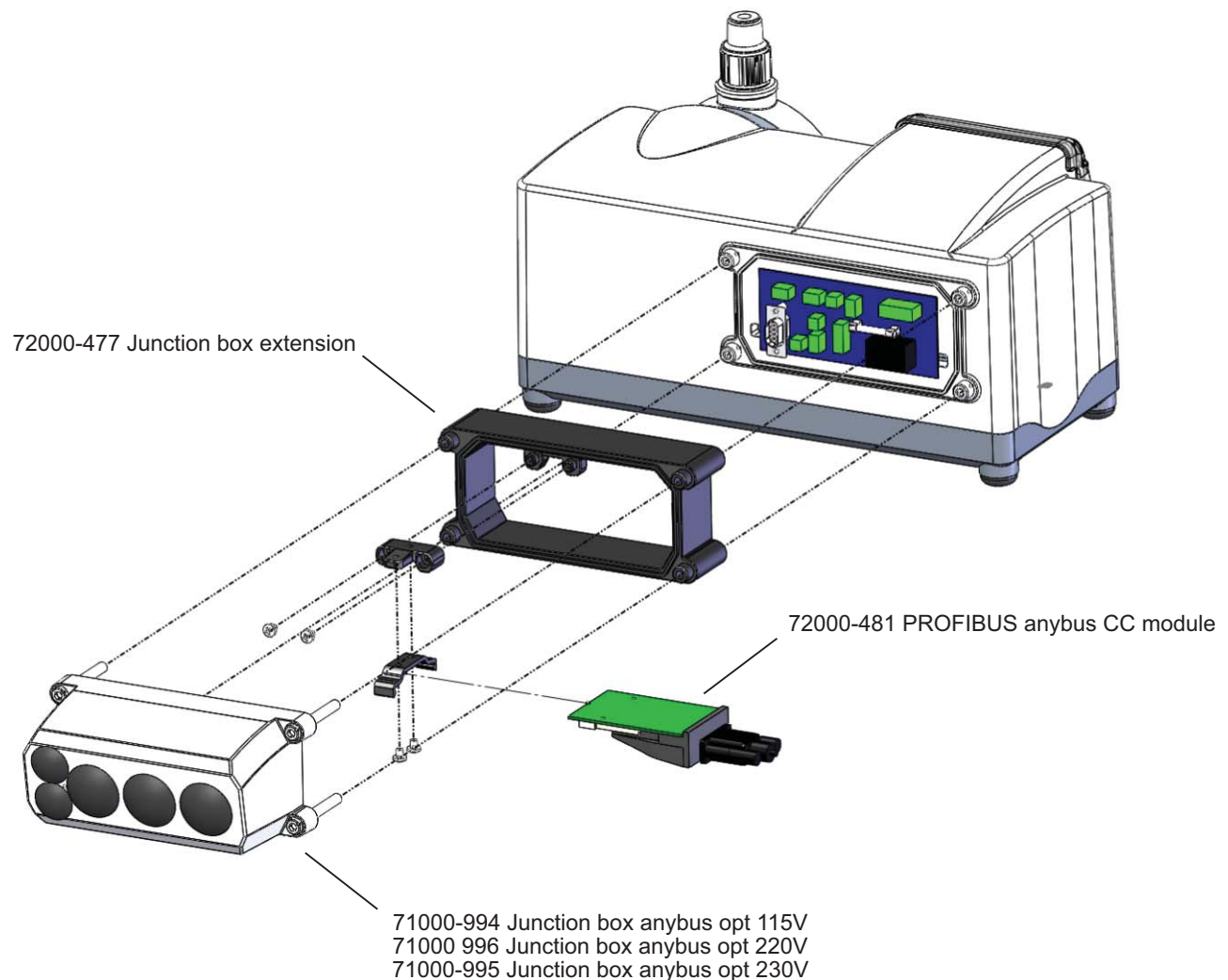
## 1.0 Introduction

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

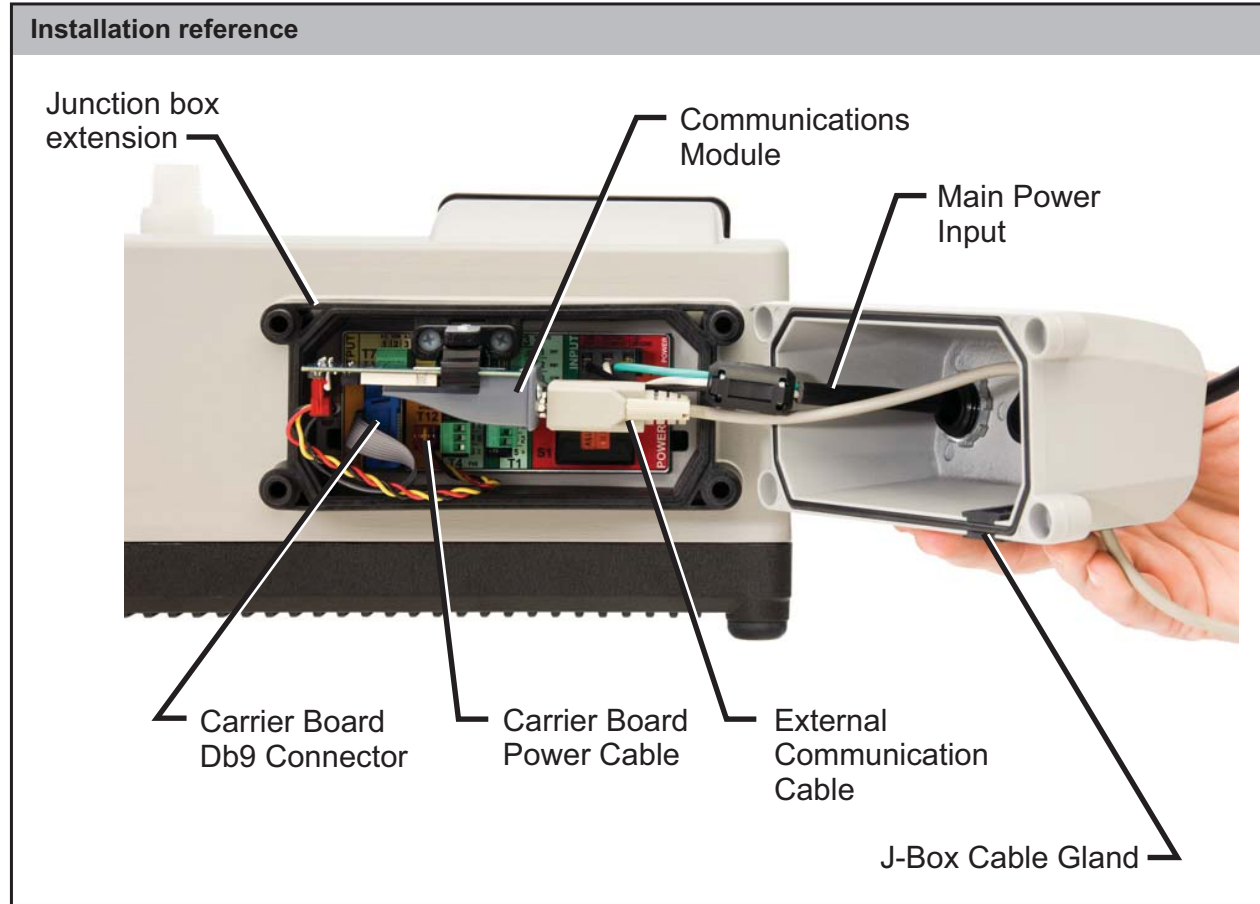
This manual describes how to install a PROFIBUS kit to your Chem-Pro® variable speed Diaphragm Metering Pump.

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

- PROFIBUS Communication Kit #72000-501 For 115V 60Hz Power Cord (USA)
