PROVU PD6088/6089 Modbus® Scanner
Quick Start Guide





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SCANVIEW USB Install

PRECISION DIGITAL

This quick start guide describes most of the common wiring connections and setup procedures for this scanner. The guide describes how to use the front panel buttons and ScanView software to program and setup the scanner. We recommend the following sequence as the easiest method for getting the scanner into service:

- Connect ScanView Software (with no other connections) and program the scanner.
- Install the scanner.
- Make input, output and power connections.
- Make any programming adjustments with the front panel buttons.

For additional information about this scanner not covered in this quick start guide, please consult the instruction manual available at www.predig.com.

Front Panel Buttons Operation

Button Symbol	Description
MENU	**MENU:** Press to enter, exit Programming Mode, or exit max/min readings
PREV	**PREV/Right Arrow:** Press to move to the previous PV or math channel
NEXT	**NEXT/Up Arrow:** Press to move to the next PV or math channel
SCAN	**SCAN/Enter:** Press once to pause scanning, press again to resume scanning

Safety Information

⚠ CAUTION

- Read complete instructions prior to installation and operation of the meter.

⚠ WARNINGS

- Risk of electric shock or personal injury. Hazardous voltages exist within enclosure.
- Installation and service should be performed only by trained service personnel.
- This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at their own risk. Precision Digital Corporation shall not be held liable for damages resulting from such improper use.

Limited Warranty

Precision Digital Corporation warrants this product against defects in material or workmanship for the specified period as detailed in the "Specifications" section of the complete manual from the date of shipment from the factory. Precision Digital's liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit. See Warranty Information and Terms & Conditions on www.predig.com for complete details.

⚠ WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

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Program Scanner with ScanView Software

The easiest and quickest way to program your ProVu scanner is to use the FREE ScanView programming software. This software is loaded into the scanner and connects and installs directly to your PC with the provided USB cable. We recommend that the first thing you do is connect the ProVu to your PC with the provided USB cable. It is not necessary to apply an input signal or AC/DC power.

ScanView Installation

1. Connect one end of the provided USB cable to the scanner and the other end to the computer. Do not apply AC/DC power. The computer will automatically install the driver software it needs to talk to the scanner. Follow the on-screen instructions and allow sufficient time for the process to complete. If the process is interrupted, then it could leave the system in an unstable condition.

⚠ WARNINGS

- Only one meter may be connected at a time. Attaching multiple meters will cause a conflict with the meter software.
- **DO NOT** apply AC or DC power to the meter when using the Micro USB connection.

2. Once the driver is installed, an AutoPlay dialog should appear for the drive "MAINSTAL." Click "Open folder to view files."
3. If the computer does not display an AutoPlay dialog for the drive "MAINSTAL," you should open My Computer and double-click on the drive labeled "MAINSTAL."
4. Double-click on the file named "MAStart." The program will open a few windows and install two programs on your computer. Simply follow the on-screen instructions until you see one of the dialogs below. If you receive a "User Account Control" warning, click "Yes."
5. If there is an update available, click the "Update" button to install the new version. Otherwise, click "Configure" to begin programming your scanner.

⚠ WARNING

- **DO NOT** unplug the scanner while the new installation files are being written to it. The scanner will display uPd dtE during the process and you will receive an on-screen notification once the process is complete.

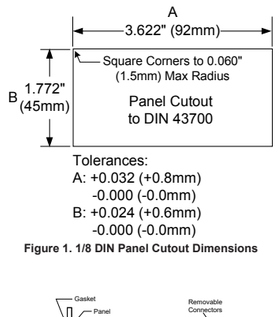
ScanView Tips

For more information on setting up your PD6088/6089 Modbus Scanner using ScanView free software from PDC, scan the QR code below or visit www.predig.com/scanview.

Installation

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout - 3.622" x 1.772" (92 mm x 45 mm). Refer to Figure 1. 1/8 DIN Panel Cutout Dimensions below for more details.
- Clearance: allow at least 6.0" (152 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the scanner (back-off the two screws so that there is ¼" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert scanner into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until scanner is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.



