Flow Management Devices, LLC

Prover Interface Module (PIM)

V3.6 owner and operation manual

Part Number: 000-100448-DOC Rev F

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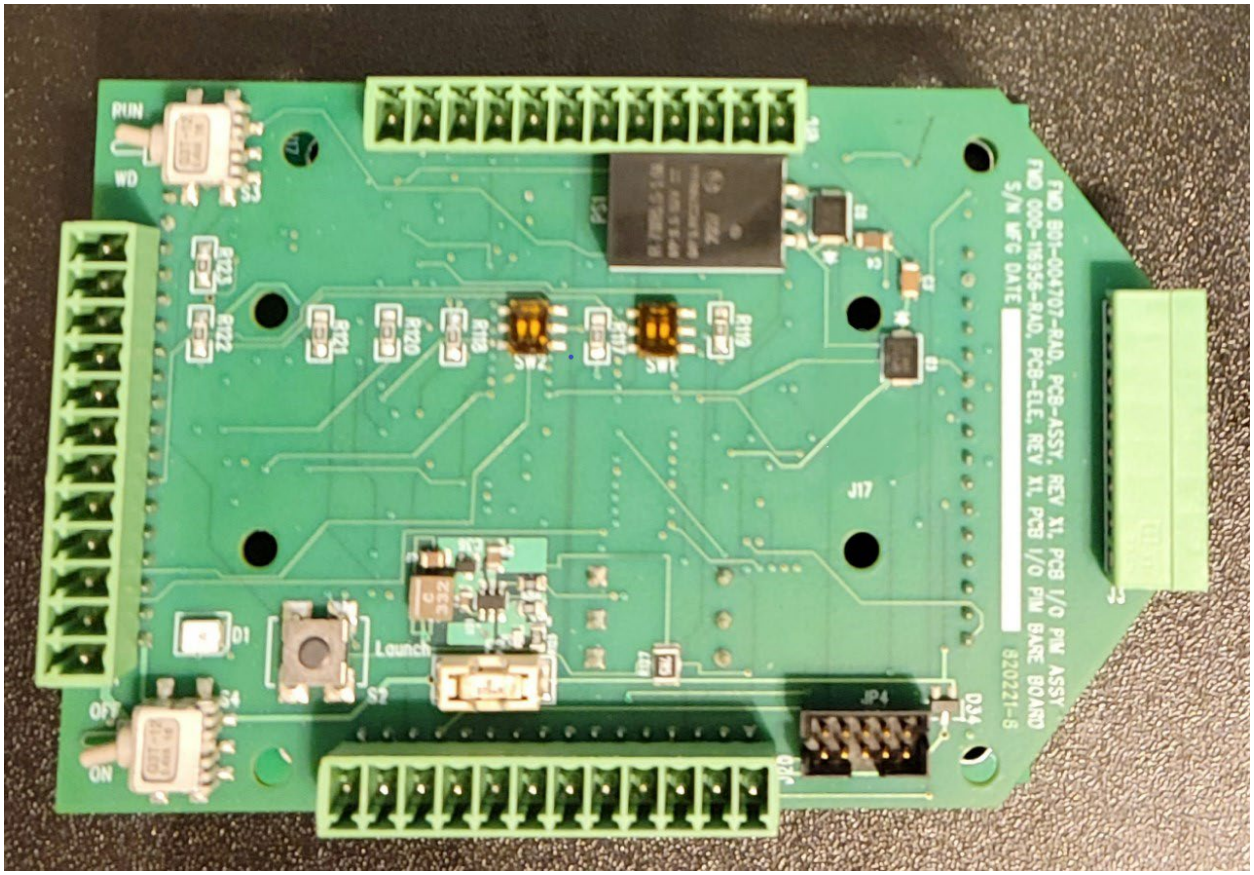
Introduction

The prover interface module (PIM) is a standalone controller with an option for a local or remote display unit mounted up to ½ mile (1km) away.



The PIM supports RS-232 and RS-485 serial data communications, programmable functionality, non-volatile data memory, a primary proving volume and one of two smaller secondary proving volumes, remote dual LED status indicators and the ability to accept either positive or negative user IO.

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Functional overview

The figures below depict the prover operation sequence as discussed in the following paragraphs.

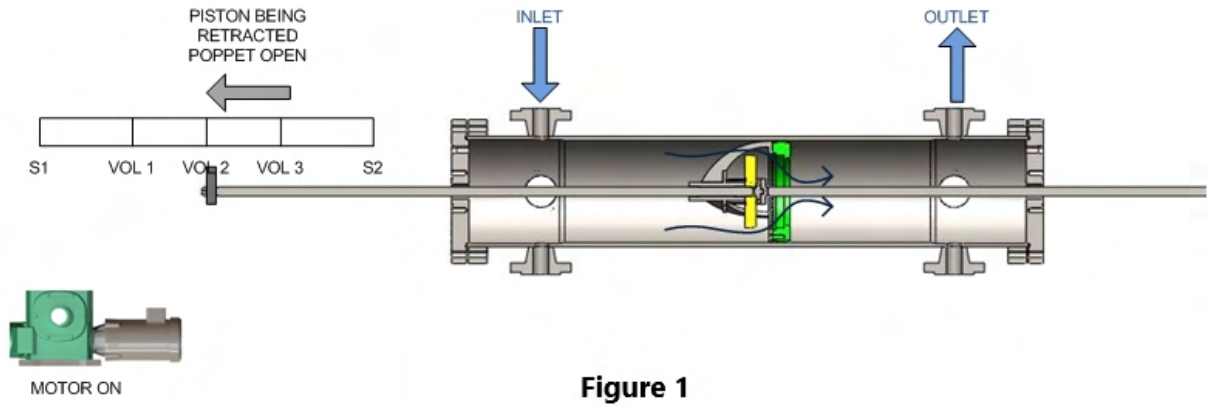

Figure 1

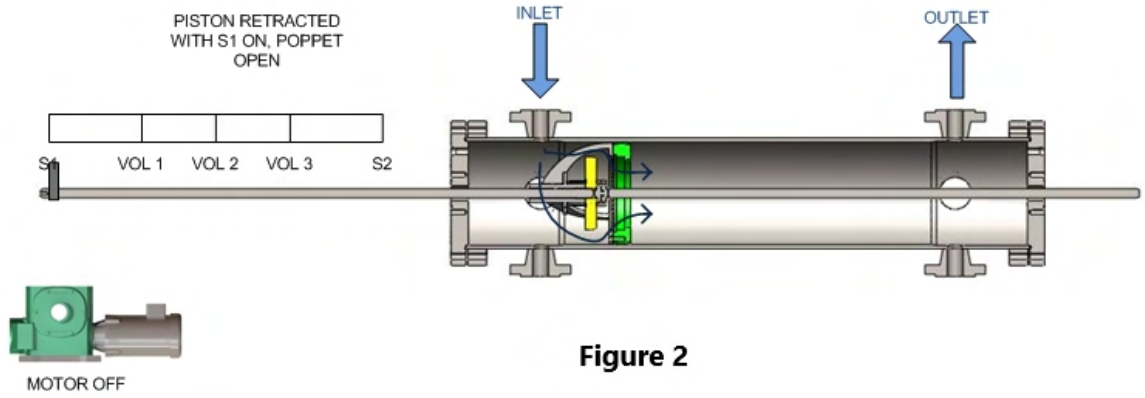

Figure 2

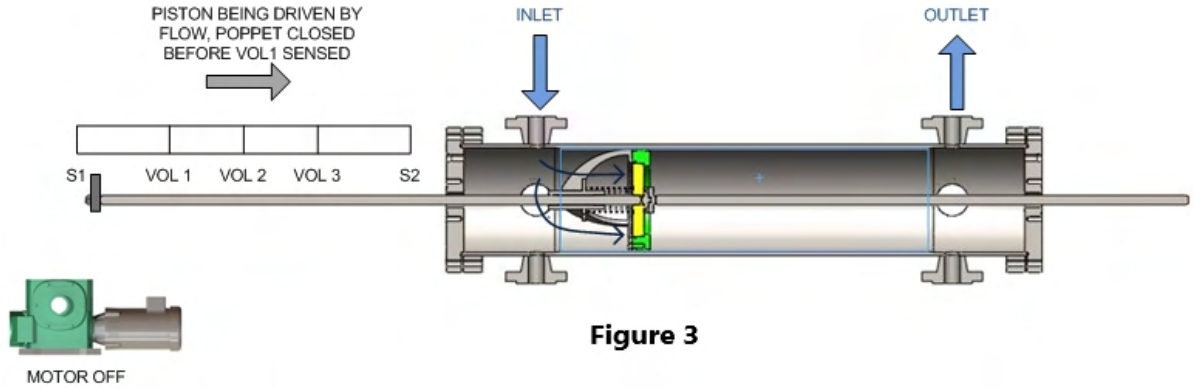

Figure 3

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Control Narrative

The flow chart (Diagrams 1 and 1a) located after this narrative provides a visual interpretation of the operational sequence of the small volume prover and the PIM.

A small volume prover is typically fitted with Inlet and Outlet process flow connections and drain connections allowing the prover to be emptied for service or for water draw calibration.

The prover piston assembly consists of the piston, a poppet assembly that is attached to the piston, and the piston shaft which holds the sensor block for the prover SwitchBar switches.

Operation of the small volume prover begins with a Launch signal. This signal can come from one of three sources; customer hardware such as a flow computer, a switch mounted on the PIM or via software communications.

The Launch signal tells the PIM to start the motor and engage the clutch after any delay time that might be set in the PIM. The motor contactor K502 is energized as is the clutch relay K501.

In Figure 1 the motor is on, the clutch engaged, and the piston is being retracted by a system of belts in the piston drive assembly. The green LED will be flashing fast and the switches on the SwitchBar are checked for proper sequencing. The word “retract” will be displayed on the bottom line of the optional display.

When the PIM senses switch S1 (Figure 2) the retract state is complete, the poppet is opened by contacting the cylinder end assembly and the clutch is turned off (K501). The motor (K502) will be turned off after the delay period set in the PIM. The green LED now flashes slowly, indicating that the measurement mode has been started. The word “measurement” will be displayed on the bottom line of the optional display. As forward movement commences the poppet closes allowing calibrated measurement to begin.

Figure 3 depicts the prover in the measurement mode. In this mode, the switches along the SwitchBar are checked again for correct sequencing. As the piston passes through switches V1, V2 and V3 two volume output pulses that correspond to the mode selected by the customer for either primary or secondary volume are generated to the host system and proving times for the primary or optional secondary measurement volumes are recorded in the PIM memory to microsecond accuracy. Accessing the proving volume time can be selected from the serial data port or from the keyboard when the optional display is present.

When the prover is equipped with switch V2 one of two smaller proving volumes may be selected. The first secondary volume is defined by V1 to V2. The other secondary volume is defined as V2 to V3. Only one secondary volume can be selected at a time. Passing the switches for the secondary volume creates pulses on the volume output line to the host system

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and generates the secondary measurement time in the PIM memory to microsecond resolution. Accessing the proving volume time can be selected from the serial data port or from the keyboard when the optional display is present.

Reaching flag V3 ends the measurement state and enables the detection of the launch signal which will restart the cycle. The green LED will now be steady on indicating that switch V3 has been detected. The word “launch” will be displayed on the bottom line of the optional display.

Water Draw mode is the same as normal operation except that the K0 Water Draw relay is active. For a primary volume water draw, water is drawn into the prover. When switch V1 is detected, relay K0 is triggered to switch from Waste mode to Fill mode. This energizes a solenoid which fills the measurement tank from the prover. When switch V3 is detected, relay K0 switches back to the Waste mode, water is diverted to the waste tank via a second solenoid and measurement is complete. For a secondary volume water draw, switch V2 is used as either the start or the end of measurement as determined by the selection in the PIM and relay K0 switches accordingly as the signal from V2 is detected.

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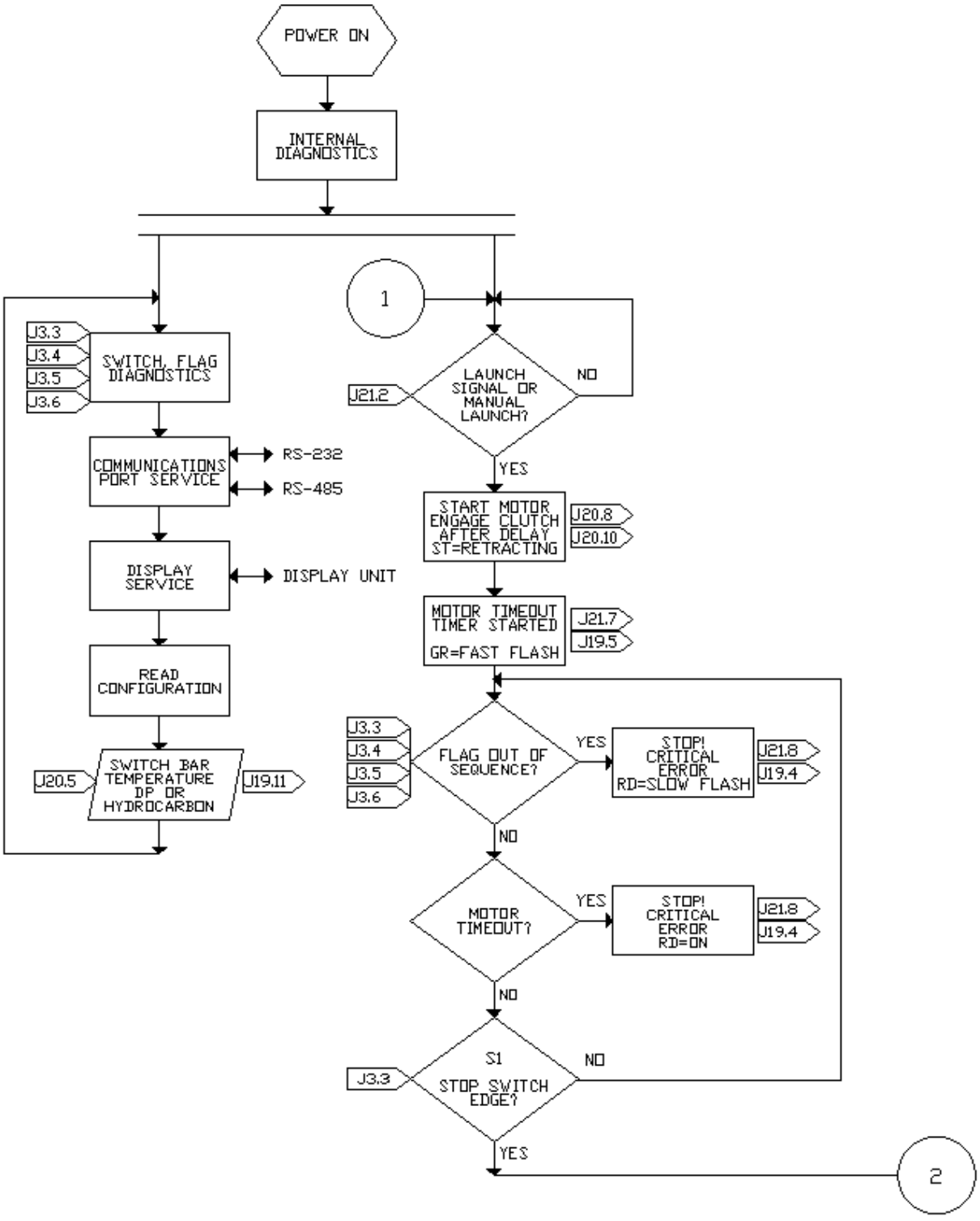

Diagram 1: Prover sequencing

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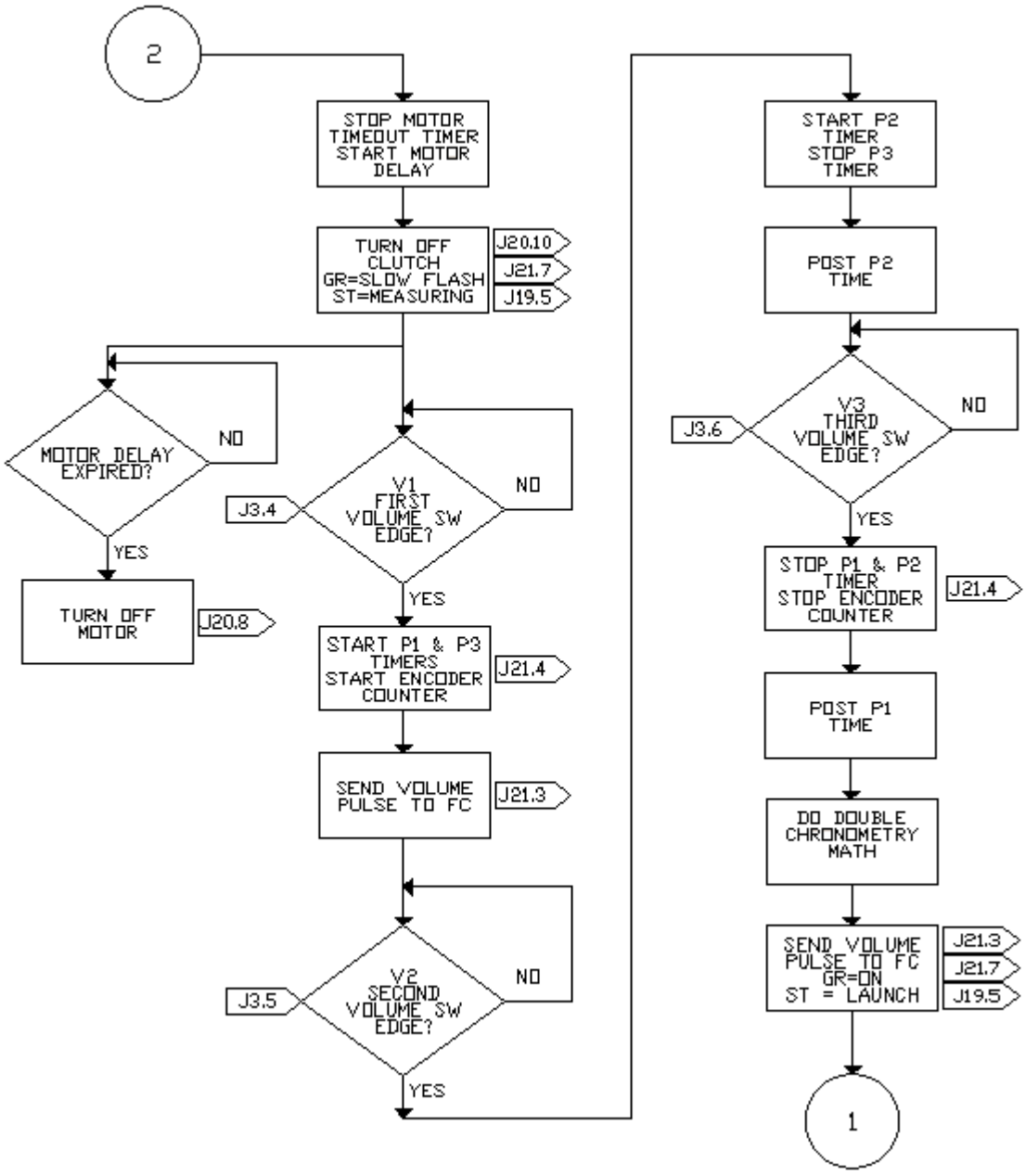

Diagram 1a: Prover sequencing

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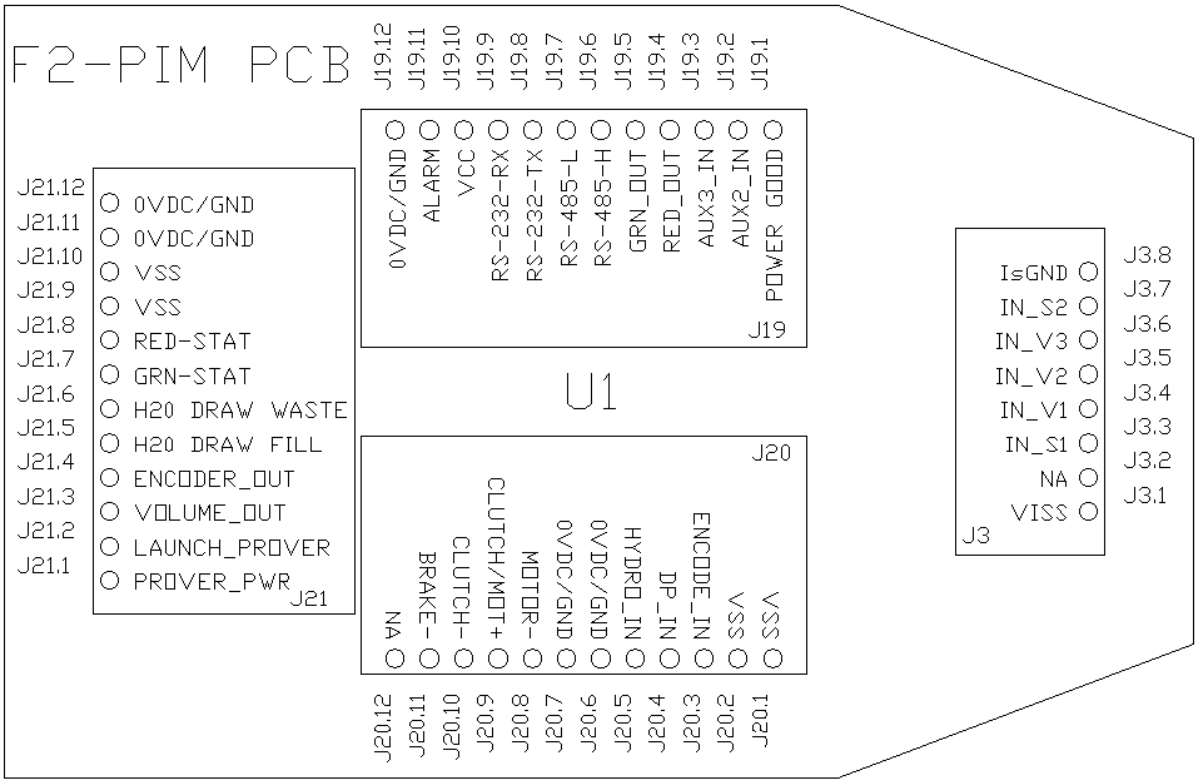
Input/Output terminations

There are 8 pin and 12 pin pluggable European style terminals on the PIM. In the view below the terminal plug at the center bottom (J20) connects to the prover, the one in the center top (J19) supports remote serial data access, remote status indication, and the optional remote display. The connector on the left (J21) connects to the host system via interposing relays. The one on the right (J3) provides an intrinsically safe connection to the prover Switchbar assembly.