- PROFIBUS Communication Kit #72000-502 For 220V 50Hz Power Cord (EU)
- PROFIBUS Communication Kit #72000-503 For 230V 60Hz Power Cord (USA)
- PROFIBUS Communication Kit #72000-520 For 240V 50Hz Power Cord (AU & NZ)



## 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.



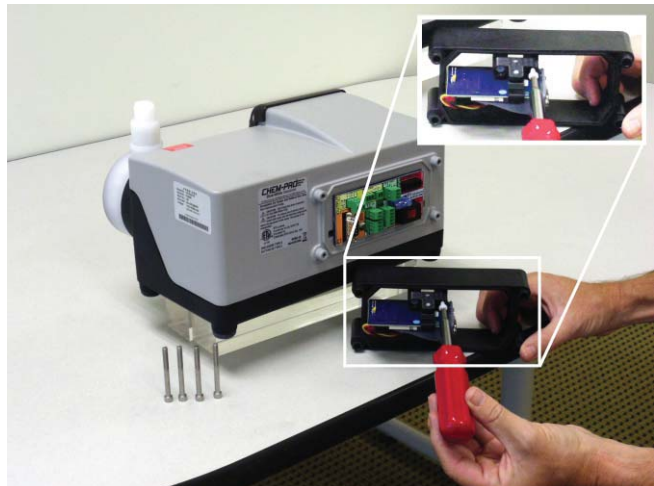
**Step 8**

Clip should be mounted onto module as shown.