Tolerances:
A: +0.032 (+0.8mm)
-0.000 (-0.0mm)
B: +0.024 (+0.6mm)
-0.000 (-0.0mm)

Figure 1. 1/8 DIN Panel Cutout Dimensions

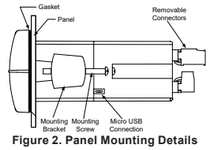


Figure 2. Panel Mounting Details

***DO NOT** apply AC or DC power to the scanner when using the Micro USB connection.*

Mounting Dimensions

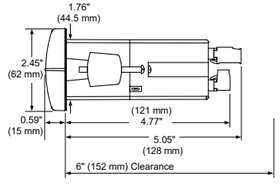


Figure 3. Scanner Dimensions - Side View

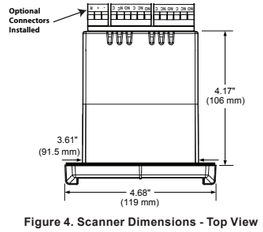


Figure 4. Scanner Dimensions - Top View

ENCLOSURE DRAWINGS CAD
Download free 3-D CAD files of these instruments to simplify your drawings!
predig.com/documentation-cad

Connections

All connections are made to removable screw terminal connectors located at the rear of the scanner. These accept wire between 12 to 24 AWG.

⚠ CAUTION

- Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the scanner and ensure personnel safety.

⚠ WARNING

- **DO NOT** connect any equipment other than Precision Digital's expansion modules, cables, or meters to the RJ45 M-LINK connector. Otherwise damage will occur to the equipment and the scanner.

Connectors Labeling

The connectors' label, affixed to the scanner, shows the location of all connectors available with requested configuration.

Note: # on the following figures refers to power options. (Example: PD6088-6H5)

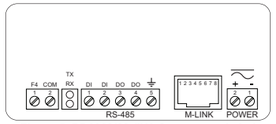


Figure 5. PD6088/89-#H0 Connectors Label

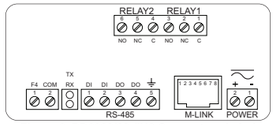


Figure 6. PD6088/89-#H2 Connectors Label

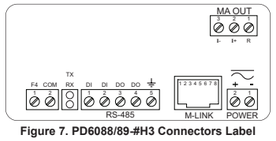


Figure 7. PD6088/89-#H3 Connectors Label

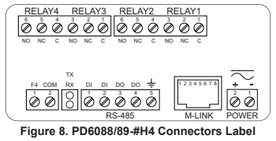


Figure 8. PD6088/89-#H4 Connectors Label

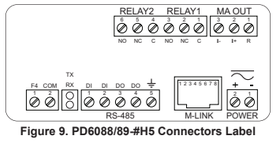


Figure 9. PD6088/89-#H5 Connectors Label

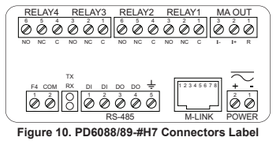


Figure 10. PD6088/89-#H7 Connectors Label

Power Connection

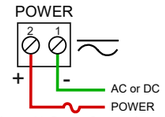


Figure 11. Power Connections

Notes:
1. *"AC" Powered scanners accept 85-265 VAC or 90-265 VDC and "DC" powered scanners accept 12-24 VDC/VAC*
2. *Required External Fuse: 5 A max, Slow Blow.*
3. *Consult the PD6088 instruction manual located at www.predig.com for additional wiring diagrams.*

Serial Communications Connections Table

The table below shows the terminal connections for 3-wire RS-485 devices.