A drawing of the PIM with terminal block functions is shown below:



PIM I/O board

The details for each terminal strip are given in the following tables. Specific wiring to known host systems is shown in Appendix B.

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The Switchbar terminals (J3)

Pin	Name	Description
1	ViSS	Intrinsically safe, fused and diode protected voltage to S1, V1, V2, V3 and S2.
2	Na	No connection.
3	S1	Sense line for switch S1 – turns the clutch off and starts a delay to turn off the motor. It initiates the measurement state. Sensing S1 to motor turn off may be delayed by setting S1 delay, item 40 in the programmable parameter memory.
4	V1	Sense line for flag V1 – starts primary measurement timing and generates the first pulse on vol1 out to the host system (J21-3).
5	V2	Optional flag V2 for defining secondary volumes .
6	V3	Sense line for flag V3 – stops measurement timing and generates the second pulse on vol1 out to the host system (J21-3).
7	S2	Optional switch for defining end of stroke (piston fully downstream and stopped). There is no logic supporting this function in this version.
8	IsGND	0VDC/system ground connection for S1, V1, V2, V3 and S2.

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Remote communications interface terminals (J19)

Pin	Name	Description
1	Power good	24VDC indicating motor/clutch power must be sensed here to enable launch. (see note 1)
2	Aux 2 in	Hi/lo logic spare input – no implementation in this version.
3	Aux 3 in	Hi/lo logic spare input – no implementation in this version.
4	Red out	Remote status red LED positive drive current limited by 475 ω resistor. (see note 2)
5	Green out	Remote status green LED positive drive current limited by 475 ω resistor. (see note 3)
6	RS-485-H	RS-485 H used to connect to optional remote display or PC.
7	RS-485-L	RS-485 L used to connect to optional remote display or PC.
8	RS-232-TX	RS-232 transmit serial communications. (see note 4)
9	RS-232-RX	RS-232 receive serial communications. (see note 4)
10	Vcc	+5v used to power optional remote display.
11	Alarm	Open collector output. On during hydrocarbon alarm.
12	0VDC/GND	Zero-volt/system ground terminal used with Vcc for optional remote display.

Notes:

1. A lack of voltage on the Power Good pin while starting a launch will cause a motor power fault alarm and disable the launch requiring a power cycle to clear the alarm.
2. A flashing red LED indicates a flag/switch sequence error. A solid red LED indicates a motor fault (timeout). The power to the PIM must be cycled to clear this fault. (See appendix A)
3. The green LED flashes fast when the motor is on, slow when the piston is moving downstream, and on solid after sensing V3 indicating that the cycle is complete and a launch signal will be accepted. (See appendix A)
4. These terminals host the RS-232 connection. If the remote display unit is connected to the RS-485 terminals, then the PC must be connected via RS-232. The remote display unit may also be connected to the RS-232 terminals so that the user can utilize the RS-485 connections. (See Appendix C)

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Host interface terminals (J21)

Pin	Name	Description
1	Prover PWR	User supplied power 12 to 28 VDC, 5 watt minimum.
2	Launch prover	Signal used to turn the motor and clutch on and retract the piston. This starts the prover cycle. Can be negative or positive going. Connects to relay K2 on terminal block X101. (see note 1)
3	Volume out	Pulses generated at start and end switches. Pulse width is programmable at parameter 41, vol1_out. Optically isolated open collector, 1k series resistance. Connects to relay K1 on terminal block X101. (see note 2)
4	Encoder out	Buffered encoder signal. Optically isolated 0 to 5v pulse.
5	Water draw fill	Used for water draw mode – connects to relay K0 on terminal block X101.
6	Water draw waste	Used for water draw mode – not connected for output.
7	Green out	Replicates the green led. Optically isolated open collector, 1k series resistance.
8	Red out	Replicates the red led. Optically isolated open collector, 1k series resistance.
9	VSS	Same as Prover PWR (J21.1) except internally fused, diode isolated, and passed through 20 ohms. The fuse is resettable; remove the excessive load and cycle the power to reset. (see notes 3 & 4)
10	VSS	(see above)
11	0VDC/GND	Zero-volt dc from same supply as prover PWR. (J21.1)
12	0VDC/GND	(see above)

Notes :

1. Launch input can be active high or active low (see item 30 in communication item definitions). If a pull up is required switch either slide switch on at sw1 for 10k ohm or both on for 5k to VSS. Sw1 the two small black slide switches found on the top board of the PIM assembly.
2. The volume out may either be hi true or low true. (see item 31 in communication item definitions). If a pull up is required switch either slide switch on at sw2 for 10k ohm or both on for 5k to VSS. Sw2 is one of the two small black slide switches found on the top board of the PIM assembly.
3. The VSS fuse trips at 400 ma. The PIM requires 5 watts minimum supply.

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4. VSS is typically 1.7v less than Prover PWR. With a 100ma load expect VSS to be 3.7v below Prover PWR due to a 20 ohm internal resistance.

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Clutch/motor function terminals (J20)

Pin	Name	Description
1	VSS	Same as J21.9 & J21.10.
2	VSS	Same as J21.9 & J21.10.
3	Encoder in	Encoder pulse input from the switch bar.
4	Temperature	4-20 ma representing switch bar temperature.
5	Differential pressure Or Hydrocarbon	4-20 ma representing differential pressure prover seal leak. Programmable alarm trigger level. (see communication items 130 – 138) or 4-20 ma representing hydrocarbon level. Programmable alarm trigger level. See communication items 50 – 54)
6	0VDC/GND	Zero-volt dc/system ground.
7	0VDC/GND	Zero-volt dc/system ground.
8	Motor-	Zero volt on this pin turns the motor on (K502). (see note 1)
9	Clutch/ motor+	Power to the motor and clutch relays; K502 and K501 respectively.
10	Clutch-	Zero volt on this pin turns the clutch on (K501). (see note 1)
11	Brake-	There is no logic supporting this function in this version.
12	Na	No connection.

notes :

1. The motor and clutch have separate programmable delay functions. (See parameters 43, 45, 46 and 48)

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Switchbar operation

Prover side - the PIM provides a nominal 6.3VDC to the Switchbar for switches S1, V1, V2, V3, and S2. This voltage is fused and protected by zener diodes to provide an intrinsically safe interface to the switch bar.

The signals will be around 0VDC when false and near ViSS (supplied voltage) when active.

IO setup

Host side - The PIM IO can be set to either positive or negative logic by the way it is configured. Both the launch and volume out connection to the host flow computer can be independently set for either positive or negative active logic by the software.

Active high launch –If the memory variable li (item 30) is set to active high then applying VSS (or any high voltage up to the user power supply voltage) to the J21-2 launch terminal will start the launch.

Active low launch –If the memory variable li (item 30) is set to active low then applying 0VDC/ground to the J21-2 launch terminal will start the launch.

If a pull up is required switch a single slide on at Sw1 for 10k ohm or both slides on for 5k to VSS. Sw1 is one of the two small black slide switches found on the top board of the PIM assembly.

Active high volume output – When the memory variable pi (item 31) is set to active low then the opto-isolator driving volume out, J21-3 will be on when the outputs are false, and off when outputting the pulse to the host.

Active low volume output – When the memory variable pi (item 31) is set to active high then the opto-isolator driving volume out, J21-3 will be off when the outputs are false, and on when outputting the pulse to the host.

If a pull up is required switch a single slide on at Sw2 for 10k ohm or both slides on for 5k to VSS. Sw2 is one of the two small black slide switches found on the top board of the PIM assembly.

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Calculations and compensations

The following describes the calculations made at the end of each prover run.

1. Calculate the flow rates for p1 and p2.

   F1 = pv / p1 and f2 = pv * (c2/c1) / p2

2. Calculate the effective switch bar length

   Sb = 4 * pv /(((id^2) – (so^2)) * 3.14159))

3. Calculate the prover volume correction for temperature

   pt = 1 + (pt – ct) * pt

4. Calculate the prove volume correction for pressure

   pp = 1 + (pp * id) / (pp * wt)

5. Calculate the prover volume factor for pressure and temperature.

   Pv = pt * pp

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Serial communications

The software program Winsd9 also known as Screwdriver9© can be used on any PC running Windows XP or later to access the parameters described above. The connection on the PC side is a 9 pin female DB9 connector.

Cables

In many cases, new laptop computers will not have a built-in serial port. A USB to serial adapter can be used. You can get a USB to RS-232 converter at B&B electronics http://www.bb-elec.com/ phone (815) 433-5100, pn 232USB9m. They are also available online or at local electronic and computer shops.

The PIM to DB9 should be wired as follows:

PIM J19 – 8	Female DB9 - 3	Receive
PIM J19 – 9	Female DB9 - 2	Transmit
PIM J19 – 12	Female DB9 – 5	Ground

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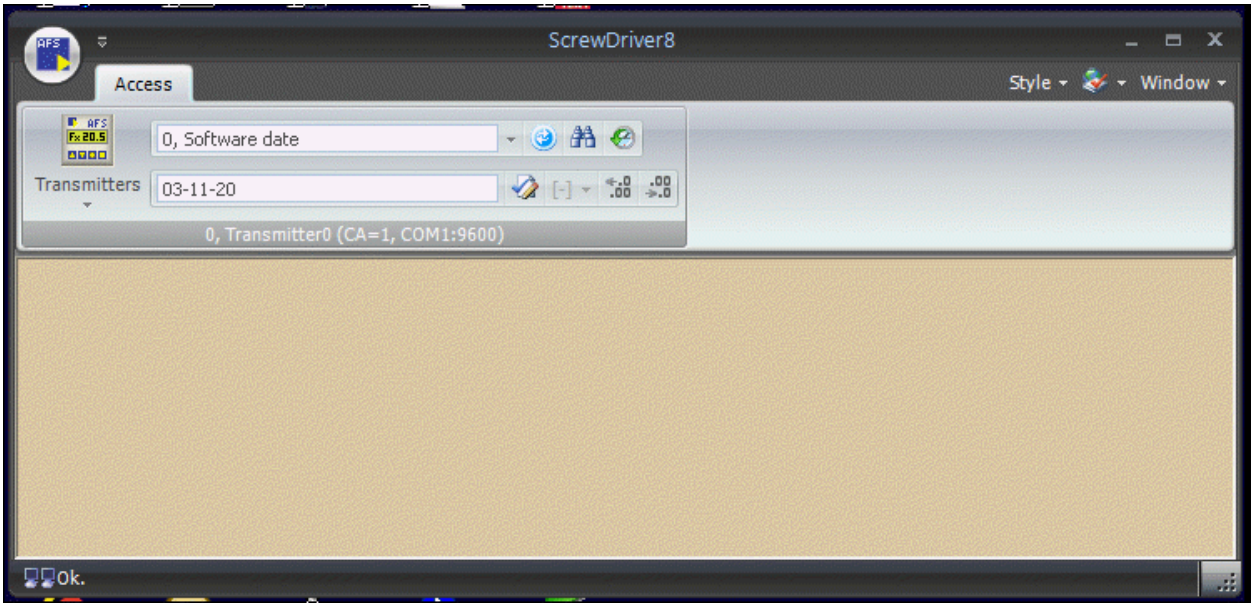
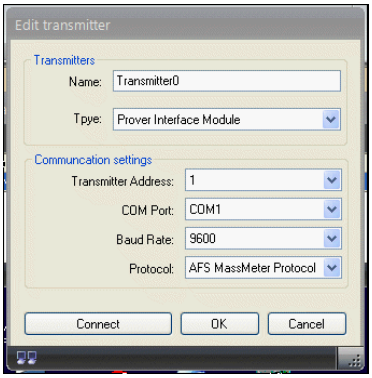
Software access

The software is loaded by running the setup program setup.exe which is furnished on a cd. After installation and starting the program you will see the following display.



Making the connection

Connect the cable from the PC to the PIM. Then click on the small down arrow below "transmitters" found in the upper left of the program window. Then click on transmitter manager. You will see the following display.



You can put any name you want in the upper window, and then select the com port you are using on your PC. If you don't know you can click on connect and the program will attempt to find the port.

Once the com port is selected, then click ok. You should see the small screen depiction in bottom bar at the left flash and ok will so to indicate the connection was successful.

If no connection was made it will be indicated on this lower stat bar. If the connection was made the software date will display in the data window.

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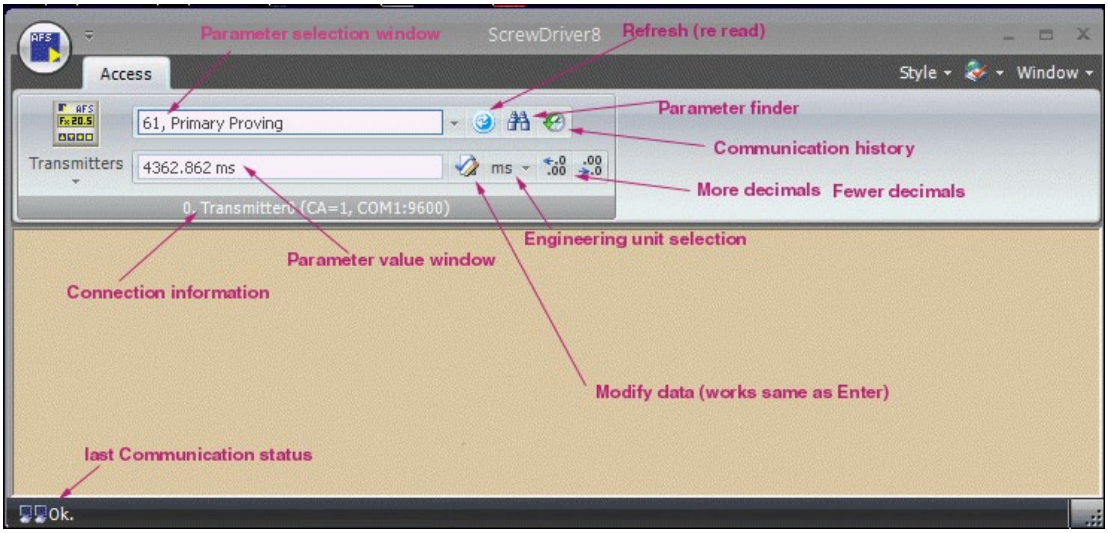
Once connection is made you should exit the program and then restart it. This process saves the connection settings, so you won't have to go through this again if the settings remain the same.

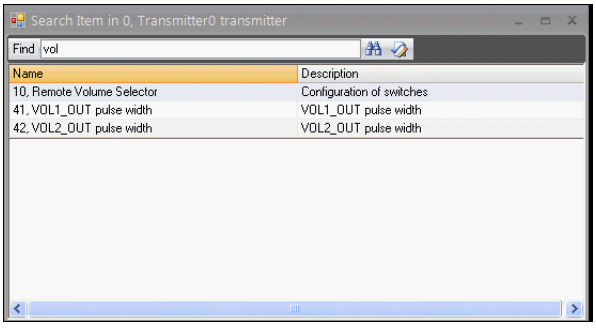
Main screen

The features on the main program screen are shown in the following picture.



To access any parameter, type the number in the parameter selection window, or use the pull-down list (small arrow to the right of the window), or you may use the parameter finder (binoculars).

Clicking on the parameter finder will show a screen like shown below:



Simply start typing words related to the parameter you want to find and all the parameters containing your typed letters will begin to appear. The longer you type the more filtered your selections will be. When you recognize the parameter, you should double click on it and it will appear in the selection and data windows.

The description given in the parameter finder helps to further define the parameter

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Read/write to all parameters is controlled by password level. The same password level applies to both the PIM (display/keyboard) and the software. Setting a password from either the keyboard or the PC will make it active on both sides. Passwords can be reset either from the keyboard or software by entering any incorrect value.

For a more in-depth look see the PCS software manual.

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Setting Modbus communications protocol with software

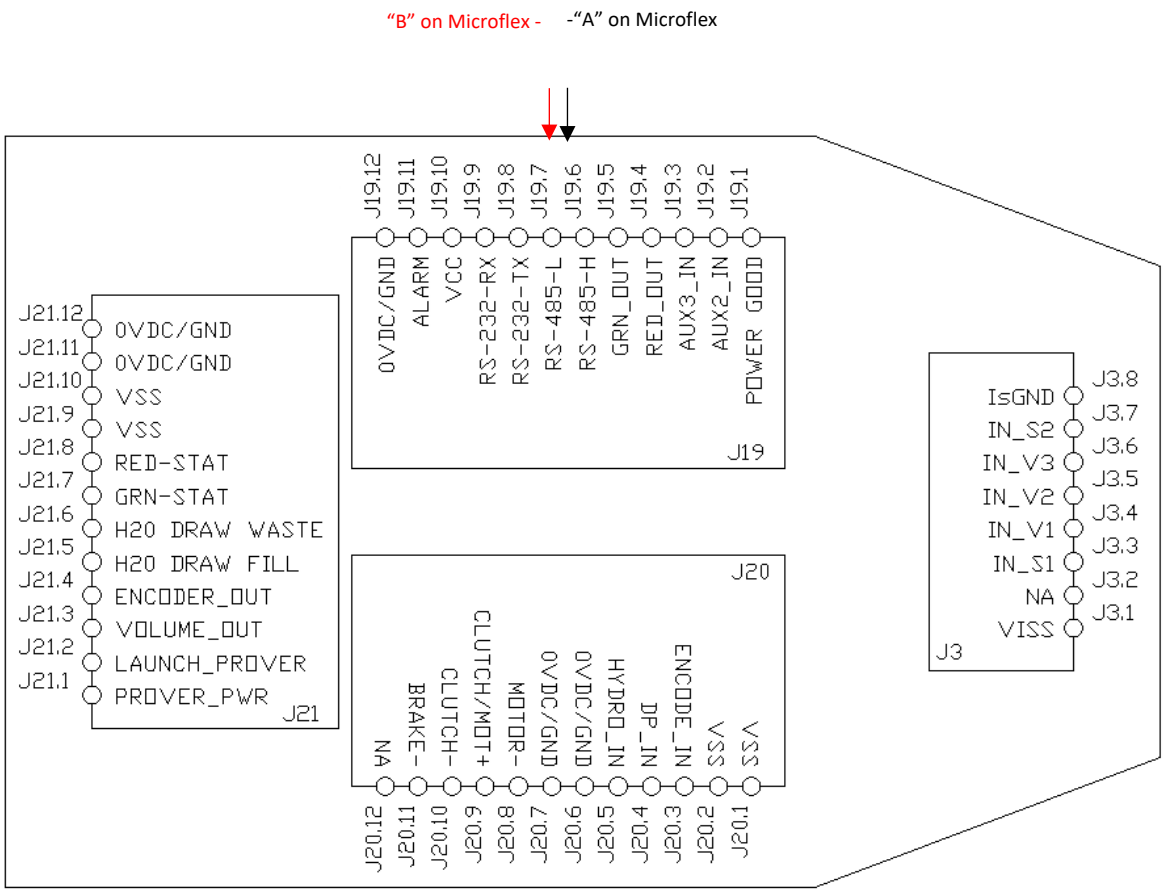
To ensure you have the Modbus version of the software, click the tools tab at the top left of the software, then click About Prover Controller from the menu shown. The version information next to the FMD logo in the dialog should be at least or greater than 9.21.10203.1715.

Note: Modbus is only available on the RS-485 connection.