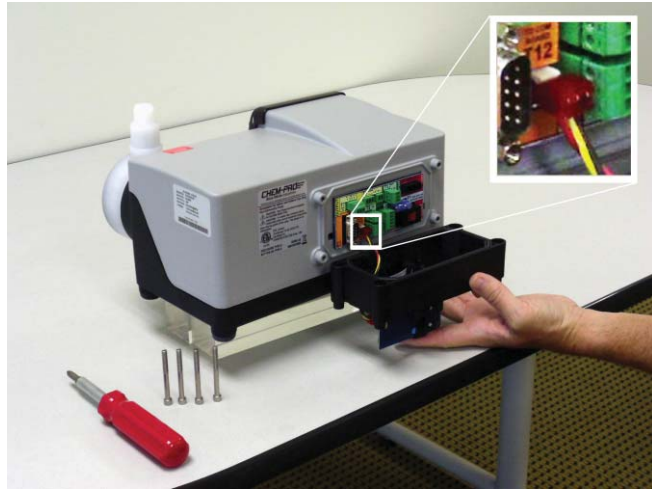
**Step 9**

Install Anybus module using clip mounting system.

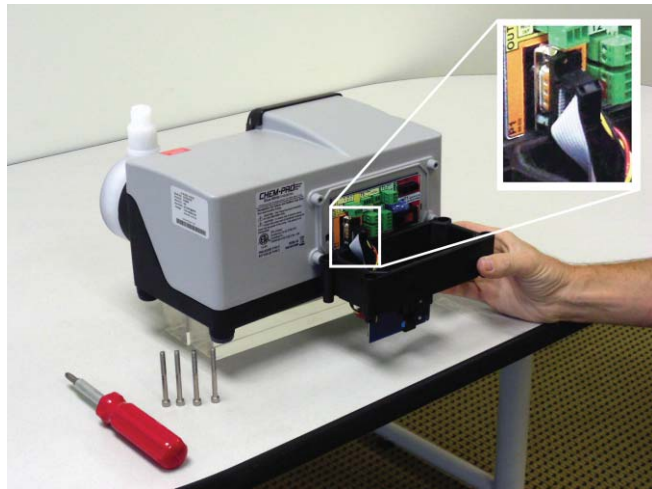


**Step 10**

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

**Step 11**

Install Anybus module using clip mounting system.

**Step 12**

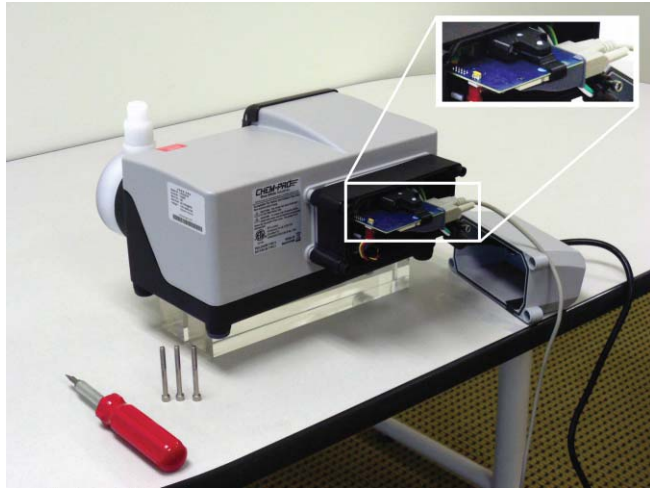
Connect external communications cable from communication carrier board to pump terminal board.





**Step 13**

External communications cable should be connected as shown.

**Step 14**

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

**Step 15**

Replace cable gland with re-routed wiring.



**Step 16**

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

**Step 17**

Place junction box onto pump.

**Step 18**

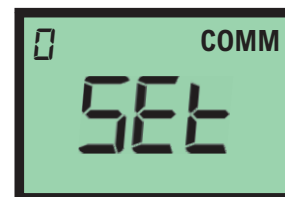
Tighten liquid-tight connectors.



## 4.0 Setting up PROFIBUS

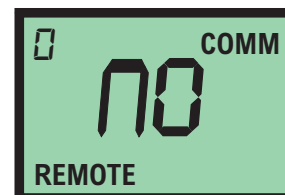
### Step 1

Power on pump and press and release MODE button until you arrive at this screen. From here, Press and hold MODE button.



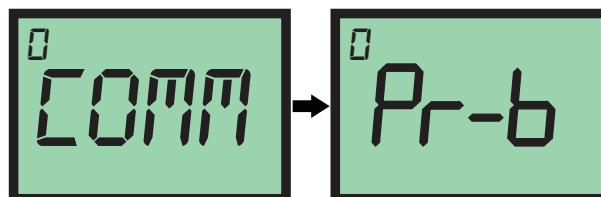
### Step 2

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



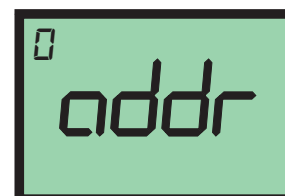
### Step 3

Press and release MODE button until you see COMM briefly flash on screen. From here you can press UP or DOWN arrows to cycle through different communication protocols. Pressing MODE button will select displayed protocol.



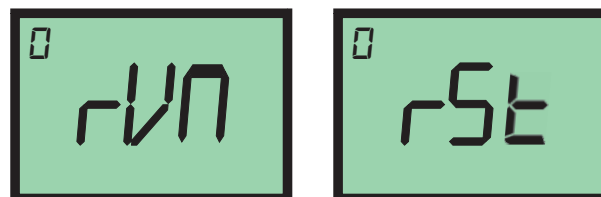
### Step 4

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 MODE to confirm your selection.



### Step 5

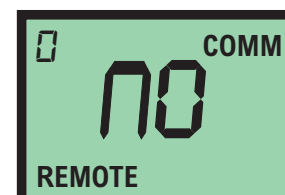
After you've made your selection press UP or DOWN arrows to select RUN or RESET. Whenever you select a new ADDRESS always select RESET to lock in your selection. Select reset then press MODE to confirm selection.



### Step 6

After you've pressed MODE button you'll 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**

## 5.0 Anybus - Control and status mapping

## Control Word: Master to Pump

CONTROL (Master to Pump)	Pump		Profibus DPV1 module		Description		
	word size (bits)	Bit	byte number	Bit			
Start/Stop pump	16	0	2	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.		
60-sec Priming @ Max pump speed		1		1	Transition from 0->1 (Edge trigger) = 60-second priming <u>Note:</u> A toggle of 0->1 of this bit is required to initiate a prime.		
Lock/Unlock Start & Stop button Key(s) (Stop pump in case of emergency; re-start pump after pump tube replacement; reset a fault, etc.)		2		2	1 = lock, 0 = Unlock. A "0" will allow both Start & Stop button keys on the pump control to be active.		
Lock/Unlock the MODE button key		3		3	1 = lock, 0 = Unlock. A "0" will allow the MODE button key on the pump control to be active.		
Lock/Unlock Arrow UP & Arrow DOWN button keys		4		4	1 = lock, 0 = Unlock. A "0" will allow both Arrow Up & Down keys to be active. Pump speed can now be set locally via the button keys which is independent of the network control via "Pump Speed Set point" command.		
Reserved		5		5	Reserved		
Reserved		6		6	Reserved		
Clear General Alarm (Reset all alarms)		7	7	Transition from 0->1 (Edge trigger) = Reset 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.			
Reserved		8	1	0	Reserved		
Reserved		9		1	Reserved		
Reserved		10		2	Reserved		
Reserved	11	3		Reserved			
Set operating (RUN) mode:  1.) MANUAL SPEED 2.) 4-20 mA INPUT 3.) 0-1000 Hz FREQ INPUT 4.) PULSE/BATCH 5.) Reserved for future use 6.) Reserved for future use	12-15	4-7		Pump Operating (RUN) Mode: <u>Note:</u> Set pump to "OFF" before change pump operating mode.			
			Bit 7	Bit 6	Bit 5	Bit 4	Equiv. Hex value
			0	0	0	0	0x0
			0	0	0	1	0x1
			0	1	0	0	0x4
			0	1	0	1	0x5
			X	X	X	X	
			X	X	X	X	
Pump Speed Set point (1.0% to 100% speed) (Network control in Manual Speed mode)	16	0-7	4	LS	Numeric Value (unsigned integer, 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 (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.		
		8-15	3	MS			
Reserved	32	0-31	5-8		Reserved		

Status information is defined in a structure containing the following elements.