Recommended USB to serial convertor for RS-485 communications:

Microflex USB to RS-485 converter: http://microflx.com/collections/RS-485-converters

Connecting to the RS-485 communications port



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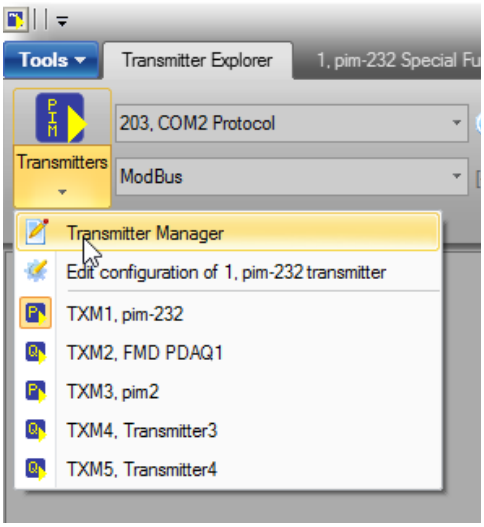
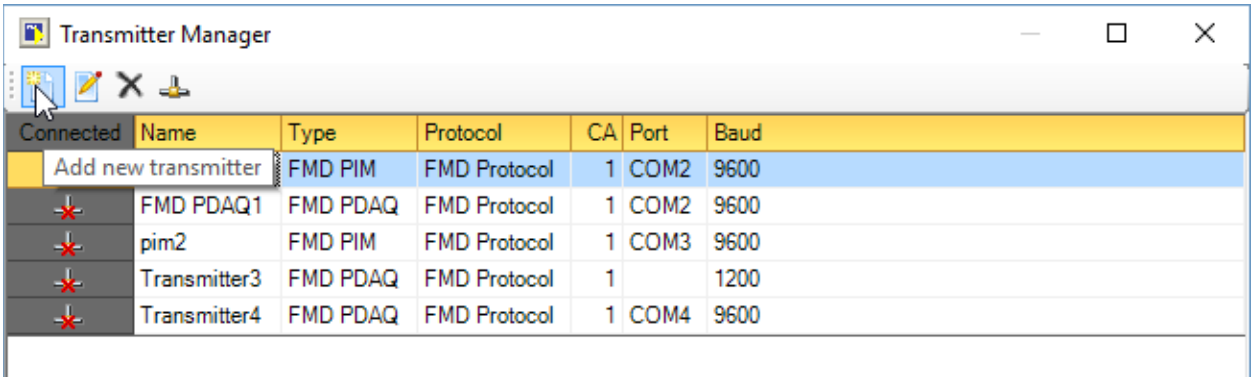
Configuring a transmitter

Select transmitter manager



Select add new transmitter



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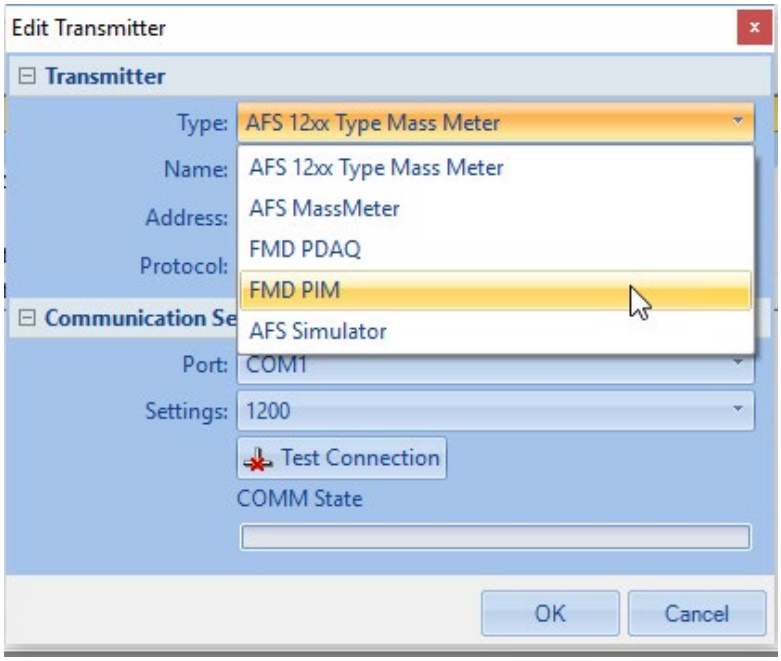
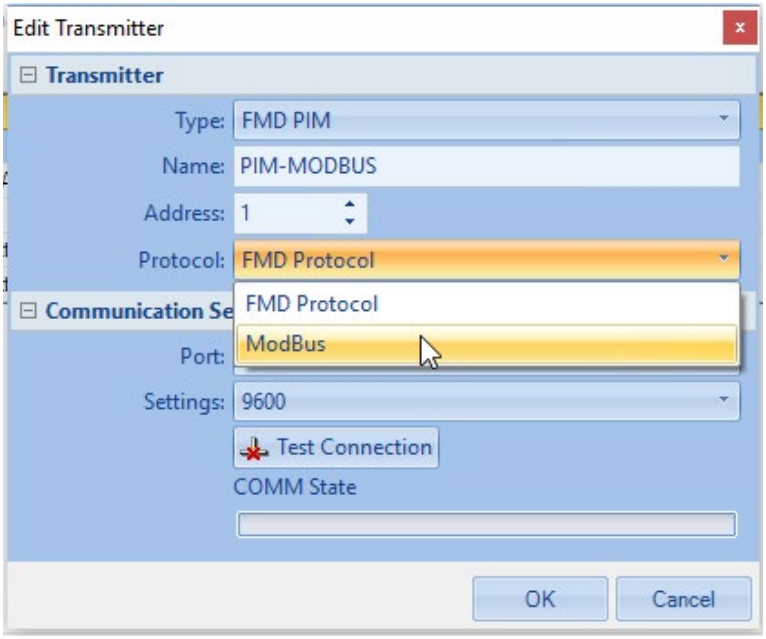
Select transmitter type “FMD PIM”



Select the communications protocol:

“FMD protocol” for most communications

“Modbus” if in Modbus mode



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Note:

1. The Modbus Address will always be “1” by default. This can be changed if required for multi-drop connections.
2. Modbus will only operate on comport 2 of the PIM which is the RS-485 port.
3. The protocol for the software needs to be configured the same as the port that the PC is connected to. I.e. if the PC is connected to the RS-232 port it should always be set to the FMD protocol. If the PC is connected to the RS-485 port it will need to be configured to the same protocol that comport 2 of the PIM is set to; either FMD or Modbus protocol.

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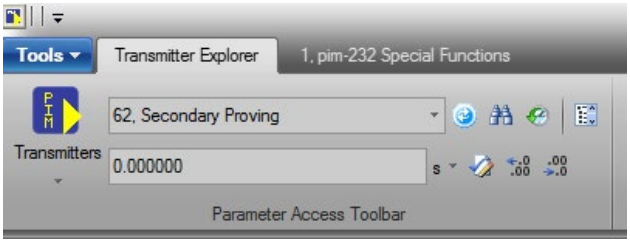
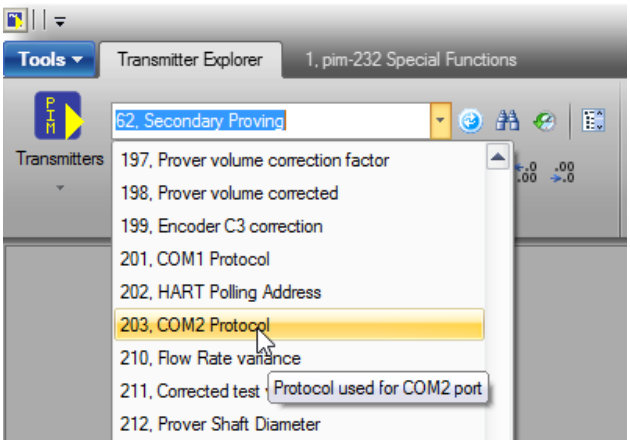
After installation and transmitter has been configured.

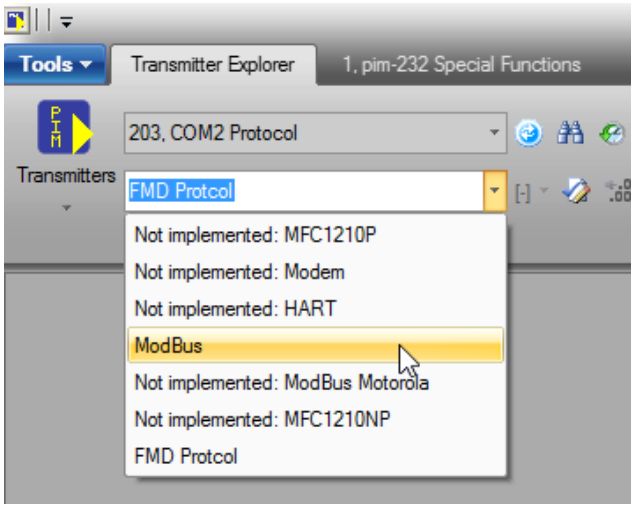
Successful connection to the device will result in a value in the box below “62, secondary proving”. If the value shown is “?” No communications have been established.



Scroll down to function code “203, com 2 protocol” and select it



Select “Modbus”



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Note:

1. Communications will be lost as soon as a different protocol is selected if the PC is using RS-485 communications. Go back to the transmitter configuration step and change the device protocol to the selected protocol, save the setting and the communications will be re-established.

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Appendix A – LED status indications

Led	State	Meaning
Green	Off	No power to the PIM.
Green	On solid	PIM is waiting for the launch signal – the word **launch** should appear on the status line of the display.
Green	Slow flash	The PIM is in the measurement state – the word **measuring** appears on the status line of the display. The piston is being driven downstream by the flow.
Green	Fast flash	The PIM is retracting the piston. The motor is on and the word **retracting** appears on the status line of the display.
Red	Off	No errors or warnings present.
Red	On solid	Motor fault. This is only cleared by cycling the power and fixing the cause of the motor fault. A launch signal will be ignored.
Red	Slow flash	This is a sequence error and is on only during the state (retract or measurement) in which the error was detected. The parameter **error count** (item 14) will be incremented, and parameter **last status** (item 14) will display sequence error until the next launch signal is detected.
Red	Fast flash	Service alert. This is displayed only during the PIM launch state once the indicated the prover cycle count has reached one of the service levels. This has no effect on the operation. The service level affected will display as a diagnostic message on the display. The fast flash can be turned off only by setting **reset maintenance alert.** (item 100 using the PC software)

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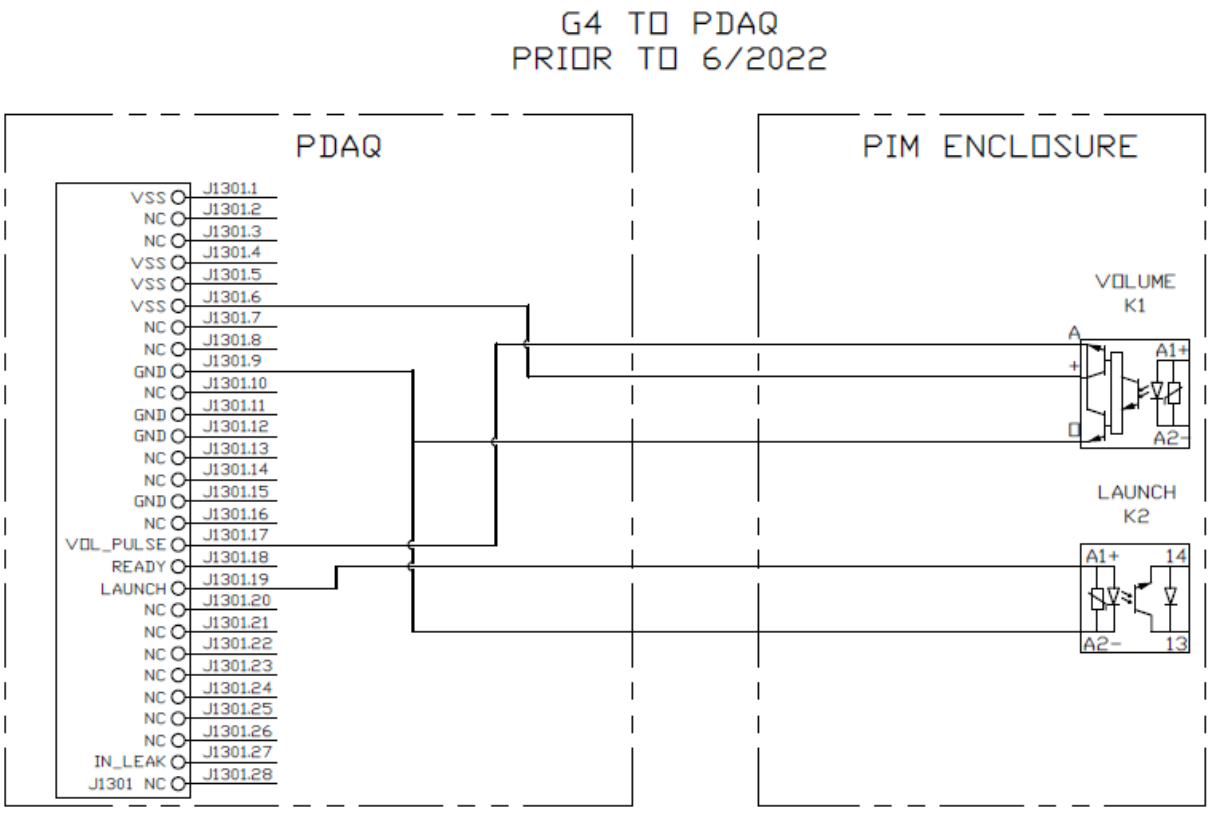
Appendix B – Wiring diagrams

PDAQ – Flow Management Devices



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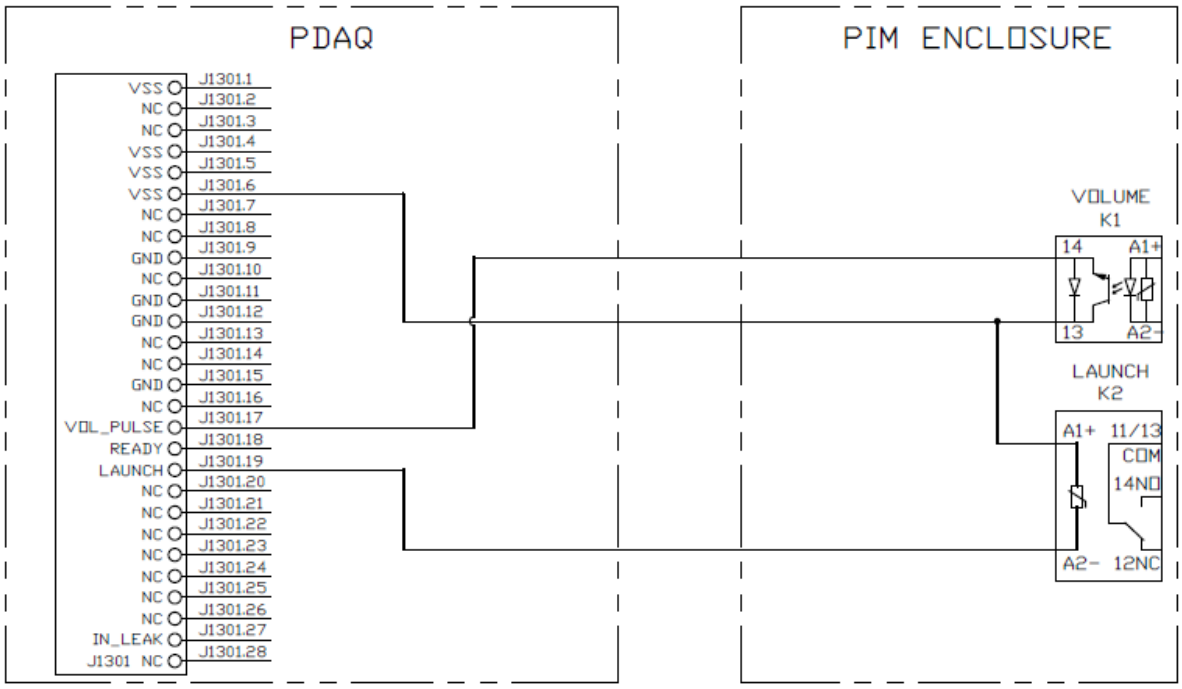
G4 TO PDAQ
AFTER 6/2022



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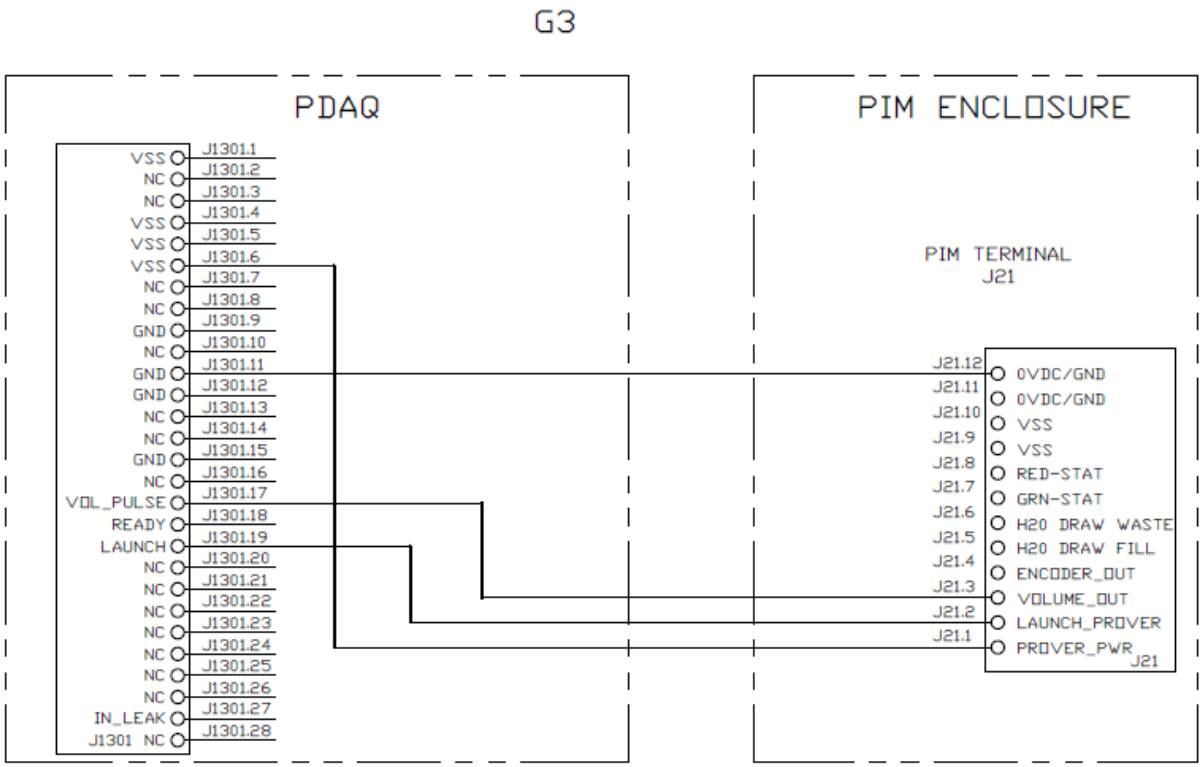

Standard configuration with prove-it® and pdaq							
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**	**Connector or card**	**Pin**	**Flow software prover type**	**Voltage level in stand by**
Launch prover	Active high	Na	↑ ↑	Control	19	Small volume Syncrotrak®	22 to 24 VDC
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**	**Connector or card**	**Pin**	**Flow software prover type**	**Voltage level in stand by**
Volume pulse	Active low	20ms	↑ ↑	Control	17	Small volume Syncrotrak®	22 to 24VDC

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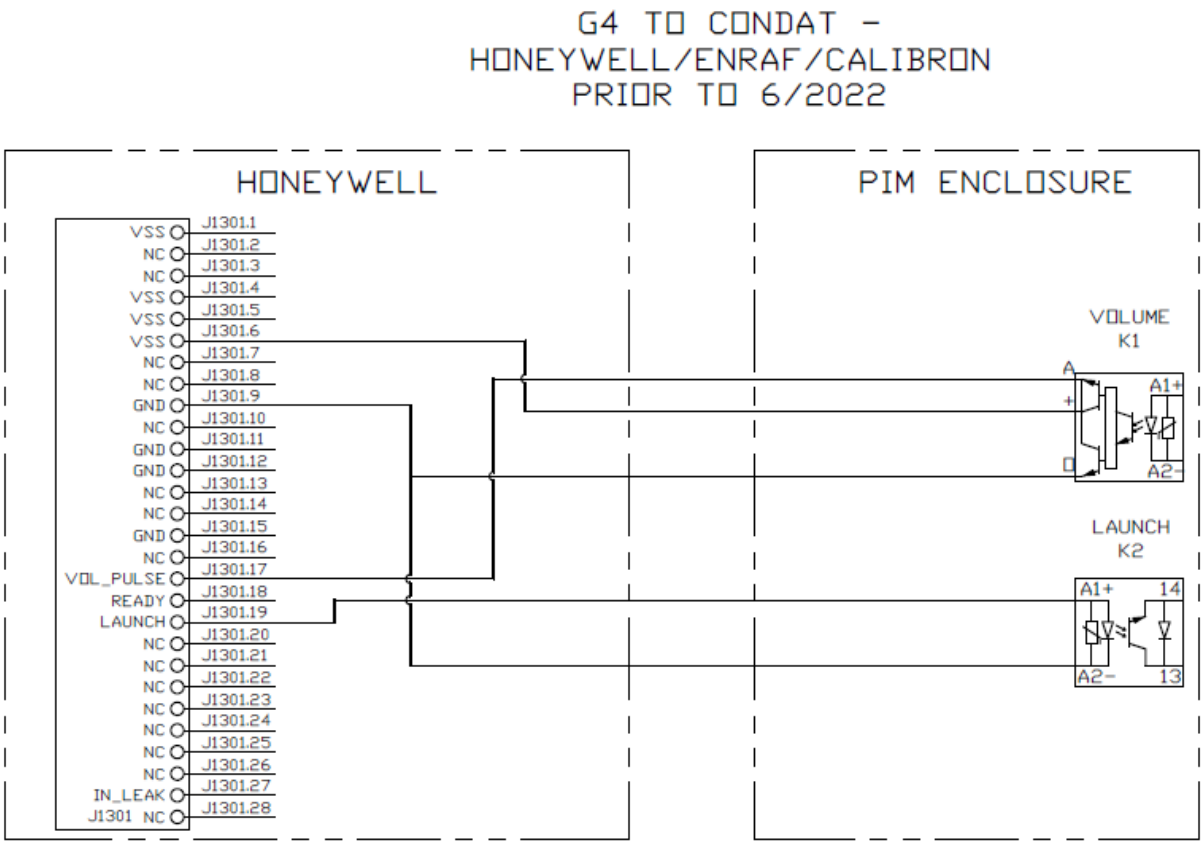
Ciu (Condat®) – Honeywell/Enraf/Calibron