Status information is a structure containing

4x	16bit	word
1x	32bit	word
1x	16bit	word
1x	32bit	word
4x	16bit	word
2x	32bit	word

**NOTE:** Profibus follows the big endian format (high order byte followed by low order byte)

### Status Word: Pump to Master

STATUS (Pump to Master)	Pump		Profibus DPV1 module		Description						
	Condition (bits)	Bit	BYTE number	Bit							
Motor ON/OFF Status	16	0	2	0	0 indicates pump if OFF 1 indicates pump is ON (Running)						
Priming status		1		1	0 = Not Priming, 1 = Priming						
Reserved		2		2	Reserved						
Local Start & Stop button key(s) status		3		3	1 = Locked, 0 = Unlocked						
Local MODE button key status		4		4	1 = Locked, 0 = Unlocked						
Local Arrow Up & Down keys status		5		5	1 = Locked, 0 = Unlocked						
Reserved		6		6	Reserved						
Reserved		7		7	Reserved						
Reserved		8	12-15	1	0	Reserved					
Reserved		9			1	Reserved					
Reserved		10			2	Reserved					
Reserved		11			3	Reserved					
Set operating (RUN) mode							Bit 7	Bit 6	Bit 5	Bit 4	Equiv. Hex value
1.) MANUAL SPEED							0	0	0	0	0x0
2.) 4-20 mA INPUT							0	0	0	1	0x1
3.) 0-1000 Hz FREQ INPUT				4-7	0	1	0	0	0x4		
4.) PULSE/BATCH				0	1	0	1	0x5			
5.) Reserved for future use				X	X	X	X				
6.) Reserved for future use				X	X	X	X				
DFD status	16	0	4	0	0 = Ok, 1 = Alarmed						
FVS status		1		1	0 = Ok, 1 = Alarmed						
General Alarm status		2		2	0 = Ok, 1 = Alarmed						
Output Relay status		3		3	0 = De-energized, 1 = energized						
Reserved		4		4	Reserved						
Reserved		5		5	Reserved						
Reserved		6		6	Reserved						
Reserved		7	7	Reserved							
Reserved		8	11-15	3	0	Reserved					
Requested speed is Out-of-Range		9			1	0 = Ok. Requested speed was Ok within range (from 1.0% to 100% speed) 1 = Error. Requested Speed was out-of-range					
Operating Mode Change requested while motor is running		10			2	0 = Ok. Mode change requested while motor is OFF; 1 = Error. Mode change requested while motor is ON					
Reserved		3-7			Reserved						

## Status Word: Pump to Master (continued)

STATUS (Pump to Master)	Pump		Profibus DPV1 module		Description		
	Operation (bits)	Bit	BYTE number	Bit			
Read Pump Speed (in %speed)	16	0-7	6	LS	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)		
		8-15	5	MS			
Reserved	16	0-7	8	LS	Reserved		
		8-15	7	MS			
Reserved	32	0-31	9-12		Reserved		
Reserved	16	0-15	13-14		Reserved		
Reserved	32	0-31	15-18		Reserved		
Read Analog Input Signal (in mA)	16	0-7	20	LS	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)		
		8-15	19	MS			
Read Frequency Input signal (in Hz)	16	0-7	22	LS	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)		
		8-15	21	MS			
Read Analog Output Signal (in mA)	16	0-7	24	LS	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)		
		8-15	23	MS			
Reserved	16	0-15	25-26		Reserved		
Pump Model & Software version	32	0-7	28		15	15	E.g.: C3V, C2V Version 1.5
		8-15	27		V	V	
		16-23	30		2	2	
		24-31	29		M	A	
Reserved	32	0-7	32		Reserved		
		8-15	31		Reserved		
		16-23	34		Reserved		
		24-31	33		Reserved		

### Notes:

1.0) a.\_ To Start pump via network control, Bit 0 of BYTE 2 must be set from Low to High, i.e., a transition from 0 to 1.

Sending a 1 may or may not start the motor.

b.\_ To Stop pump via network control, Bit 0 of BYTE 2 must be set from High to Low, i.e., transition from 1 to 0.

Sending a 0 may or may not stop the motor.

2.0) To change the operating mode of the pump via network control:

a.\_ First, stop pump in the current operating mode if it is running by setting Bit 0 or BYTE 1 from High to Low (1->0 transition);

b.\_ Second, send a new HEX value of the desired operating mode to the combination of bits 12, 13, 14, & 15.

If the above rule is not followed, the request to change the operating Mode of the pump may not be executed properly.

## 6.0 GSD File

```

=====
; GSD file for Blue-White Industries Pump Controller
;
; Blue-White Industries
; Pump Controller
; www.bw.com
;
; based on
;
; Profibus Device Database of HMS Industrial Networks.
;
; Model: Anybus-CC PROFIBUS DP-V1
; Description: Anybus-CC PROFIBUS DP-V1 slave
; Language: English
; Author: HMS Industrial Networks
; WWW: www.anybus.com
;
; Original HMS Revision log:
; 2.16 2008-12-04 Updated Min_Slave_Interval and Revision
; 2.15 2008-07-13 Updated Revision and Software_Release
; 2.14 2008-06-12 Updated Revision and Software_Release
; 2.13 2008-05-28 Updated Min_Slave_Interval, Revision and Software_Release
; 2.12 2008-03-05 Updated Revision, Software_Release.
; 2.11 2008-02-26 Updated Revision, Software_Release.
; 2.10 2008-02-13 Updated name of GSD file and model name so that new and old
; ABCC module can co-exist in one configuration.
; 2.09 2008-01-16 Updated Model Name.
; 2.08 2007-08-08 Updated Revision, Software_Release.
; 2.07 2007-07-31 Updated Revision, Software_Release and changed the keyword
; User_Prm_Data to Ext_User_Prm_Data_Const(0).
; 2.06 2007-05-25 Updated Revision, Software_Release.
; 2.05 2007-04-24 Updated Revision, Software_Release.
; 2.04 2007-04-13 Updated Revision and changed keyword User_Prm_Data_Len
; to Max_User_Prm_Data_Len;
; 2.03 2007-04-03 Updated Revision, Software_Release.
; 2.02 2007-03-20 Added the keywords for alarm as comments.
; 2.01 2007-02-14 Updated Revision, Software_Release, Hardware_Release.
; 2.00 2006-10-05 Added support for Identification and Maintenance.
; Updated C1/C2_Max_Data_Len, Revision and Software_Release.
; Removed support for Check_Cfg_Mode.
; Updated diagnostic messages. Updated revisions.
; 1.04 2005-05-26 Updated Revision, Software_Release and Model_Name.
; Increased C1_Response_timeout and C2_Response_Timeout.
; 1.03 2005-03-14 Updated Revision, Software_Release and Implementation_Type.
; 1.02 2004-11-29 Updated Revision, Software_Release, I/O lengths,
; Diag length, C1 and C2 data lengths.
; 1.01 2004-10-29 Updated Revision and Implementation_Type.
; 1.00 2004-09-28 First release
;
=====
#Profibus_DP

GSD_Revision = 5

; Device identification
Vendor_Name = "HMS Industrial Networks"
Model_Name = "Anybus compactCom DPV1"
Revision = "2.16"
Ident_Number = 0x1811
Protocol_Ident = 0 ; DP protocol
Station_Type = 0 ; Slave device
FMS_supp = 0 ; FMS not supported
Slave_Family = 0 ; General device
Hardware_Release = "Version 2.03"
Software_Release = "Version 2.11"

; Supported hardware features
Redundancy = 0 ; not supported
Repeater_Ctrl_Sig = 2 ; TTL
24V_Pins = 0 ; not connected
Implementation_Type = "NP30"

; Supported DP features
Freeze_Mode_supp = 1 ; supported
Sync_Mode_supp = 1 ; supported
Auto_Baud_supp = 1 ; supported
Set_Slave_Add_supp = 1 ; supported
Fail_Safe = 1 ; supported