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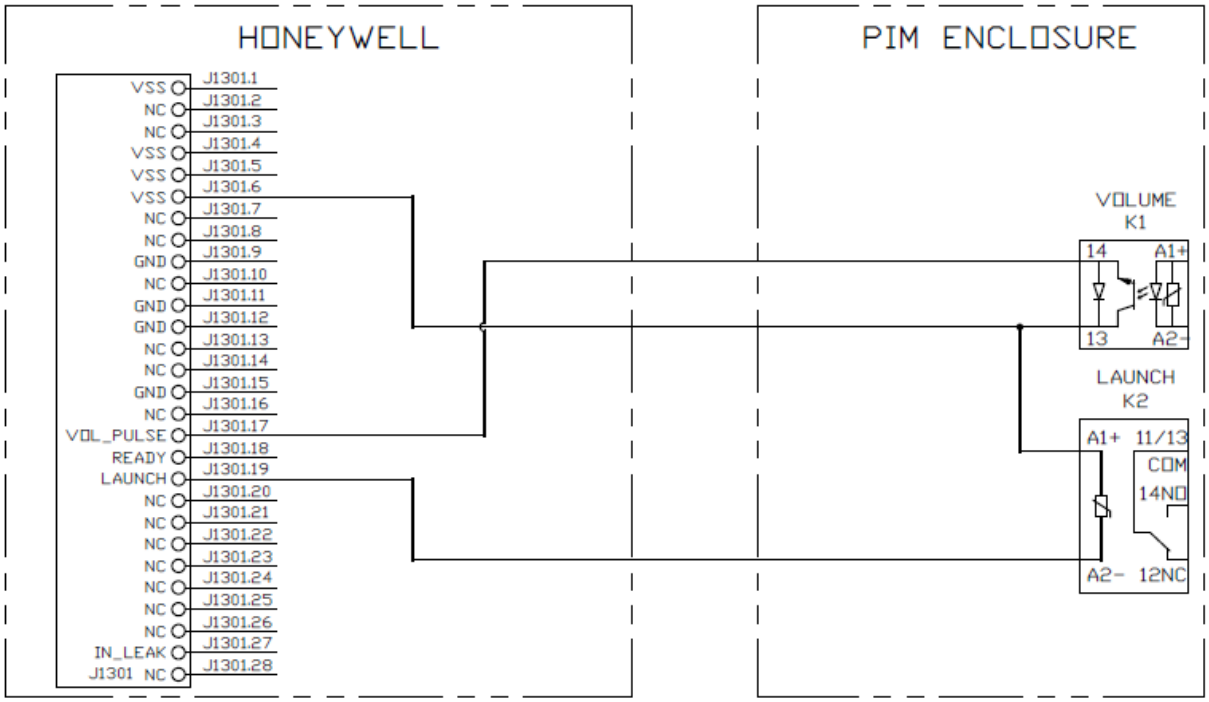
G4 TO CONDAT -
HONEYWELL/ENRAF/CALIBRON
AFTER 6/2022



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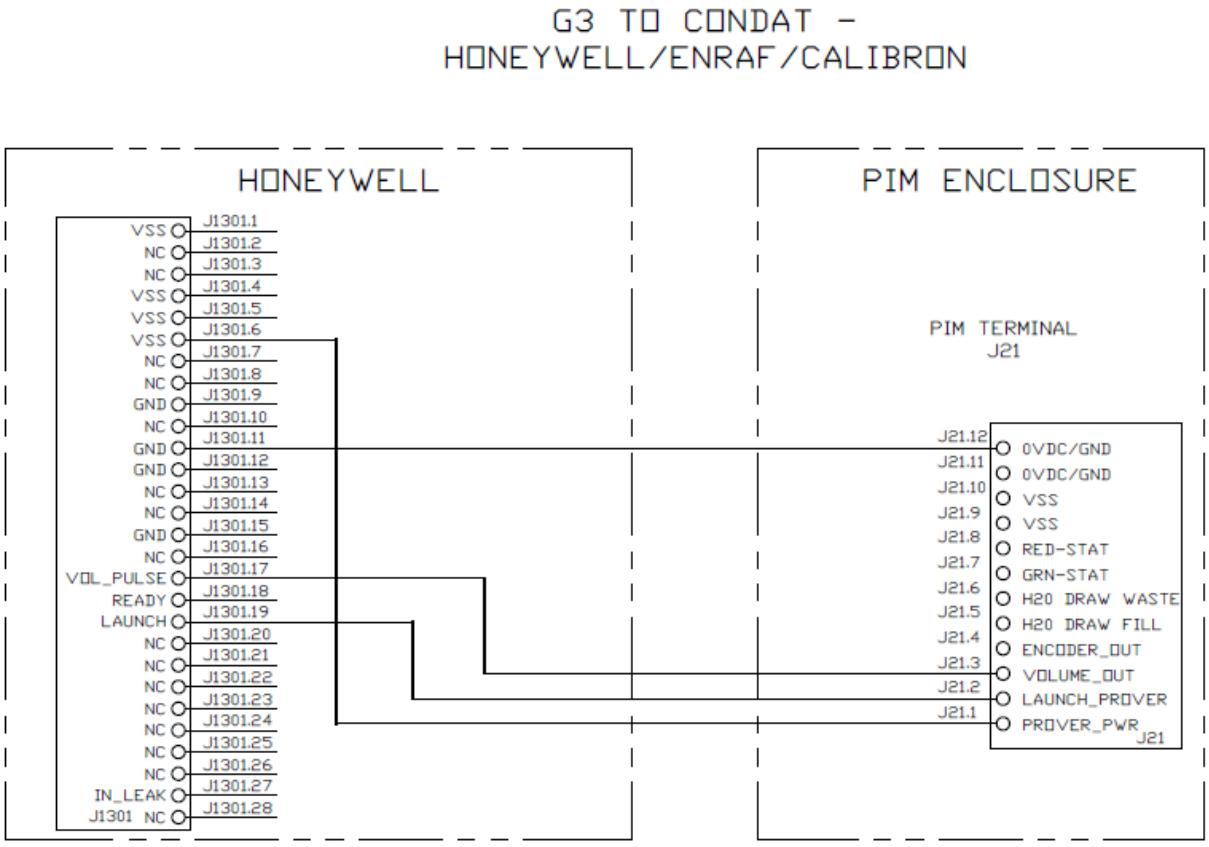

Standard configuration with prove-it® and condat ®							
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**	**Connector or card**	**Pin**	**Flow software prover type**	**Voltage level in stand by**
Launch prover	Active high	Na	↑ or ↓	Control	19	Small volume Syncrotrak®	12 to 15VDC
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**	**Connector or card**	**Pin**	**Flow software prover type**	**Voltage level in stand by**
Volume pulse	Active low	20ms	↓ ↓	Control	17	Small volume Syncrotrak®	12 to 15VDC

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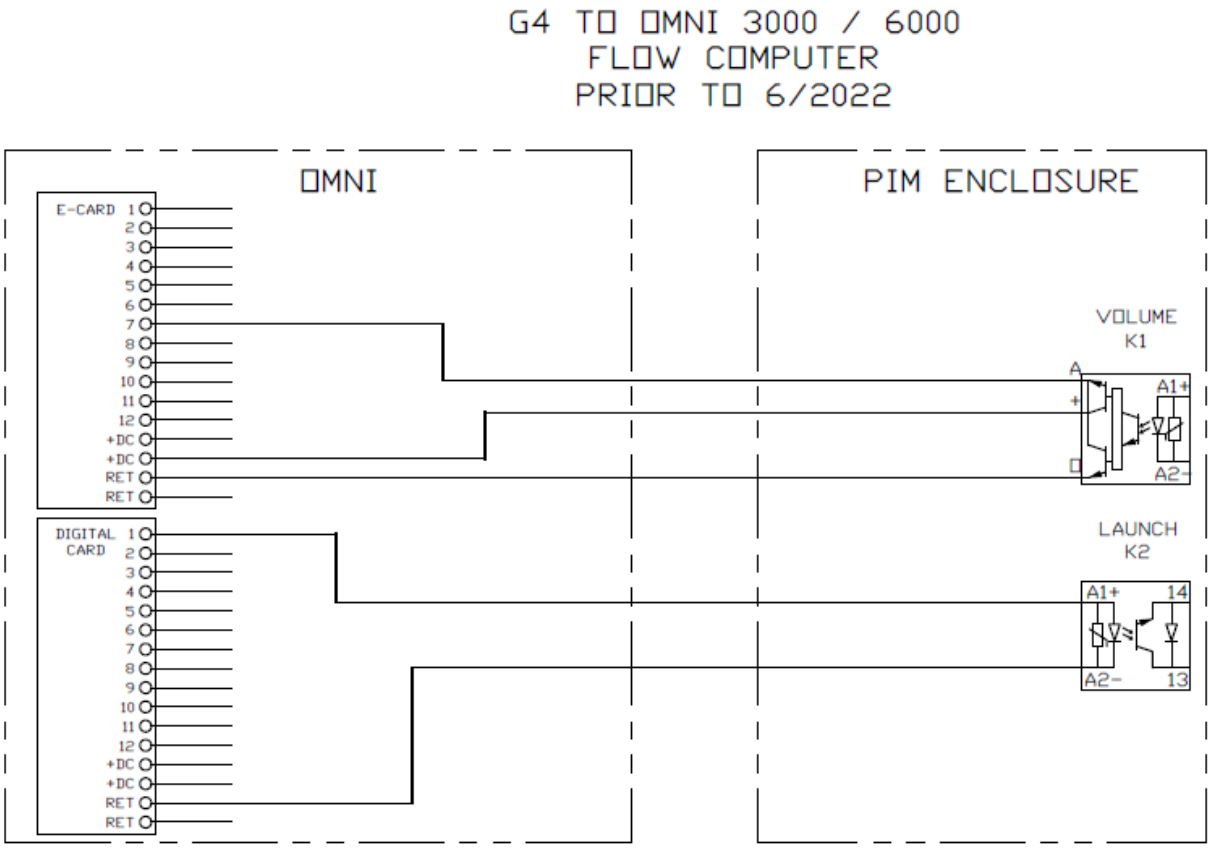
Omni 3000/6000 flow computer



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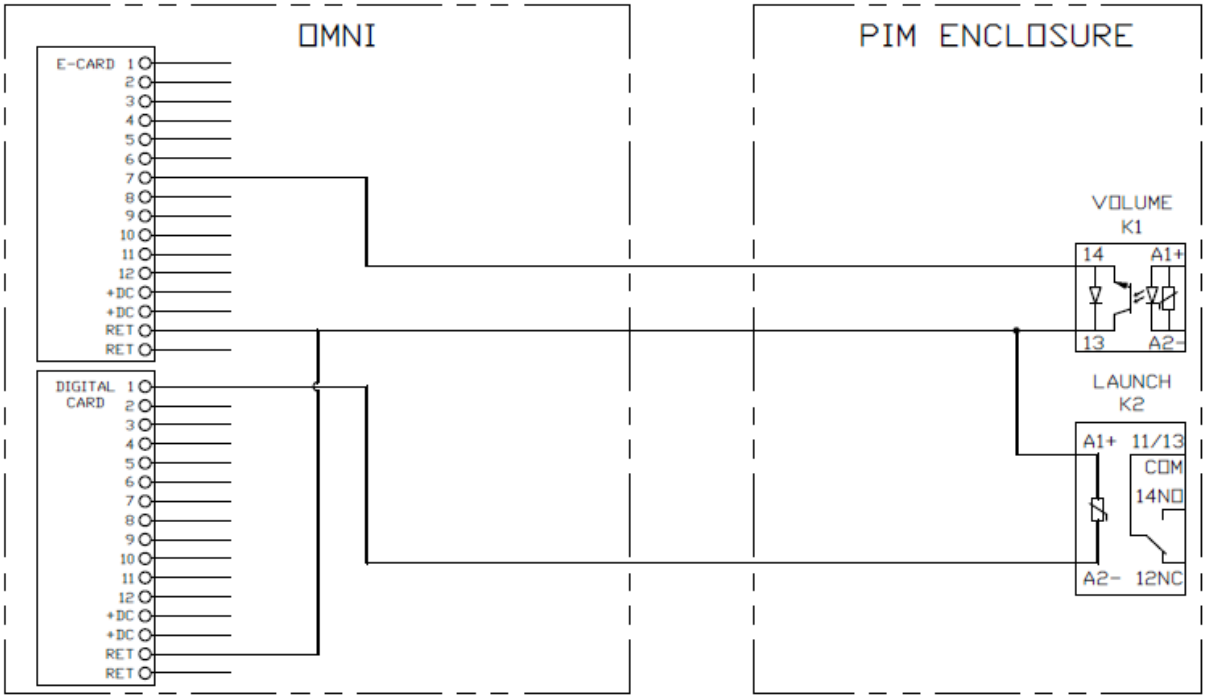
G4 TO OMNI 3000 / 6000 FLOW COMPUTER AFTER 6/2022



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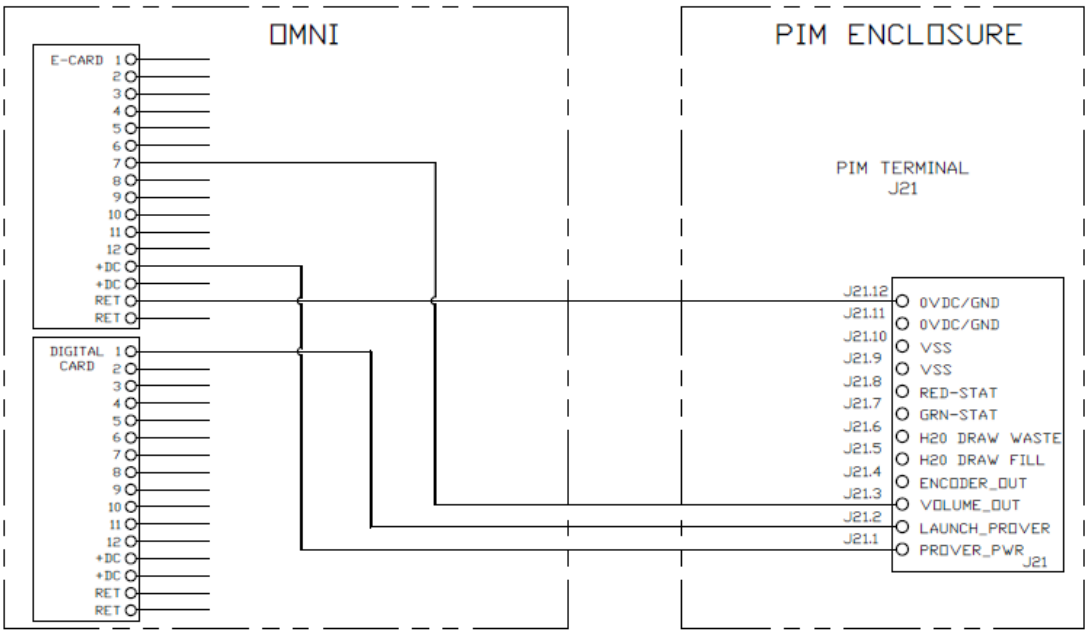
G3 TO OMNI 3000 / 6000
FLOW COMPUTER



Standard launch and volume pulse configuration									
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**		**Flow comp connector or card**	**Flowc omppi n(s)**	**Flow computer setting**	**Voltage level in stand by**	**Boolean statement**
Launch prover	Active low	Na	↑	↑	Digital card	1 to 12	+24 to launch	0VDC	1927
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**		**Flow comp connector or card**	**Flowc omppi n**	**Flow computer setting**	**Voltage level in stand by**	**Prover type**
Volume pulse	Active low	20 to 120 ms	↑	↑	E-card	7	Wait for low	9 to 11 VDC	Uni-directional pipe compact
Optional launch configuration with multiple omni(s) with one prover in common									
Launch prover	Active high	Na	↑	↑	Digital card	1 to 12	Ground to launch	+22 to 24VDC	/1927

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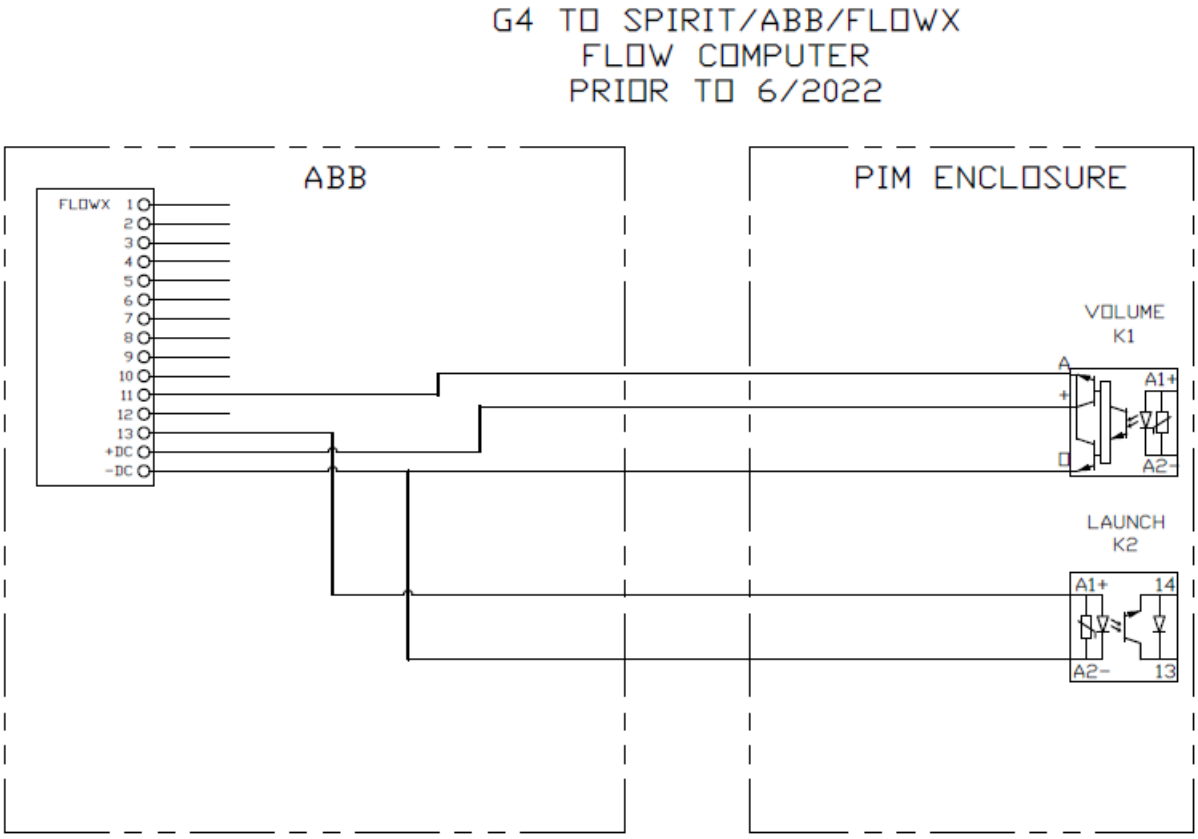
Spirit – ABB/Flowx



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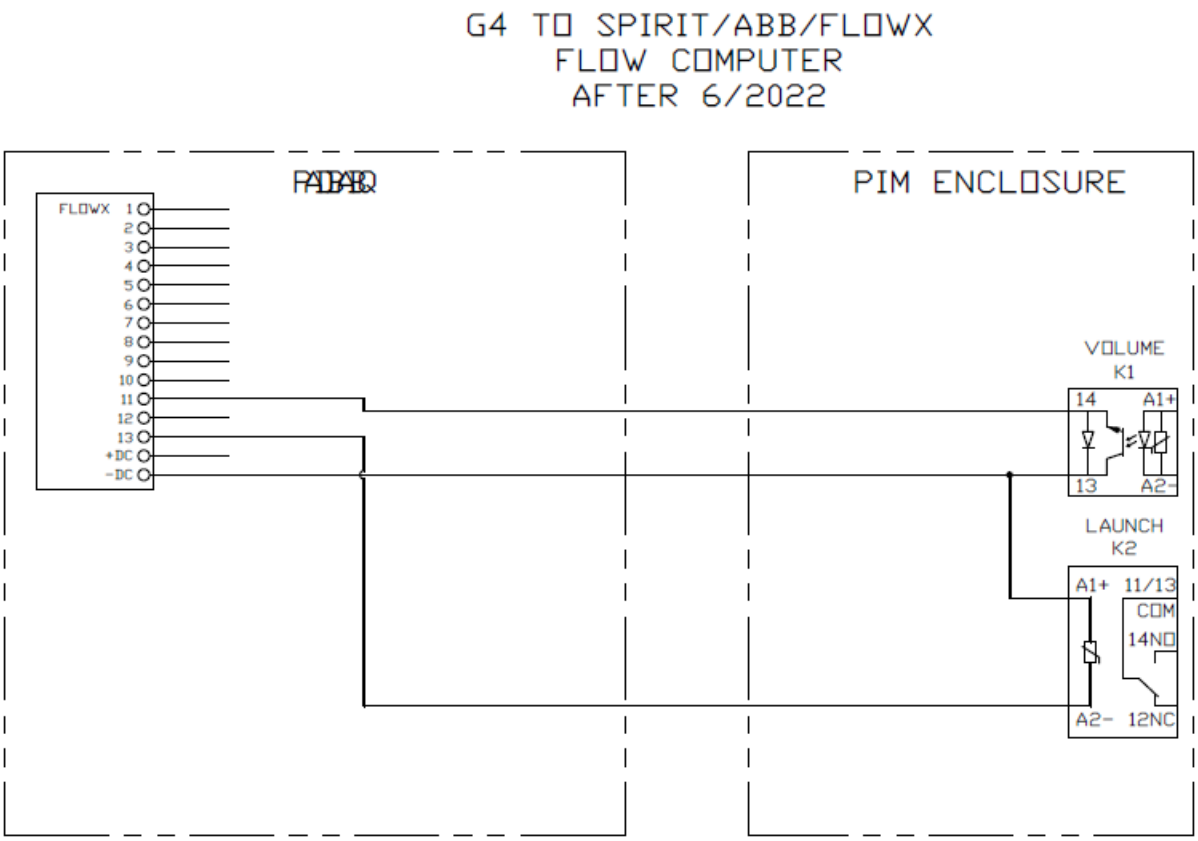

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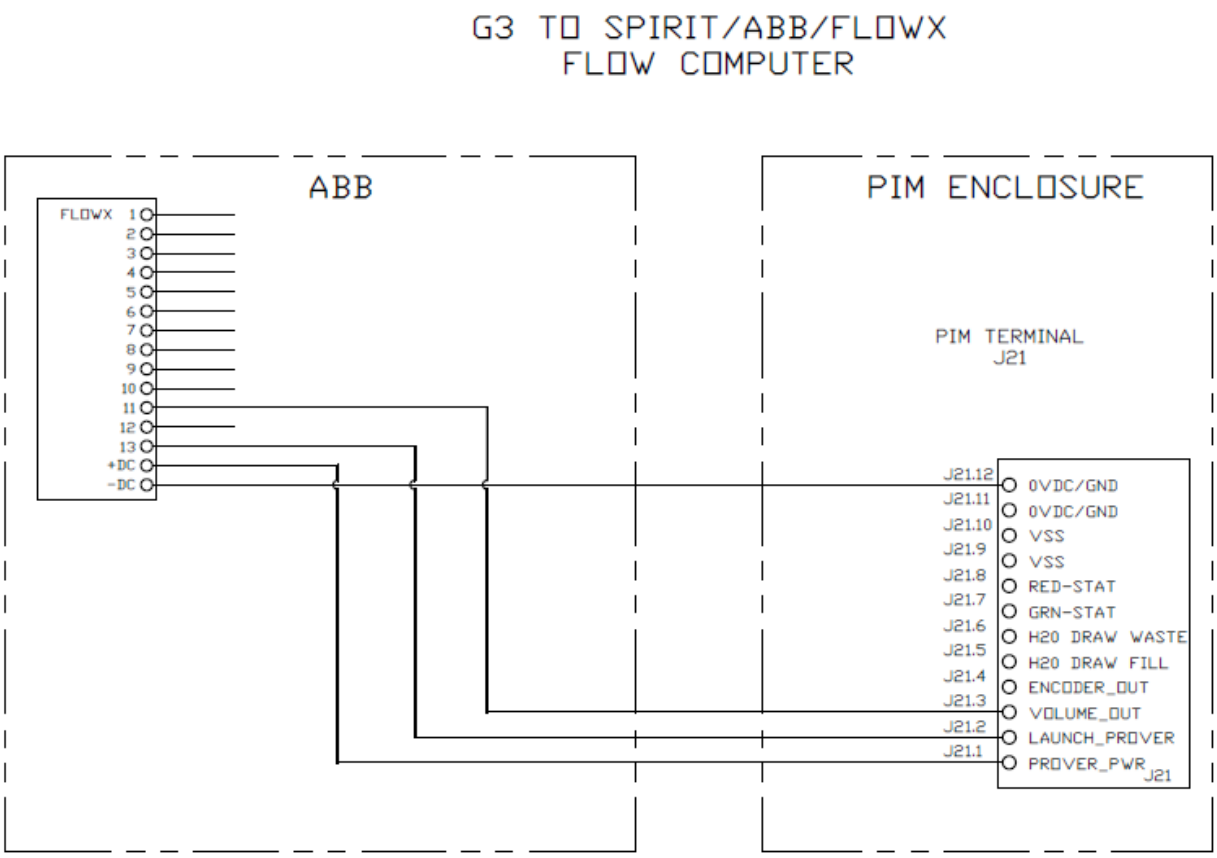

Standard launch and volume pulse configuration								
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**		**Flow comp connector or card**	**Flowcomppin**	**Flow computer setting**	**Voltage level in stand by**
Launch prover	Active low	Na	↓	↓	X1a	13	Normal	0VDC
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**		**Flow comp connector or card**	**Flowcomppin**	**Flow computer setting**	**Voltage level in stand by**
Volume pulse	Active low	20 to 120 ms	↓	↓	X1a	11	Normal	22 to 24VDC

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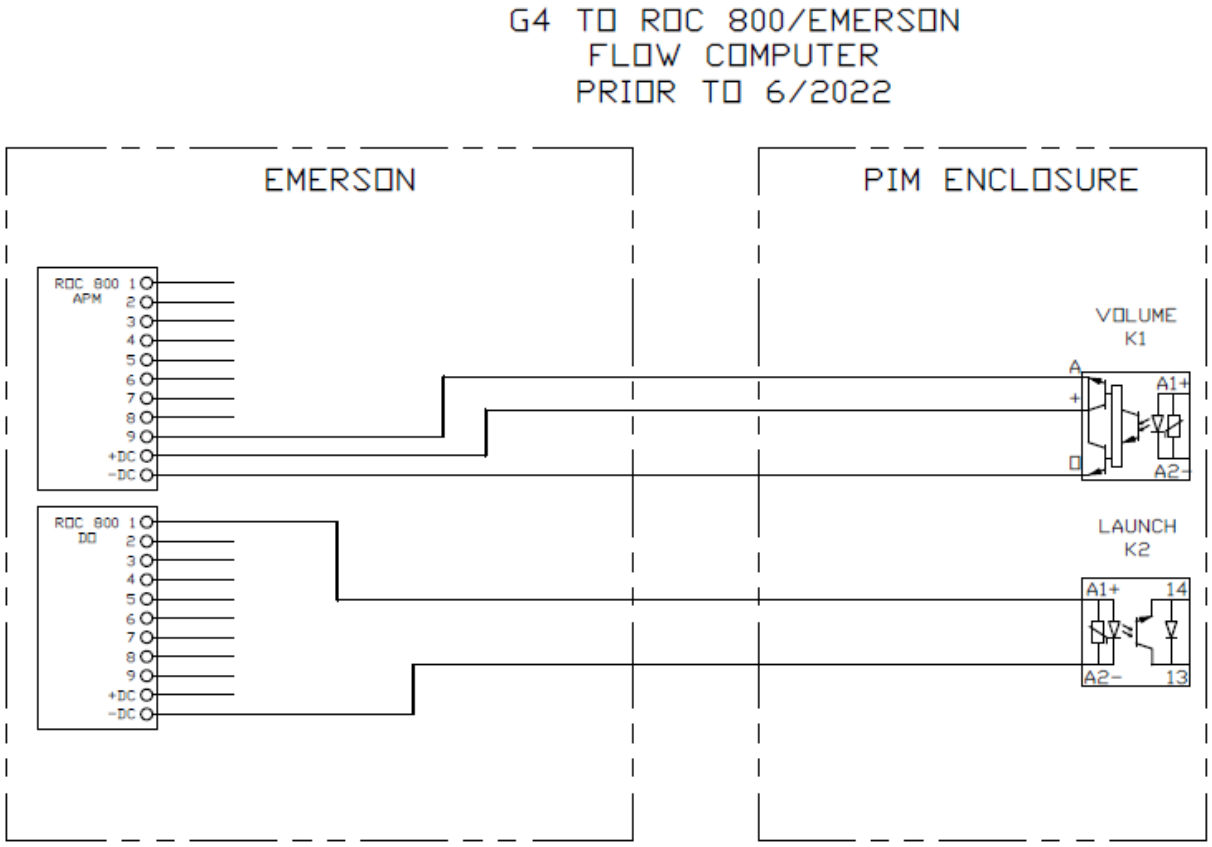
ROC 800 – Emerson



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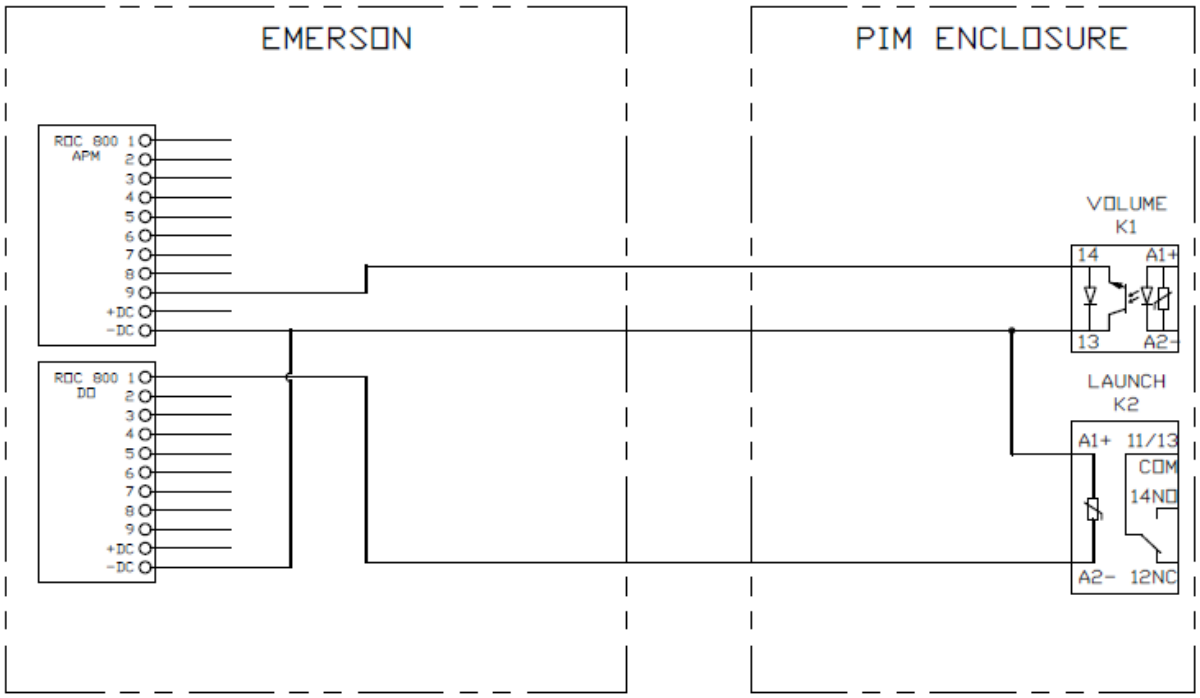
G4 TO ROC 800/EMERSON FLOW COMPUTER AFTER 6/2022



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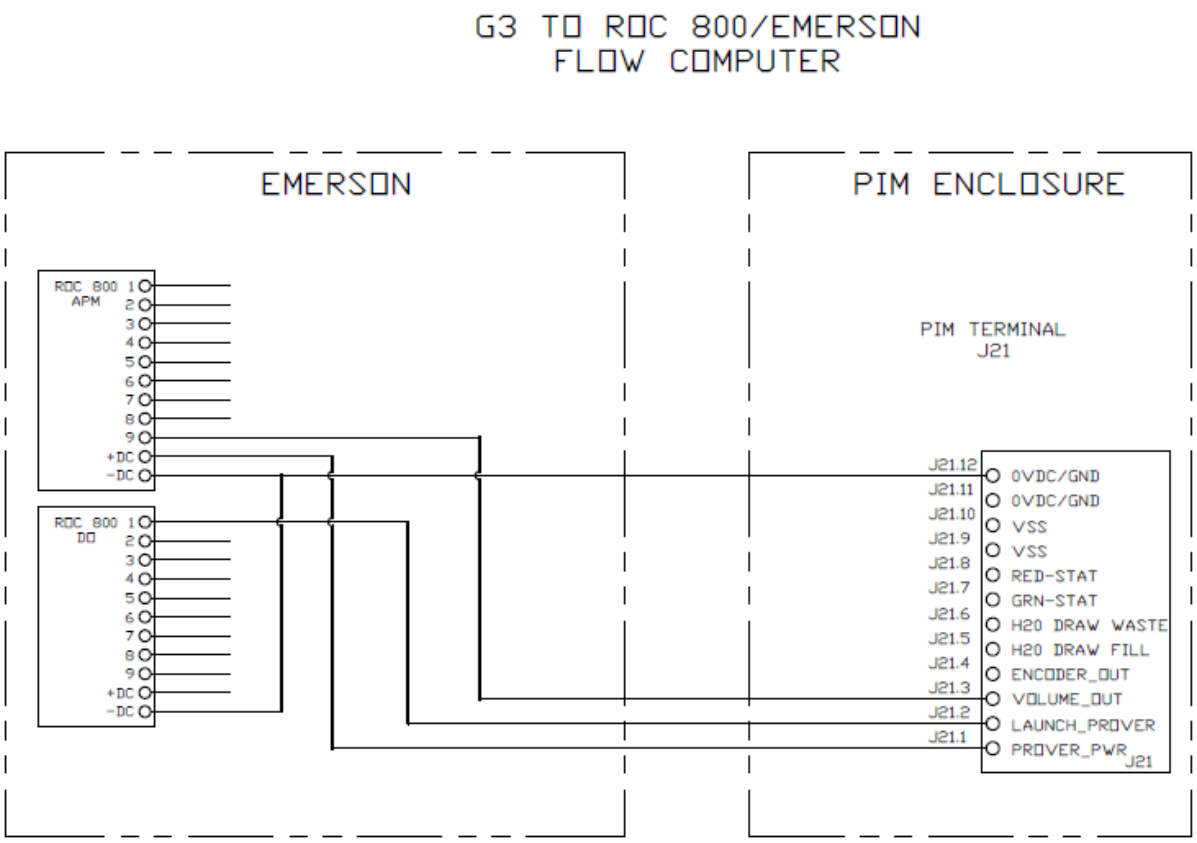

Standard launch and volume pulse configuration								
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**		**Flow comp connector or card**	**Flowc omppi n**	**Flow computer setting**	**Voltage level in stand by**
Launch prover	Active low	Na	↓	↓	Do	1	Active low	0VDC
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**		**Flow comp connector or card**	**Flowc omppi n**	**Flow computer setting**	**Voltage level in stand by**
Volume pulse	Active low	20 to 120 ms	↓	↓	Apm	9	Single switch input	22 to 24VDC

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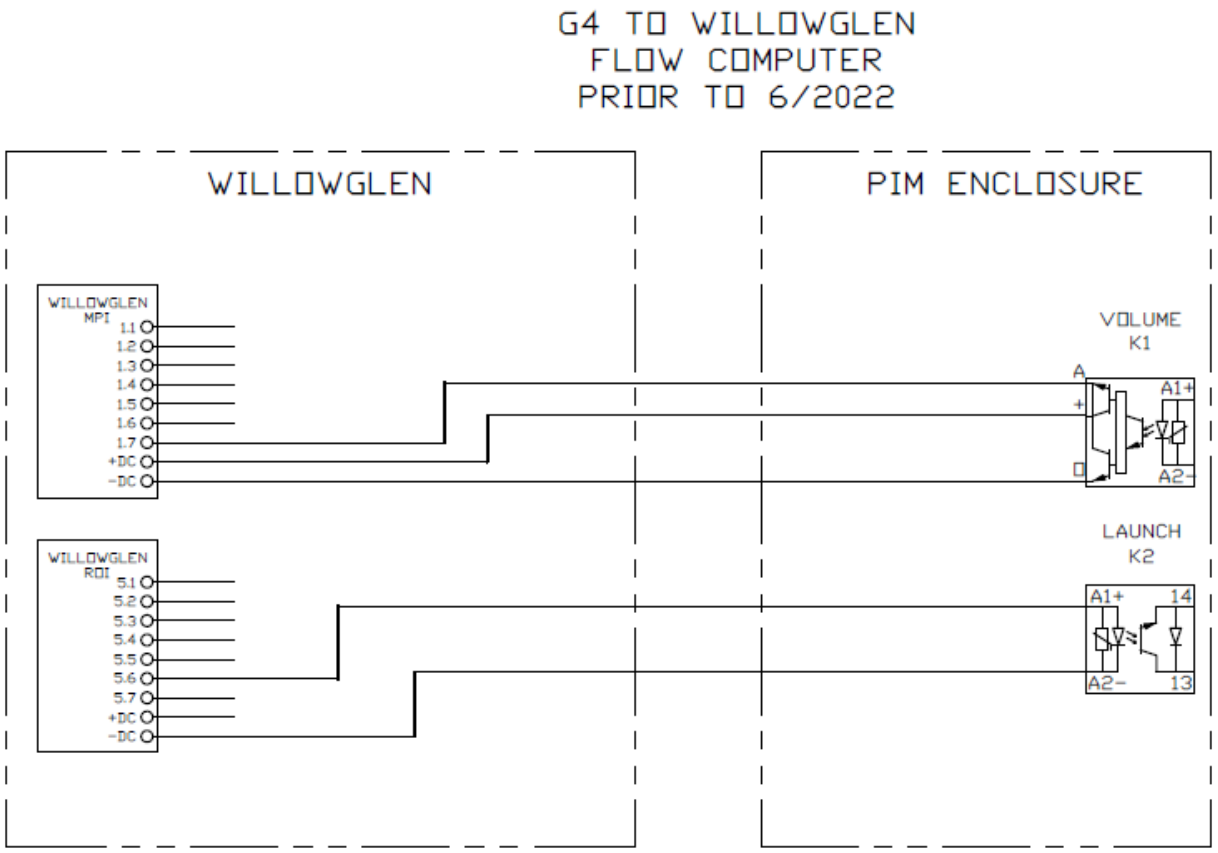
Willowglen



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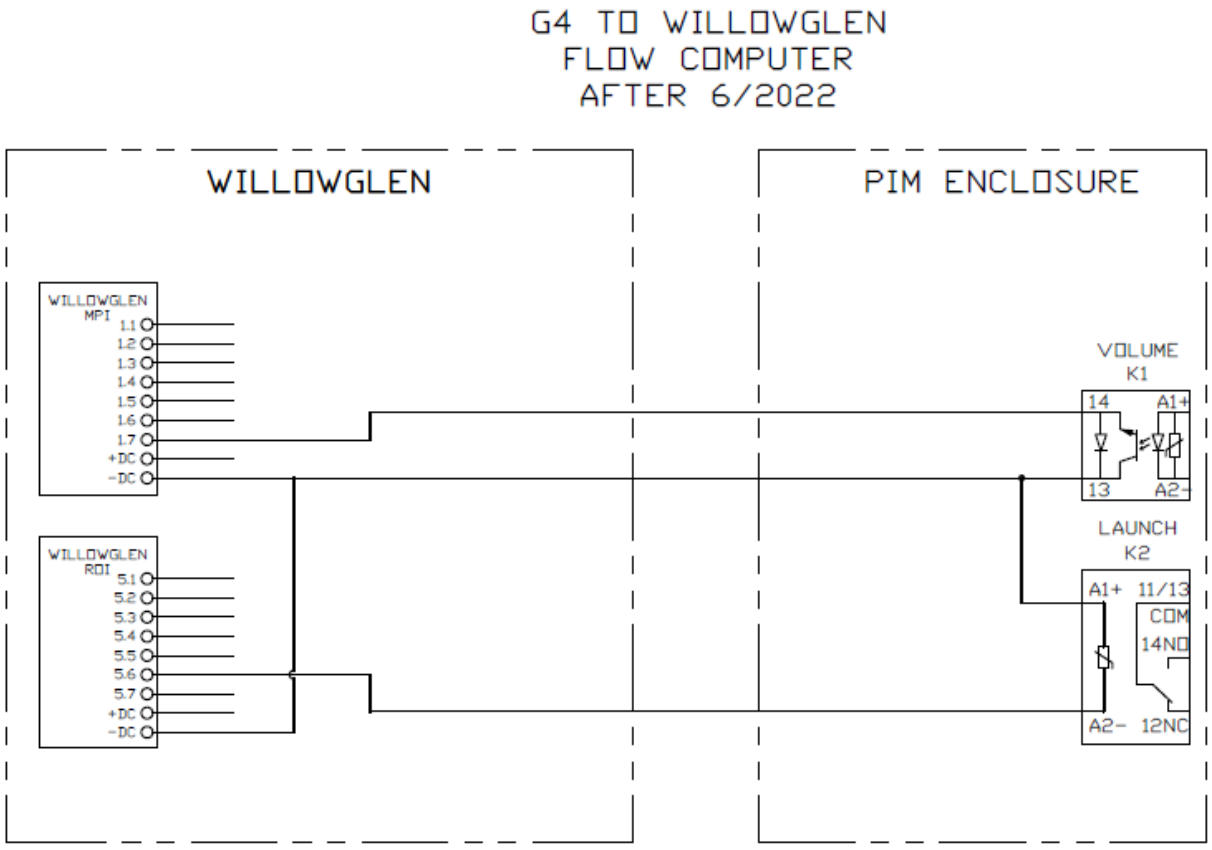