```

```
; Supported baudrates
9.6_supp      = 1
19.2_supp     = 1
45.45_supp    = 1
93.75_supp    = 1
187.5_supp    = 1
500_supp      = 1
1.5M_supp     = 1
3M_supp       = 1
6M_supp       = 1
12M_supp      = 1

; Maximum responder time for supported baudrates
MaxTsd_r_9.6  = 15
MaxTsd_r_19.2 = 15
MaxTsd_r_45.45 = 15
MaxTsd_r_93.75 = 15
MaxTsd_r_187.5 = 15
MaxTsd_r_500  = 15
MaxTsd_r_1.5M = 25
MaxTsd_r_3M   = 50
MaxTsd_r_6M   = 100
MaxTsd_r_12M  = 200

; Maximum polling frequency
Min_Slave_Intervall = 6 ; 0.6 ms

; I/O related keywords
Modular_Station = 1 ; modular
Max_Module      = 152
Max_Input_Len   = 152
Max_Output_Len  = 152
Max_Data_Len    = 152
Modul_Offset    = 1

; Parameterization related keywords
Max_User_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0xC0,0x00,0x00

; Diagnostic related keywords
Max_Diag_Data_Len = 80

; Status diagnostic messages
Unit_Diag_Area=16-17
Value(0) = "Status not changed"
Value(1) = "Status appears"
Value(2) = "Status disappears"
Unit_Diag_Area_End

Unit_Diag_Area=24-31
Value(0) = "Minor, recoverable"
Value(16) = "Minor, unrecoverable"
Value(32) = "Major, recoverable"
Unit_Diag_Area_End

Unit_Diag_Area=32-39
Value(16) = "Generic Error"
Value(32) = "Current"
Value(33) = "Current, device input side"
Value(34) = "Current, inside the device"
Value(35) = "Current, device output side"
Value(48) = "Voltage"
Value(49) = "Mains Voltage"
Value(50) = "Voltage inside the device"
Value(51) = "Output Voltage"
Value(64) = "Temperature"
Value(65) = "Ambient Temperature"
Value(66) = "Device Temperature"
Value(80) = "Device Hardware"
Value(96) = "Device Software"
Value(97) = "Internal Software"
Value(98) = "User Software"
Value(99) = "Data Set"
Value(112) = "Additional Modules"
Value(128) = "Monitoring"
Value(129) = "Communication"
Value(130) = "Protocol Error"
Value(144) = "External Error"
Value(240) = "Additional Functions"
Unit_Diag_Area_End
```



```
; DPV1 related keywords
DPV1_Slave           = 1
Check_Cfg_Mode      = 0

C1_Read_Write_supp  = 1
C1_Max_Data_Len     = 68
C1_Response_Timeout = 100 ;1 sec

C2_Read_Write_supp  = 1
C2_Max_Data_Len     = 68
C2_Response_Timeout = 100 ;1 sec
C2_Max_Count_Channels = 1
Max_Initiate_PDU_Length = 52

Ident_Maintenance_supp = 1

; Definition of modules
Module = "Input 1 byte" 0x90      ;Byte, Consistency over whole module
1
EndModule
;
Module = "Input 1 word" 0xD0      ;Word, Consistency over whole module
2
EndModule
;
Module = "Input 2 words" 0xD1     ;Word, Consistency over whole module
3
EndModule
;
Module = "Input 4 words" 0xD3     ;Word, Consistency over whole module
4
EndModule
;
Module = "Output 1 byte" 0xA0     ;Byte, Consistency over whole module
5
EndModule
;
Module = "Output 1 words" 0xE0    ;Word, Consistency over whole module
6
EndModule
;
Module = "Output 2 words" 0xE1    ;Word, Consistency over whole module
7
EndModule
;
Module = "Output 4 words" 0xE3    ;Word, Consistency over whole module
8
EndModule
;

;Alarm settings are not on by default.
;Here are the parameters that are used for alarms:

;Diagnostic_Alarm_supp=1
;Process_Alarm_supp=1
;Pull_Plug_Alarm_supp=1
;Status_Alarm_supp=1
;Update_Alarm_supp=1
;Manufacturer_Specific_Alarm_supp=1

;Extra_Alarm_SAP_supp=0
;Alarm_Sequence_Mode_Count=32
;Alarm_Type_Mode_supp=1

;Diagnostic_Alarm_required=0
;Process_Alarm_required=0
;Pull_Plug_Alarm_required=0
;Status_Alarm_required=0
;Update_Alarm_required=0
;Manufacturer_Specific_Alarm_required=0
```

### 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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