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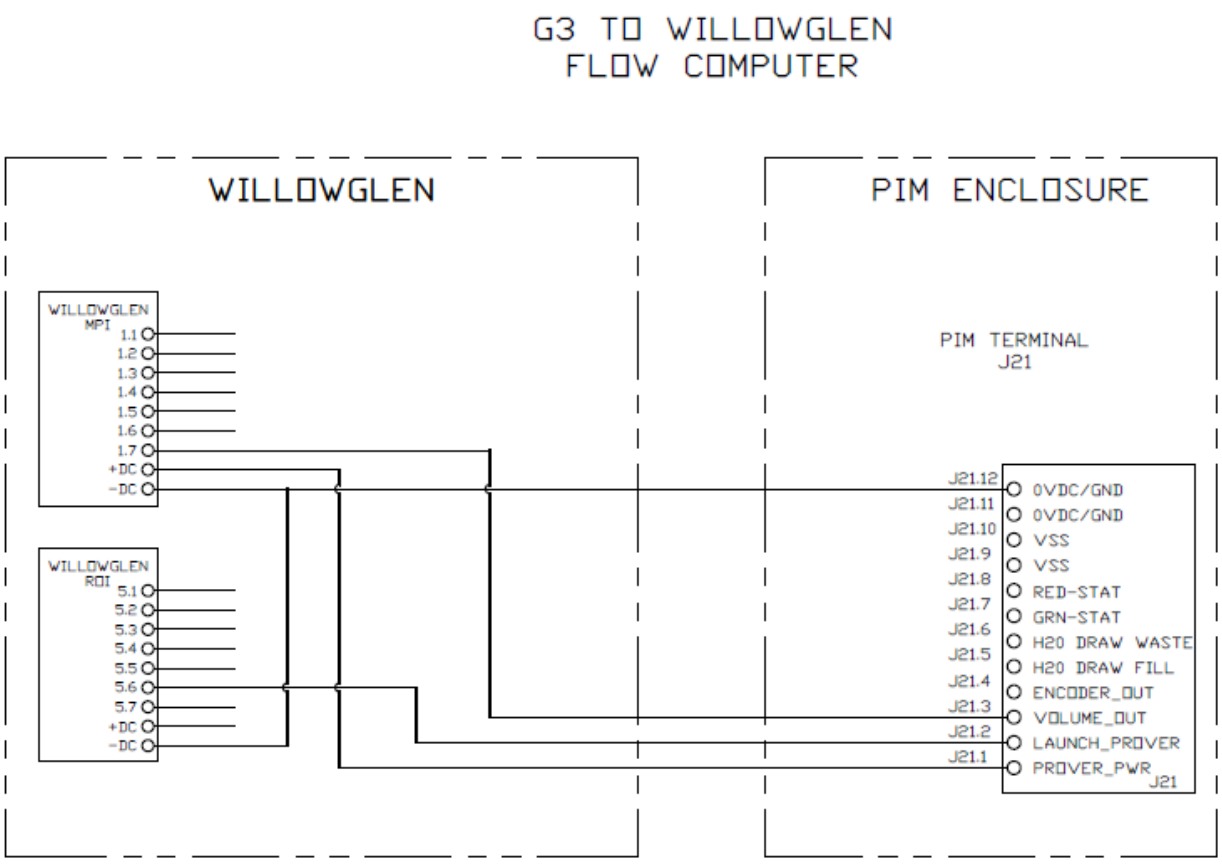

Standard launch and volume pulse configuration								
Input	**PIM setting li**	**PIM setting**	**PIM dip sw1**		**Flow comp connector or card**	**Flowcomppin**	**Flow computer setting**	**Voltage level in stand by**
Launch prover	Active high	Na	↓	or ↑ ↓	Roi	5 or 6	Normal	0VDC
Input	**PIM setting pi**	**PIM setting 1w/2w**	**PIM dip sw2**		**Flow comp connector or card**	**Flowcomppin**	**Flow computer setting**	**Voltage level in stand by**
Volume pulse	Active low	20 to 120 ms	↑	↑	Mpi	1 or 7	Normal	22 to 24VDC

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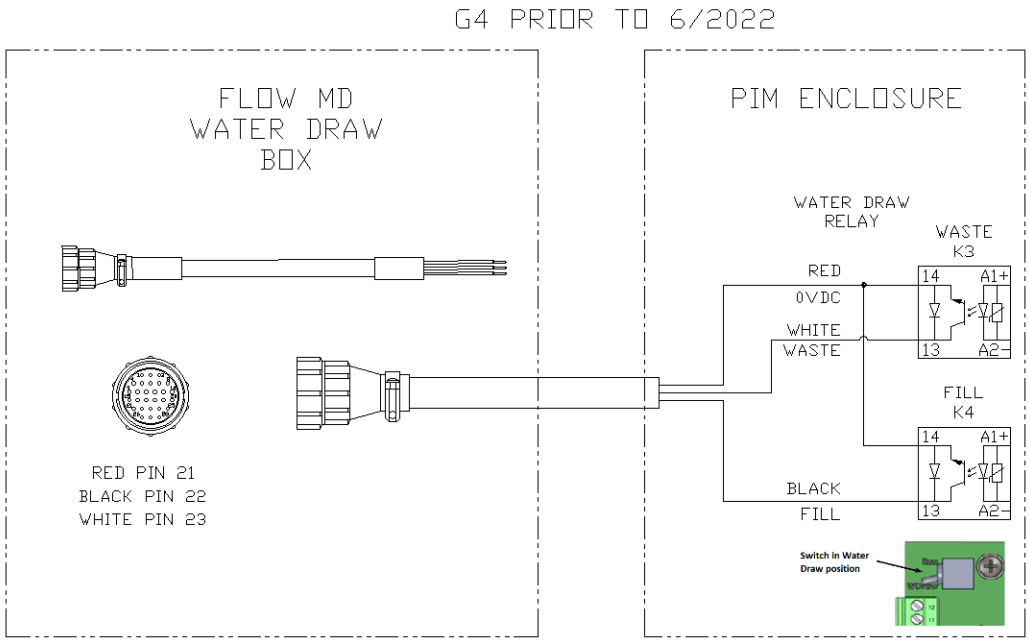
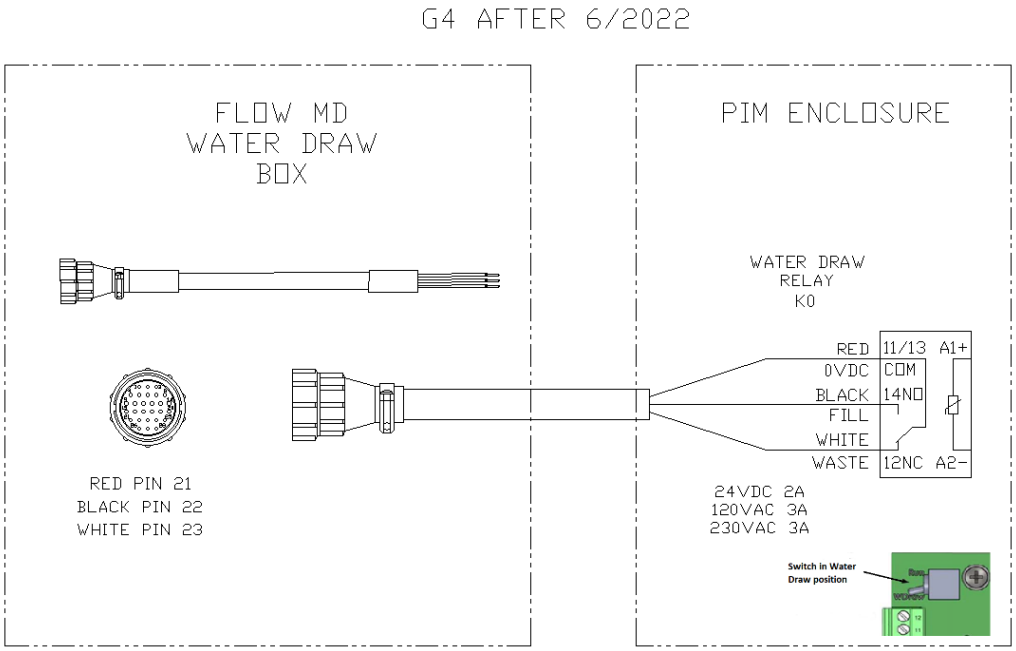
Water draw wiring





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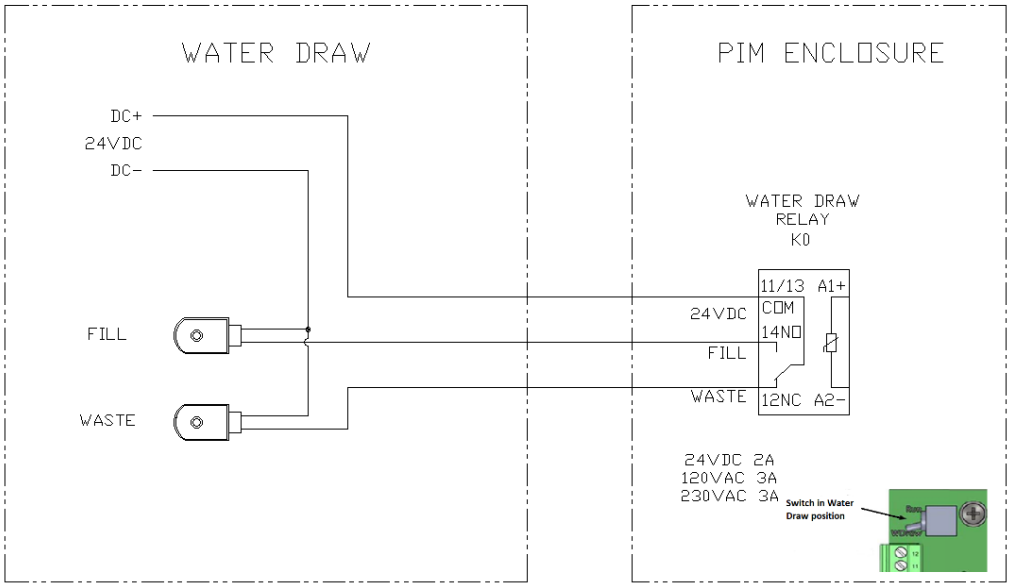
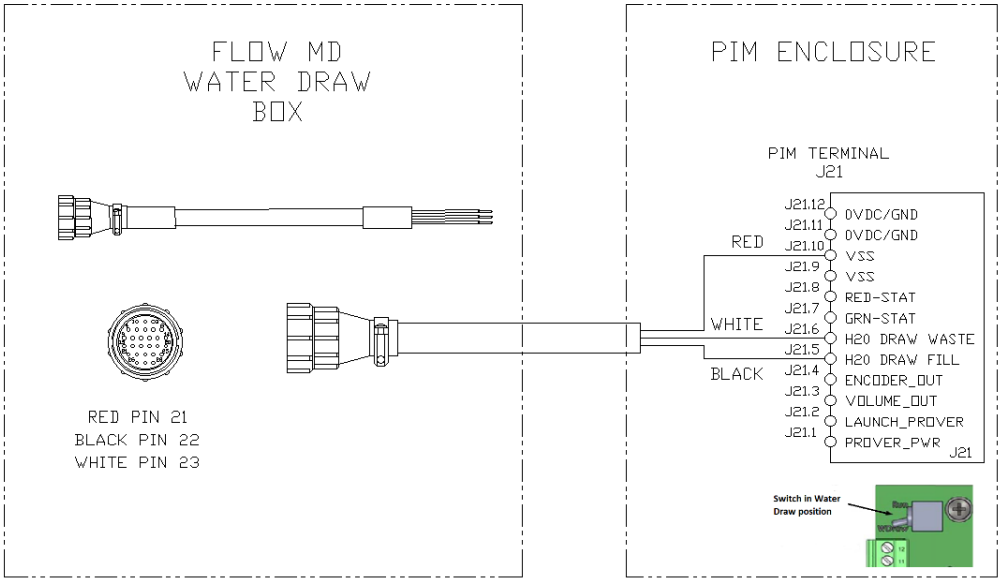
G4 W/TWO SOLENOIDS



G3



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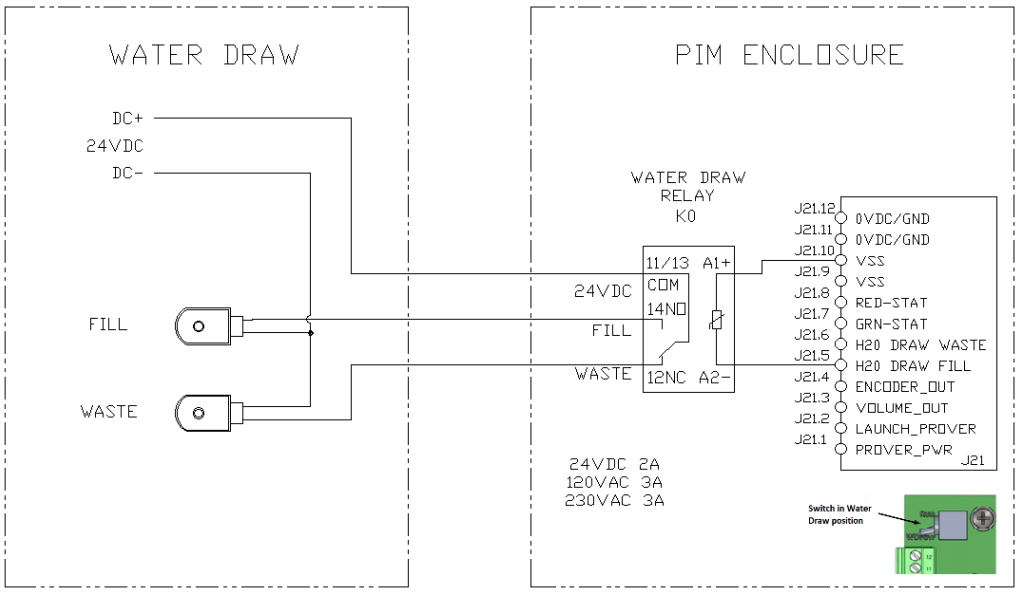
G3 W/TWO SOLENOIDS



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Appendix B – Remote display unit

Remote display option switches

There are two 4 position slide switches on the back of the display unit. They are set as follows:

Note:

2. Count the position from the pin 1 mark on PCB. Do use not the label on the switch.

Position	Meaning	Default
Sw1-1	Red, green LED status enable	On (true)
Sw1-2	High baud	Off
Sw1-3	Lo baud	On
Sw1-4	RS-485 or RS-232	Off (485)

Sw1.2 Hi	Sw1-3 Lo	Baud Rate
Off	Off	4800
Off	On	9600
On	Off	19200
On	On	38400

Position	Meaning	Default
Sw2-1	Address 3 (binary 8)	Off
Sw2-2	Address 2 (binary 4)	Off
Sw2-3	Address 1 (binary 2)	Off
Sw2-4	Address 0 (binary 1)	On

Addresses are in binary – the default setting is address 1 (switch sw2-4 on), all switches on would be address 15. For example, for address 5 set sw2-2 on and sw2-4 on (binary 4+1=5).

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Remote display installation

The back of the remote display is shown below. All the connections and set up are done from there. The display comes with a terminal strip connected to the RS-485 connector (J1). This plug has screw terminals and will be the most convenient method of connection.

Connect as follows for **RS485** set up.

J1-1	Ground	J19-12
J1-2	5v	J19-10
J1-3	RS-485 l	J19-7
J1-4	Rs4-85 h	J19-6

Connect as follows for **RS232** set up.

J1-4	5v	J19-10
J1-3	Ground	J19-12
J1-2	RS-232 rx	J19-9
J1-1	RS-232 tx	J19-8

The operation of the remote display is covered in the menu section of this manual.

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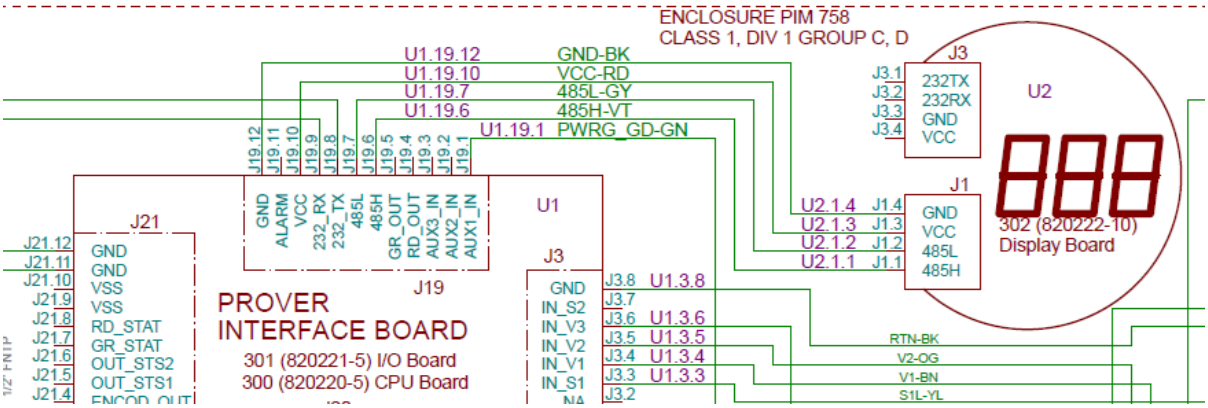
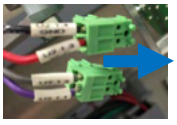
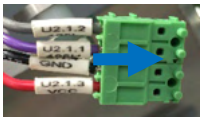
Using Modbus with the PIM Remote display connected

Modbus communication on the PIM can only be done via the RS-485 port. Standard factory configuration is to wire the remote display to the RS-485 port. The first step it to move the wiring to the display to the RS-232 connection.



To rewire:

1. Turn off prover power.
2. Unplug the green connector from J1 on the rear of the display.
3. Split the 4pin connector in half, slide it apart (see pictures below).

4. Put the connector back together on the opposite side it was previously ie. The red wire will end up on the outside and line up with vcc.
5. Plug the green connector into J3.
6. Move the violet wire from J19.6 to J19.8.
7. Move the gray wire from J19.7 to J19.9.
8. On the back of the display on the opposite side of the green connector, toggle the dip switch sw1.4 to the opposite position.

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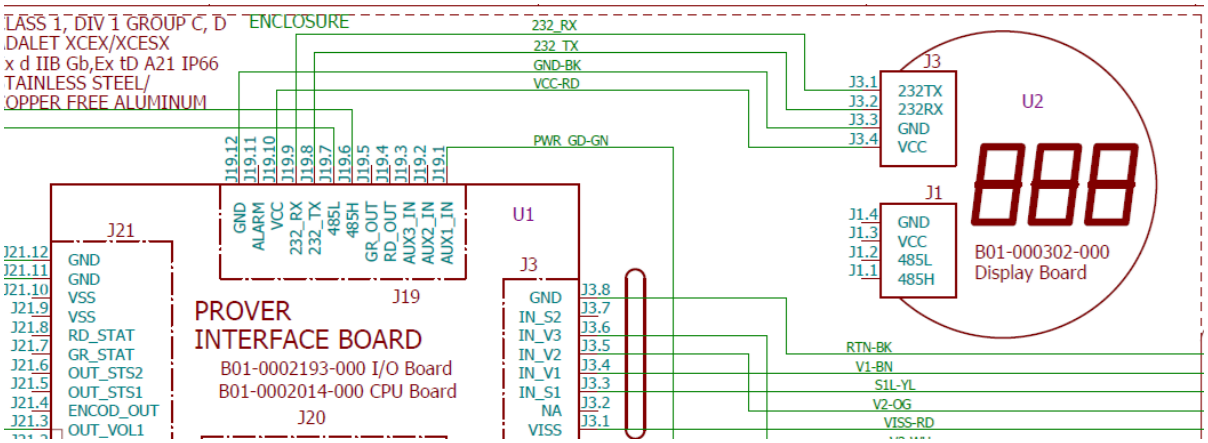
After the completion of rewiring for the customer use of RS-485 the below wiring diagram will apply.



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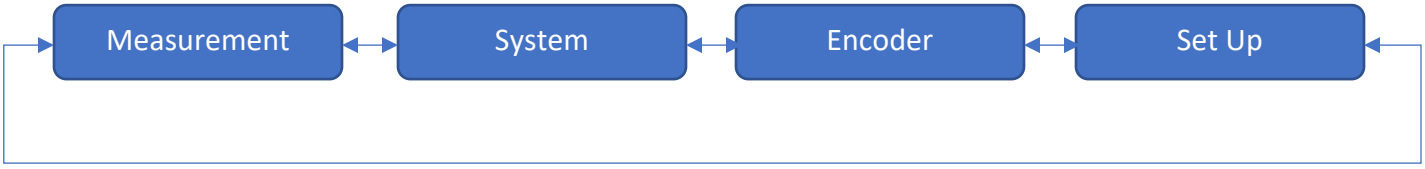
Optional display

The optional display operates the same regardless of it being the local or remote version. There are 4 display lines, each 20 characters long on the display. The keyboard has four buttons, which are defined as follows:

Scroll up **Scroll down** **Enter** **Escape**

The **Scroll up** (symbolized by the upward point triangle) and **Scroll down** (symbolized by the upward point triangle), **Enter** (the round button), and **Escape** (the square button). The **Scroll up** (symbolized by the upward point triangle) and **Scroll down** (symbolized by the upward point triangle). These keys control the circulation through the data parameters, or the menus. At the top level, there are 4 menus that circulate using these keys as shown below.



Menu selection

At the beginning of the menu system the name of the currently selected menu appears on the top line. To reach the beginning of the menu system from any place in the menu system, press the **Escape** button several times until the top-level menu is displayed. Use the **Scroll up** or **Scroll down** buttons to circulate around the top-level menus.

To enter a menu, press the **Enter** button when the name of the menu is on the top line. To leave the current menu press the **Escape** button.

Parameter selection

Press the **Scroll up** or **Scroll down** button to circulate around the parameters within a menu. If there are embedded sub menus the names will show on the top line and you can enter or exit a sub menu by pressing **Enter** or **Escape** respectively.

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Change a parameter

To change a parameter, it must be on the top line of the display. Press **Scroll up**, **Scroll down**, and **Enter** simultaneously to enter the *edit mode*. An "=" sign and "_" (cursor) will turn on to indicate the parameter on display can be changed. The digit or selection over the cursor can be changed by pressing the **Scroll up** or **Scroll down** buttons. To move the cursor right press the **Scroll up** and **Enter** buttons or to move left press the **Scroll down** and **Enter** buttons. Press **Enter** to enter the new number.

There are a couple of short cuts when you are in edit mode. You can press **Scroll up** and **Scroll down** together to reset a number on the display to zero. You can press **Scroll up**, **Scroll down**, and **Enter** to escape and not save the number you have created.

Display format

The display format for each line is a 2-Letter parameter code followed by the data for the parameter and the engineering units. For example:

p1 89043.257 ms

This indicates the time from sensing V1 to V3 (primary prover volume) was 89043.257 ms.

Change engineering units

The engineering units for a parameter displayed on the top line can be changed by pressing the **Scroll up** and **Enter** buttons or the **Scroll down** and **Enter** buttons. The engineering units will cycle each time you press the keys. For example, if you are looking at the primary proving time you can change the units to microseconds (µs), milliseconds (ms) or seconds (s).

Change decimal resolution

The decimal resolution for a parameter can be changed by pressing the **Scroll up** and **Escape** buttons or the **Scroll down** and **Escape** buttons.

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Menu structure

The full menu structure is shown below. The descriptions are brief however each parameter will be detailed in the table below. The parameter descriptions here are the two-letter display codes and the descriptions including units or selections (if any). The menu names are in **bold**.

Measurement			
	p1	61	primary volume time (sec, ms, µs)
	p2	62	secondary volume time (sec, ms, µs)
	st	12	prover state – launch, retract, measure
	vs	10	volume selection – V1-V3, V1-V2, V2-V3
	rs	8	remote selection via J19 terminals – not used, V1-V3, V1-V2, V2-V3 (over rides cf)
	ar	11	auto retract – disable, enable
	al	15	auto launch - disable, enable
	rl	16	remote launch
	ls	13	last launch cycle status
	ec	14	error counter
	li	13	launch signal positive/negative control
	pi	31	output pulse positive/negative control
	hc	49	hydrocarbon sensor level
	h%	50	hydrocarbon sensor filtering level
	hl	52	hydrocarbon low value alarm level
	hh	53	hydrocarbon high value alarm level
	us	47	enable or disable checking switch sequences during retract mode.
System			
system /about			
	sd	0	software date
	sv	3	software version
	se	5	serial number
	t#	223	tag assigned (user settable)
	i	224	description (user settable)
	da	134	current date
	ti	216	current time
	cy	70	prover cycles
system/water draw			
	wd	120	water draw mode
	rw	123	remote water draw

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wv	122	water draw volume (primary, secondary)
pg	121	water draw valve purge

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Encoder

ct	149	reference temperature for temperature corrections
en	150	raw counter from encoder – runs whenever encoder is running
2c	151	integer encoder count for secondary volume
1c	152	integer encoder count for primary volume
f1	181	flow rate measured over primary volume
f2	182	frequency measured over secondary volume
1t	183	temperature corrected double chronometry for V1-V3 measurement
2t	184	temperature corrected double chronometry for V1-V2measurement
B1	185	Temperature corrected P1 actual counts
B2	186	Temperature corrected P2 actual counts
E1	187	Encoder derived volume error

encoder/dual chron

ep	164	double chronometry count result for measured volume
ef	165	measured frequency over test volume
ip	163	integer pulses collected over test volume
ta	161	double chronometry timer a
tb	162	double chronometry timer b

Set up

set up/password

pw	140	password level (none, operator, technician, engineer, factory)
p1	142	Operator Password (contact flow measurement devices)
p2	143	Technician Password (contact flow measurement devices)
p3	144	Engineer Password (contact flow measurement devices)
p4	145	Factory Password (contact flow measurement devices)

set up/clock

da	217	current date
ti	216	current time

set up/com

ca	1	com address user settable
br	2	baud rate - 4800, 9600, 19200
P1		Protocol for Com1
P2		Protocol for Com2

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Set up/timeouts

dt	20	debounce time (sec, ms, µs)
S1	40	S1 to motor off delay time (sec, ms, µs)
1w	41	vol1 output pulse width (sec, ms, µs)
2w	42	vol2 output pulse width (sec, ms, µs)
ct	43	clutch time out (sec, ms, µs)
cd	48	clutch delay from motor start (sec, ms, µs)
ta	44	auto launch delay from last flag (sec, ms, µs)
mt	45	motor fault time out (sec, ms, µs)
bt	46	brake time out (sec, ms, µs)
t1	63	prover lower time limit

set up/Switchbar

sb	154	length of Switchbar
tb	155	Switchbar temperature
c1	157	calibrated V1 to V3 at the reference temperature
c2	158	calibrated V1 to V2 at the reference temperature
c3	159	calibrated V2 to V3 at the reference temperature
to	153	Switchbar tolerance
cb	156	Switchbar temperature coefficient of linear expansion
sm	194	Switchbar material
s%	175	filtering applied to Switchbar temperature measurement
pp	196	prover volumetric pressure correction
pt	195	prover volumetric temperature correction
pv	197	prover volume at reference temperature and pressure
id	197	prover inside diameter
so	212	prover center shaft outer diameter
wt	178	prover wall thickness
pp	191	prover volumetric pressure correction factor
pt	192	prover volumetric temperature correction factor
pm	193	prover material

set up/data logger

li	111	current record number
lm	112	maximum record length
lc	113	clear data logger
lx	114	next record id
lo	115	logger overflow (buffer will wrap and overwrite oldest record)

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Set up/timeouts

dt - debounce time (sec, ms, µs)
S1 - S1 to motor off delay time (sec, ms, µs)
1w - vol1 output pulse width (sec, ms, µs)
2w - vol2 output pulse width (sec, ms, µs)
ct - clutch time out (sec, ms, µs)
cd - clutch delay from motor start (sec, ms, µs)
ta - auto launch delay from last flag (sec, ms, µs)
mt - motor fault time out (sec, ms, µs)
bt - brake time out (sec, ms, µs)
t1 - prover lower time limit

set up/Switchbar

sb - length of Switchbar
tb - Switchbar temperature
c1 - calibrated V1 to V3 at the reference temperature
c2 - calibrated V1 to V2 at the reference temperature
c3 - calibrated V2 to V3 at the reference temperature
to - Switchbar tolerance
cb - Switchbar temperature coefficient of linear expansion
sm - Switchbar material
s% - filtering applied to Switchbar temperature measurement
pp - prover volumetric pressure correction
pt - prover volumetric temperature correction
pv - prover volume at reference temperature and pressure
id - prover inside diameter
so - prover center shaft outer diameter
wt - prover wall thickness
pp - prover volumetric pressure correction factor
pt - prover volumetric temperature correction factor
pm - prover material

set up/data logger

li - current record number
lm - maximum record length
lc - clear data logger
lx - next record id
lo - logger overflow (buffer will wrap and overwrite oldest record)

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set up/prover

PP - Prover flow tube volumetric pressure coefficient
Pt - Prover flow tube volumetric temperature coefficient
Pv - Calculated correction factor for prover volume
ID - Prover flow tube internal diameter
Wt - Prover flow tube wall thickness

set up/Diff Pres

Im – Current input for Differential pressure
Dn – Nominal differential pressure
Fn – Fluid name
D% - Digital filter for measured differential pressure

set up/Hydrocarbon

Im – Current input for Hydrocarbon level
H% - Hydrocarbon percentage
HL – Low limit for hydrocarbon level
HH – High limit for hydrocarbon level

set up/Viscosity

Vc – Enable viscosity calculations
Vo – Viscosity offset
V1 – Multiplier parameter 1 for viscosity calculations
V2 – Multiplier parameter 2 for viscosity calculations
Vs – Density at reference temperature for kinematic viscosity

set up/Options

Im - Current input setup
Ie – Encoder setup
Is - SwitchBar Temp
Pd – Delays output pulse
Bc – Brake Control

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Passwords

There are four passwords that control access to the parameters. Each password is associated with a level of access. The higher-level passwords give the user access to that level and all levels below. The access levels from lowest to highest level are:

1 **Operator**
2 Technician
3 Engineer
4 Factory

For example, if you have the technician password you have access to both technician and operator levels. The passwords do not time out. To disable a password, enter any invalid number (0 is the simplest entry) into the active password location to deactivate access to that level.

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Parameter details

The following table gives a detailed description of each parameter.

Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
Sd	0	Creation date of the software	4		#
CA	1	Communication address to enable access to multiple units. Each prover needs a unique address. Set this parameter from 1 to 32 for up to 32 provers connected to the communications line. RS-485 allows communications of up to ½ mile (~ 1 km) with parallel connection of multiple units.	3	1	0 to 32
BR	2	Communication baud rate. If multiple units are connected, this value must be the same on all units.	3	9600	1200 to 57600
Sv	3	Software version number	4		
	4	Reserved for future use.			
SE	5	Serial number	3		
	6	Reserved for future use.			
R!	7	Writing a 1 to this location will cause the PIM to reset. This will be a soft reset and no data will be lost. A soft reset has the same effect as cycling the power. A hard reset, resulting in a cold start and loss of all data can be obtained by first writing a special	4	0	0 or 1

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
		code into item 223. This code must be obtained from the factory.			
	8	Reserved for future use.			
Co	9	Reserved for future use.			
VS	10	This parameter sets the prover volume options. Set to 0 or 1 to enable V1 to V3 primary volume only. Set to 2 and V1 will signal the start of the secondary volume and V2 will signal the end of the secondary volume. Set to 4 and V2 will start the secondary volume and V3 will signal the end of the secondary volume.	1	1	0,1,2,4
AR	11	If this is set it enables automatic retract (launch) when power is turned on.	1	0	0, 1
ST	12	This shows the state of the prover. Launch (idle wait), Retract (motor on), Measurement (piston free to be driven downstream by the flow.	1		
Ls	13	The status from the last prover cycle. Ok or Sequence error V1, V2 or V3.	1		
EC	14	Error count – counts sequence errors from the last maintenance reset.	1		0 to 32768

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
AL	15	If this is set the system will automatically launch after detecting the last flag. The actual launch can be delayed by parameter ta, item 44.	1	0	0, 1
RL	16	Once the cycle is initiated this parameter is cleared by the software. Unless auto-Launch is on this will be a one-time prover cycle.	1	0	0, 1
ky	17	**This is not a user parameter.** It is used by the software to emulate the user pressing keys on the optional display.	4		
	18	Reserved for future use.			
	19	Reserved for future use.			
DT	20	Debounce time applied to input signals.	4	150	0 to 30000
up	21	Prover updated. Set to 1 by the PIM if a prover cycle is ready after the calculations. Cleared by user or automatically at next launch.	4	0	
Vc	22	Enables viscosity calculations.	1	0	0, 1
Vs	23	Calculated dynamic viscosity.	4		*
Vo	24	Offset parameter for viscosity calculations.	4		*
V1	25	Multiplier parameter 1 for viscosity calculations.	1	0.750	*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
V2	26	Multiplier parameter 2 for viscosity calculations.	1	0.250	*
Vs	27	Calculated kinematic viscosity.	1		*
Vs	28	Density at reference temperature for computing kinematic viscosity.	4	0.995	*
	29	Reserved for future use.			
Li	30	Controls positive/negative logic for launch signal from host.	1	0	0, 1
Pi	31	Controls positive/negative logic for volume output pulses to the host.	1	0	0, 1
bc	32	Reserved for future use.			
S1	40	Time in milliseconds for drive system to reach S1. If this time out occurs it is considered a hard fault requiring power to be cycled.	1	0	0 to 60000
1w	41	Sets the pulse width for volume out for the primary volume. Set in ms.	1	20	0 to 30000
2w	42	Sets the pulse width for volume 2 out for the secondary volume. Set in ms.	1	20	0 to 30000
Ct	43	Time out for stopping the clutch automatically and declare a motor fault.	1	30000	0 to 60000

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
Ta	44	Sets the time delay from sensing the last flag to auto launch. Auto launch must be enabled by al, parameter 15. Set in ms.	3	5000	0 to 60000
Mt	45	This sets the time out to turn off the motor after launch inactivity	1	30000	0 to 60000
Bt	46	Reserved for future use.	4		0 to 60000
Us	47	Enables suppression of switch sequence testing during retract mode, when set to 0 the PIM tests the switch sequence in both retract and measurement modes.	4	0	0,1
Cd	48	Clutch will only be started after the specified time	1	100	0 to 60000
HC	1	Displays the hydrocarbon level (4-20 ma output – indicating the sense concentration)	1		0 to 100
H%	50	Hydrocarbon percentage.	2		0 to 100
	51	Reserved for future use.			
HL	52	Sets the low alarm level for the hydrocarbon sensor output. Set 0 to 100% any negative setting disables the alarm	4	-1.00	0 to 100
HH	53	Sets the high alarm level for the hydrocarbon sensor output. Set 0 to 100% any negative setting disables the alarm	4	0.25	0 to 100
HR	54	Setup of current input of hydrocarbon level	4		*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
P1	61	Measured time from V1 to V3 for primary volume. Read in µs, ms, or seconds	4		*
P2	62	Measured time from V1 to V2 or V2 to V3 for secondary volume. Configured in cf, parameter 10. Read in µs, ms, or seconds	3		*
T1	63	Minimum prover time for V1 to V3 – anytime the stroke time is less than this value it will generate an error message	3	250	*
Cy	70	Counter for total strokes (increments at each motor start). Used to trigger service and maintenance.	1		*
Ie	71	Shows whether the encoder is installed.	4	0	0, 1
Is	72	Shows whether the SwitchBar temperature is installed.	4	0	0, 1
Pd	73	If >0 then delays output pulse (ms)	4	0	
C1	80	Cycle threshold tested against cy (parameter 70) for maintenance alert level 1 – start up. Setting available only through serial port	4	6000	*
C2	81	Cycle threshold tested against cy (parameter 70) for maintenance alert level 2 - setting available only through serial port.	4	12000	*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
C3	82	Cycle threshold tested against cy (parameter 70) for maintenance alert level 3 - setting available through serial port	3	18000	*
C4	83	Cycle threshold tested against cy (parameter 70) for maintenance alert level 4 - setting available only through serial port	3	24000	*
C5	84	Cycle threshold tested against cy (parameter 70) for maintenance alert level 5 - setting available on through serial port	3	32000	*
D1	90	Date maintenance level 1 occurred – startup date. Available only through serial port.	3		*
D2	91	Date maintenance level 2 occurred. Available only through serial port.	3		#
D3	92	Date maintenance level 3 occurred. Available only through serial port.	3		#
D4	93	Date maintenance level 4 occurred. Available only through serial port.	4		#
D5	94	Date maintenance level 5 occurred. Available on through serial port.	4		#
RA	100	Resets maintenance alerts – access is only through serial port.	4	0	0,1
LR	110	Current record	4		

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
LI	111	Index (pointer to current record)	4		
LM	112	Maximum records allowed in buffer; launches. After the record count reaches this value the oldest record will be overwritten. (circular data array)	4	100	
LC	113	Clears record buffer	1	0	0,1
Lx	114	Count of records in the buffer	1		
Lo	115	Buffer has overflowed	1	0	0,1
WD	120	Water draw mode – displays water draw state (on or off) as set by the water draw toggle switch or remotely by setting remote water draw (item 123 on)	1	0	0,1
Pg	121	Purge the water draw valves – enabled only when not in water draw mode. When it is active it turns on status 1 and status 2 (J21-5 and J21-6). The operator should turn these off before entering water draw mode. If this is not done, the setting will be ignored in water draw mode, but when water draw mode is exited, they will come back on.	1	0	0,1
WV	122	When set selects the secondary volume as set up in item 8/10 as the waste/sample control volume.	2	0	0,1

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
RW	123	Remote water draw enable – may be set via remote PC or the keyboard. The water draw toggle switch on the PIM must be set to run to enable remote water draw to control the mode.	4	0	0,1
Im	130	Mode setting for analog input channel 1 hydrocarbon or differential pressure	1	0	0, 1, 2
DP	131	Live differential pressure reading	4		*
Dm	132	Minimum differential pressure reading captured during the last prover run	4	0.000	*
DM	133	Maximum differential pressure reading captured during the last prover run	4	0.000	*
Da	134	Average differential pressure reading captured during the last prover run	4	0.000	*
Dn	135	User programmable nominal expected level during the prove run – if the average detected during a run an alarm message “possible seal leak” will be display. This does not affect the data collected	2	2.000	*
Fn	136	Fluid name – the user may input text characters for descriptive purposes.	4		

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
DR	137	Set up record for the differential pressure channel for the differential pressure mode	2		
D%	138	Damping applied to the differential pressure readings.	4	50.0	*
Dr	139	Differential Pressure while retracting.	4	0.000	*
pw	140	Active password level (none, operator, technician, engineer, and factory)	0		0, 1, 2, 3, 4
PL	141	Password list – used to apply unique passwords. Available only through serial port.	2		
p1	142	Enter operator password here	2		
p2	143	Enter technician password here	2		
p3	144	Enter engineer password here	2		
p4	145	Enter factory password here	2		
CT	149	Factory reference temperature for temperature-based corrections	4	20.0	*
EN	150	Raw encoder counts – active when encoder is running	4		*
2C	151	Integer counts for secondary volume	4		*
1C	152	Integer counts for primary volume	4		*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
To	153	Tolerance on double chronometry encoder measurement value	4	15	*
SB	154	Switchbar length – calculated from calibrated volume (see calculations and compensations)	4		*
TB	155	Switchbar temperature	4		*
CB	156	Switchbar temperature coefficient of linear expansion	4		*
C1	157	Factory calibrated double chronometry temperature corrected (to reference temperature – item 149) for V1-V3	2	2048	*
C2	158	Factory calibrated double chronometry temperature corrected (to reference temperature – item 149) for V1-V2	4	3000	*
C3	159	Factory calibrated double chronometry temperature corrected (to reference temperature – item 149) for V2-V3	4	2000	*
2m	160	If set enables overwrite of the lower line with messages, if not set it will disable the overwrite.	4	1	1,2,3.4
Ta	161	Timer 'a' of dual chronometry	4		*
Tb	162	Timer 'b' of dual chronometry	4		*
Ip	163	Integer pulse count of dual chronometry	3		*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
Ep	164	Pulse count calculated by dual chronometry	4		*
Ef	165	Frequency of encoder pulses	4		*
EM	166	Encoder counts or external flow meter pulses.	3		
Mx	167	Count limit for flow meter pulse counter.	4		
Mc	168	Flow meter pulse count.	2		
C\	170	Checksum for the software – used internally	4		
S%	175	Digital filter for measured hydrocarbon (0%=off, 99%=max)	4		0 to 100
SR	176	Setup of current input of switch bar temperature	4		
WT	178	Prover flow tube wall thickness	4		*
ID	179	Prover flow tube internal diameter	4		*
PV	180	Prover volume – factory set and normalized to reference temperature and 0 psig	4		*
F1	181	Flow rate measured over primary volume (see calculations and compensations)	4		*
F2	182	Flow rate measured over secondary volume (see calculations and compensations)	4		*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
1t	183	Temperature corrected double chronometry for V1-V3 measurement (see calculations and compensations)	4		*
2t	184	Temperature corrected double chronometry for V1-V2 measurement (see calculations and compensations)	4		*
b1	185	Temperature corrected P1 actual counts.	4		*
b2	186	Temperature corrected P2 actual counts.	4		*
e1	187	Volumetric error for test volume (see calculations and compensations)	4		*
TE	188	Test error in measured double chronometry counts vs. Factory calibrated counts at the reference temperature	4		*
PP	189	Prover pressure – entry by user required	4		*
PT	190	Prover temperature – measured from temperature transmitter	4		*
Pp	191	Prover flow tube volumetric pressure coefficient (see calculations and compensations)	4		*
Pt	192	Prover flow tube volumetric temperature coefficient (see calculations and compensations)	4		*
PM	193	Prover tube material	4		

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
SM	194	Switchbar material	4		
pt	195	Calculated temperature correction factor for prover volume (see calculations and compensations)	4	1.000	*
pp	196	Calculated pressure correction factor for prover volume (see calculations and compensations)	4	1.000	*
pv	197	Calculated correction factor for prover volume (see calculations and compensations) simply pt*pp	3	1.000	*
pc	198	Corrected prover volume pv*pv (see calculations and compensations)	3		*
t3	199	Communication protocol - proprietary	4		*
P1	201	Reserved for future use.			
P2	202	Reserved for future use.			
	203	Protocol used for COM2 Port	FMD		FMD, MODBUS
Fv	210	Flow rate variance for primary to secondary volumes (see calculations and compensations)	3		*
VC	211	Corrected test volume (pressure and temperature compensated - see calculations and compensations)	3		*
So	212	Diameter of prover shaft	2		*

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Parameter Code	Parameter #	Parameter Description	Password Level	Default Value	Range
Ti	216	Time of day	2		#
Da	217	Current date	2		#
	218	Reserved for future use.			
	219	Reserved for future use.			
	220	Reserved for future use.			
	221	Reserved for future use.			
	222	Reserved for future use.			
T#	223	Tag for prover – user assigned, up to 8 alpha-numeric characters. A special factory issued code loaded into this item will cause a cold start for any single incident of reset.	2		
i	224	Description for prover – user assigned, up to 8 alpha-numeric characters.	2		
A#	225	Account number for prover – user assigned, up to 8 alpha-numeric characters	2		
L3	251	Set to the item number in the list that you want to permanently display on line 3	2		10,12,13 14,61,62 216,217
L4	252	Set to the item number in the list that you want to permanently display on line 4	2		10,12,13 14,61,62 216,217

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Notes:

1. PIM data parameters are calculations or live measurements. They may always be viewed and shown. Passwords shown for access are for reference only**.**
2. * - denotes a floating-point number.
3. # - denotes a time or date string.
4. The parameters listed above can be accessed (read and written) via the keyboard as well as the serial port. Write access is only allowed with the indicated password level that is currently logged in to the PIM.
5. Engineering units available for each parameter are shown on the display and may be selected as required by the user. This applies as well for the software. The internal calculations are always in metric units and are independent from the engineering units selected for display.

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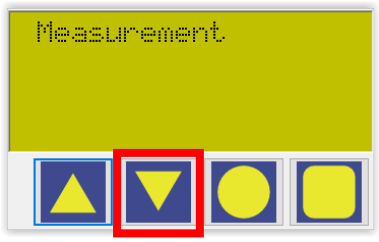
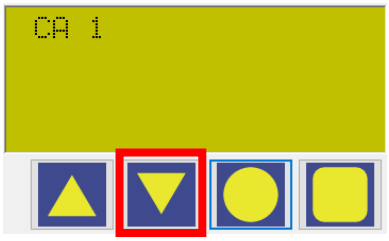
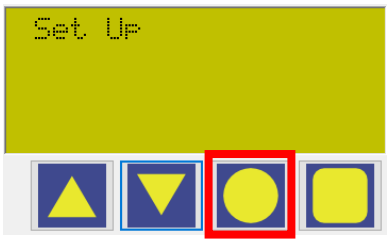
Setting Modbus communications protocol with remote display



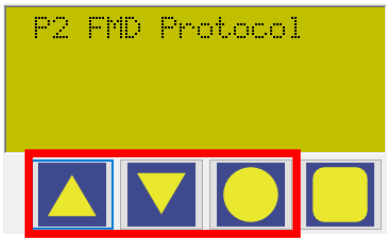
Press 1x



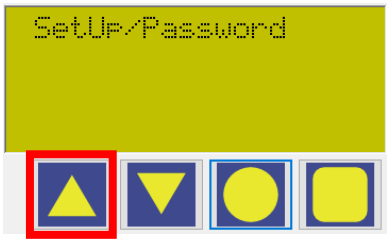
Press 1x



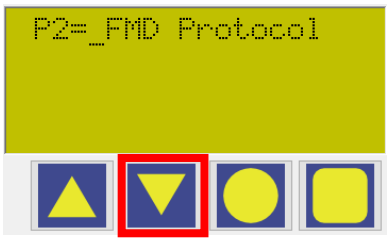
Press 1x



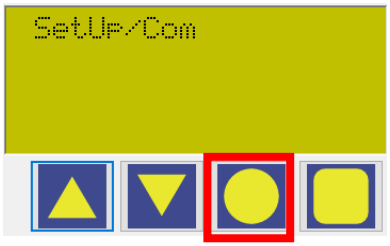
Press all three simultaneously



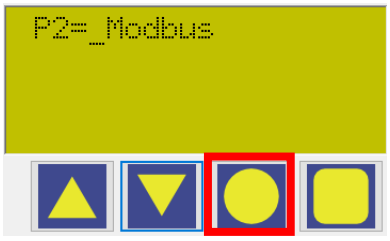
Press 2x



Press 3x



Press 1x



Press 1x

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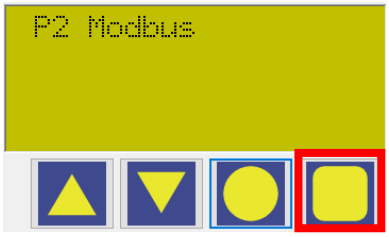
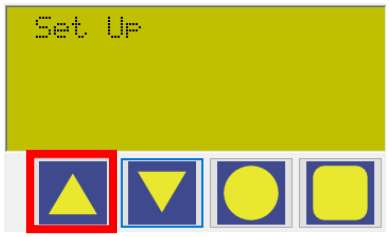


Press 5x



Press 1x

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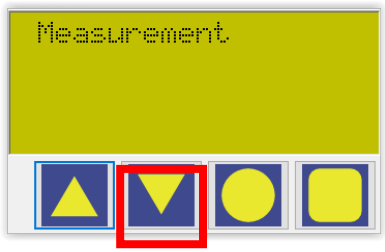
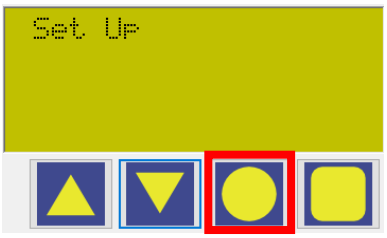
Common field settings

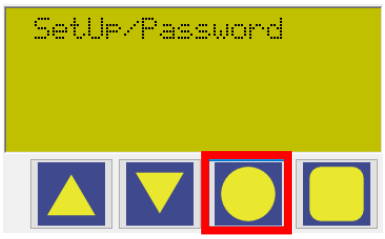
Setting the access password



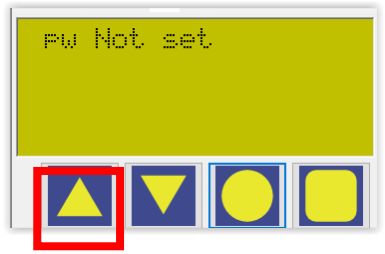
Press 1x



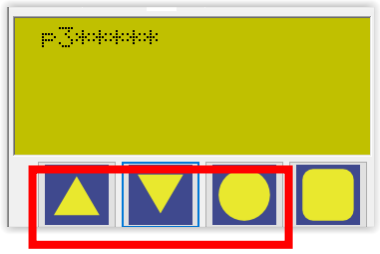
Press 1x



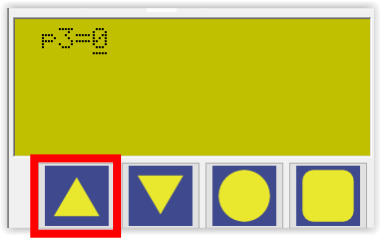
Press 1x



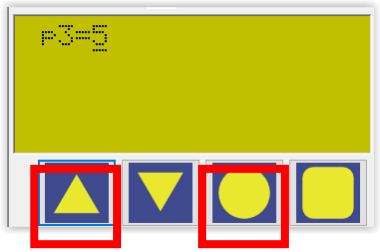
Press 2x



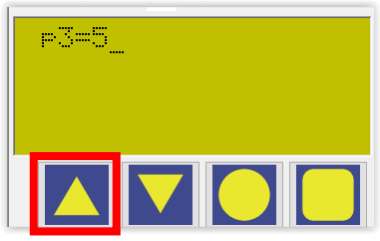
Press all 3 buttons simultaneously and release



Press till the desired value is reached



Move the curser to the right → press both buttons simultaneously and release



Press till the desired value is reached

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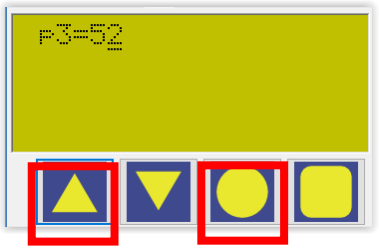
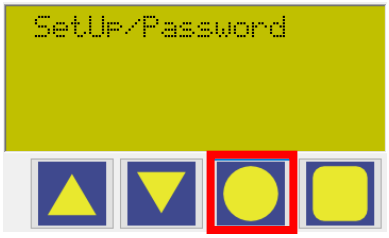


Move the curser to the right → press both buttons simultaneously and release



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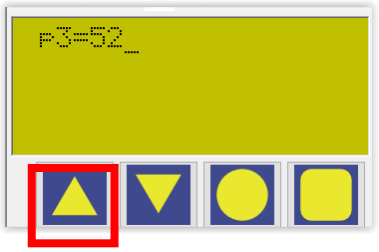
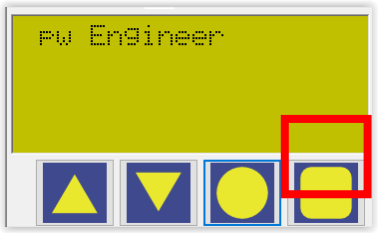
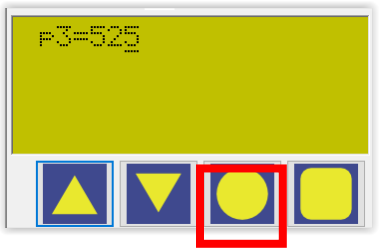


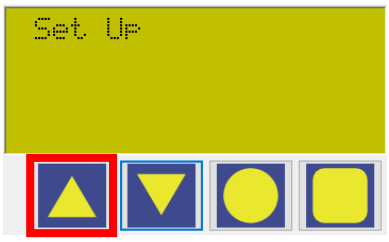
Press till the desired value is reached



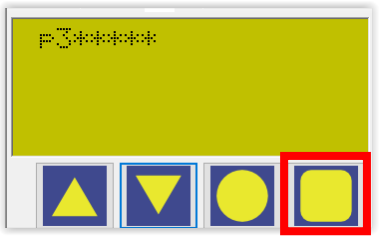
Press 2x



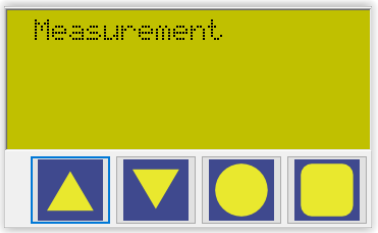
Press 1x



Press 1x



Press 1x



Complete

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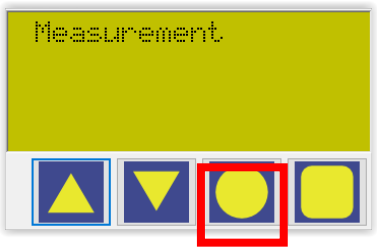
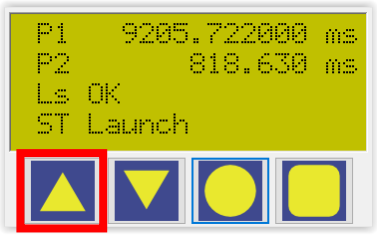
Setting the launch pulse trigger level

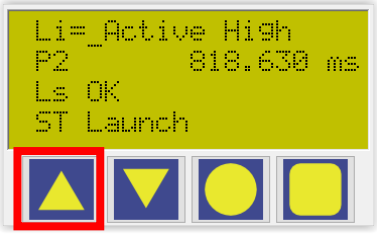


Press 1x

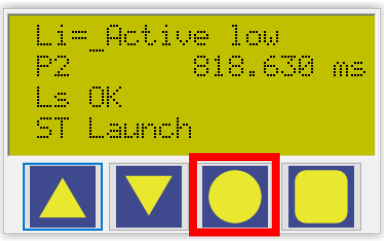


Press 9x

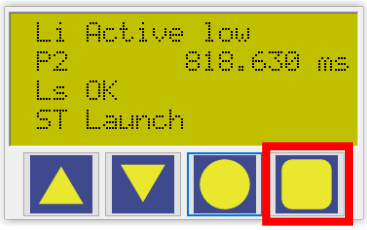
Press all 3 buttons simultaneously and release



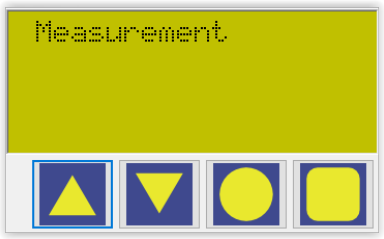
Press 1x



Press 1x



Press 1x



Complete

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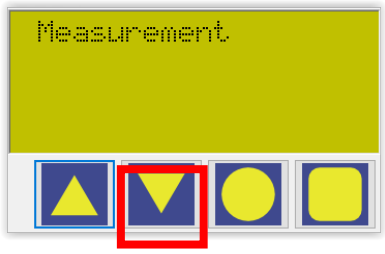
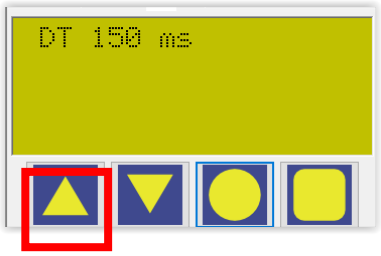
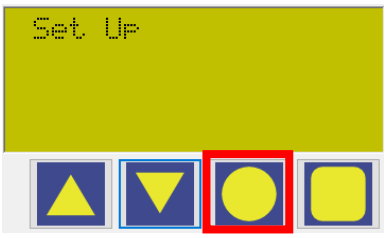
Setting volume pulse length



Press 1x



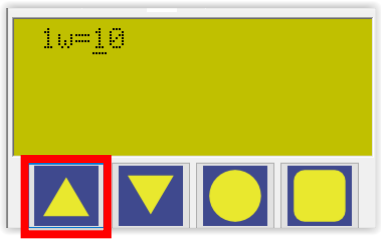
Press 3x



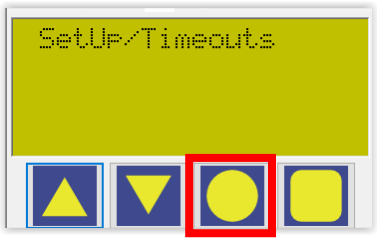
Press 1x

Press all 3 buttons simultaneously and release

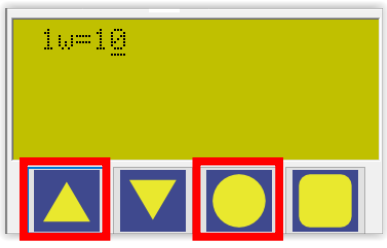
Press 3x



Press till the desired value is reached



Press 1x



Move the curser to the right → press both buttons simultaneously and release

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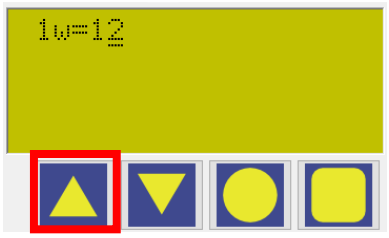
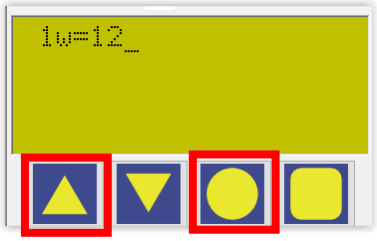
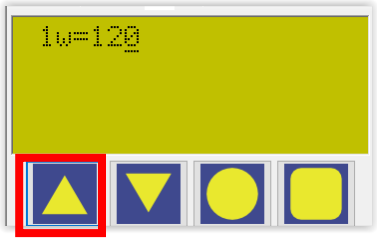


Press till the desired value is reached

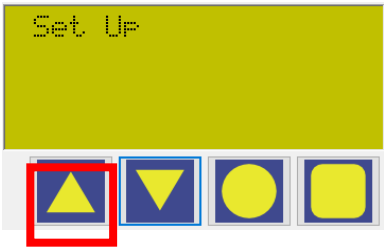


Move the curser to the right → press both buttons simultaneously and release

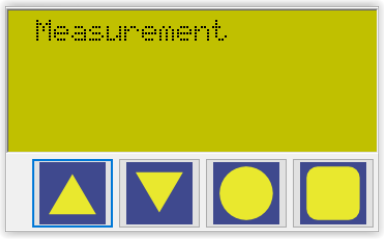


Press till the desired value is reached

Press 3x

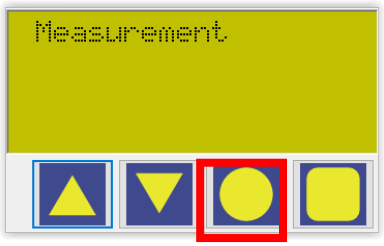


Press 3x

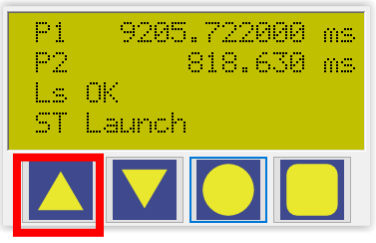


Complete

Selecting the prover volume



Press 3x



Press 3x

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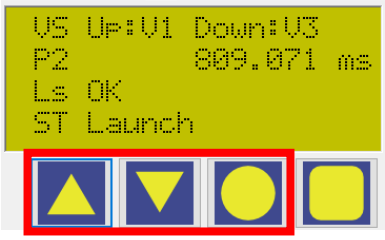
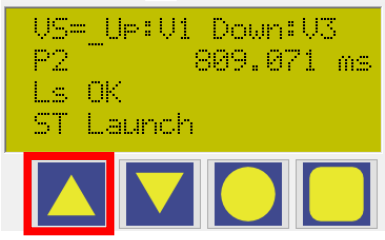
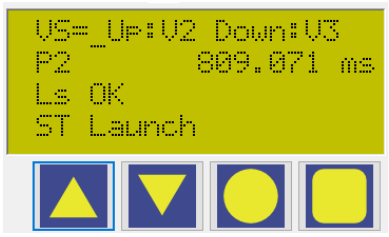


Press all 3 buttons simultaneously and release

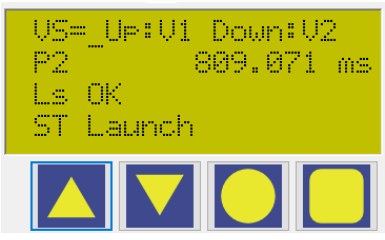


Press 1x secondary volume

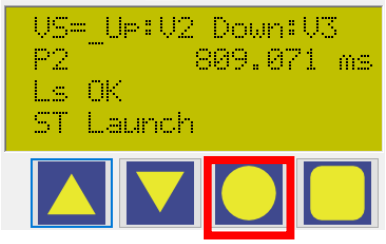
Press 2x tertiary volume



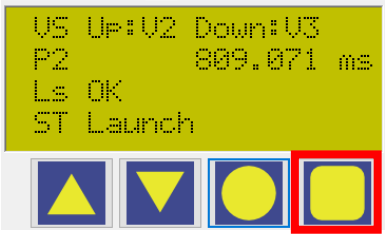
Secondary volume



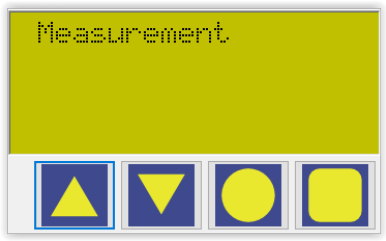
Tertiary volume



Press 1x to set volume



Press 1x



Complete

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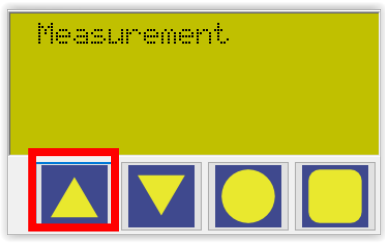
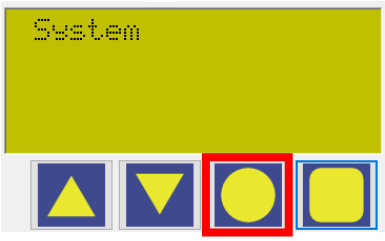
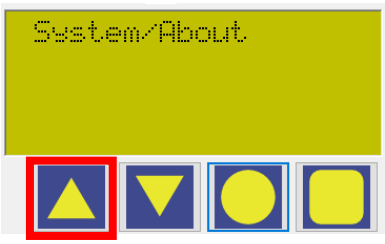
Setting water draw volume



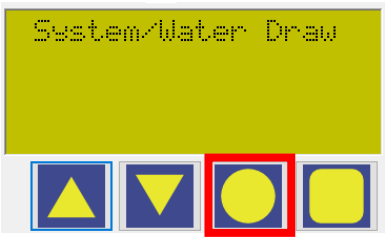
Press 1x



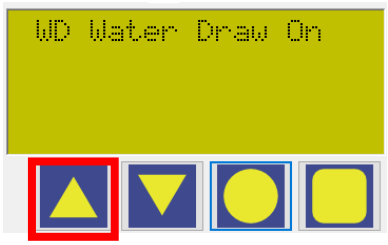
Press 1x



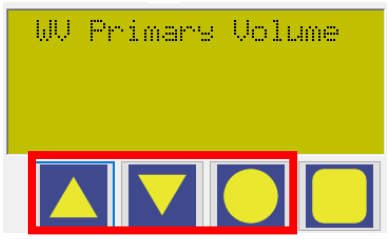
Press 1x



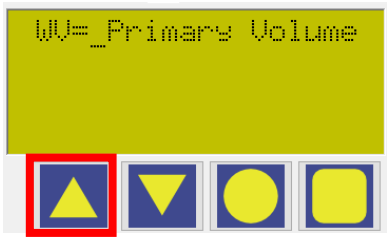
Press 1x



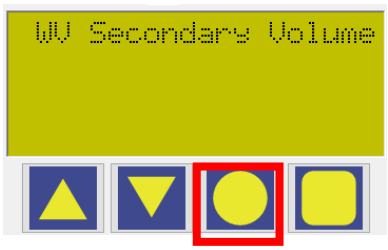
Press 2x



Press all 3 buttons simultaneously and release



Press 1x



Press 1x

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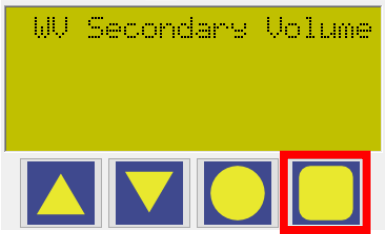

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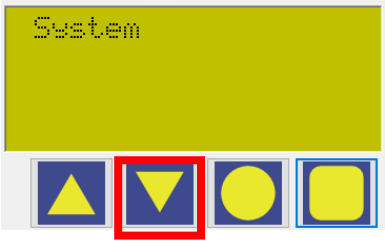
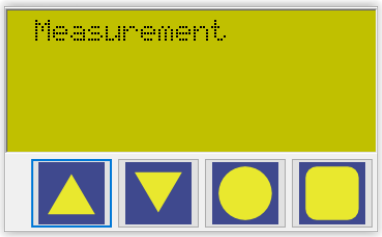


Press 1x



Complete

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