PD6088/ PD6089 Master	PD6088/ PD6089 Snooper	PC Connection	Modbus Slave Meter	Modbus Level Gauge
On-Board Terminals	On-Board Terminals	PDA8485 RS-485 to USB	RS-485	RS-485
⏚	⏚	⏚	G	GND
DI - DO	DI - DO	DI - DO	D-	A (-)
DI - DO	DI - DO	DI - DO	D+	B (+)

Three Wire Connections

In order to wire the 5 pins for use as a 3-wire half-duplex RS-485 connection, it is necessary to create a jumper connection between DI – DO and DI- – DO- as shown below.

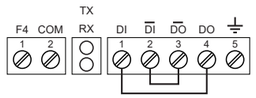


Figure 12. Three-Wire RS-485 Connection

F4 Digital Input Connection

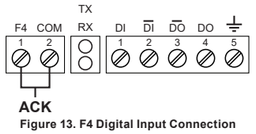


Figure 13. F4 Digital Input Connection

4-20 mA Output Wiring[1]

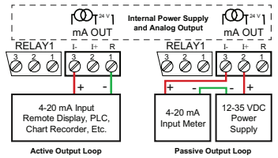


Figure 14. 4-20 mA Output Connections

Relay Connections[2]

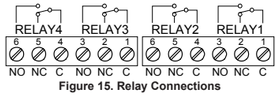


Figure 15. Relay Connections

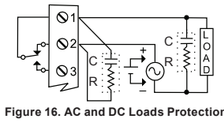


Figure 16. AC and DC Loads Protection

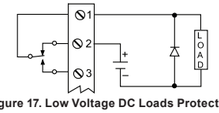


Figure 17. Low Voltage DC Loads Protection

[1] Models with 4-20 mA output option (PD6088/89-XH3/5/7)
[2] Models with relay option (PD6088/89-XH2/4/5/7)

Setup and Programming

The PD6088 displays in decimal format, while the PD6089 displays in Feet & Inches.



PD6088 Decimal Display



PD6089 Feet and Inches Display

Front Panel Buttons

Button	Description
MENU	Menu
PREV F1	PREV/Right arrow/F1
NEXT F2	NEXT/Up arrow/F2
SCAN F3	SCAN/Enter/F3
Note: F4 is a digital input. Alarms 5-8 are enabled when relay expansion module is installed.	

- Press the **MENU** button to enter or exit the Programming Mode at any time.
- Press the **RIGHT** arrow button to move to the next digit during digit or decimal point programming.
- Press the **UP** arrow button to scroll through the menus, decimal point, or to increment a digit.
- Press the **ENTER** button to access a menu or to accept a setting.
- Press and hold the **MENU** button for three seconds to access the advanced features of the scanner.
- Press the **SCAN/ENTER** button once to pause scanning (Pause LED flashes), then press the **SCAN/ENTER** button again to resume scanning (Play LED turns on).
- Press **NEXT** to go to the next PV; auto scan resumes after 10 seconds of inactivity.
- Press **PREV** to go to the previous PV; auto scan resumes after 10 seconds of inactivity.

Front Panel LED Indicators

LED	State	Indication
1-8	Steady	Alarm condition based on set and reset points, independent of relay status in certain configurations. (Available on all meter configurations, including those without relays installed)
1-8	Flashing	Relay interlock switch open
1-8 & M	Flashing	Relay in manual control mode
F	Flashing	Communications fault Condition
⏸	Flashing	Press SCAN to pause scanning
▶	Steady	Press SCAN to resume scanning
■	Flashing	Stop scan on alarm
M	Flashing	Analog output in manual control mode

PD6089 Feet and Inches Display only		
8	Steady	Eighths of an inch
16	Steady	Sixteenths of an inch

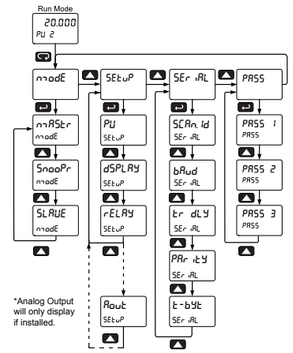
PD6089 Faceplate Symbols

Symbol	Description
FT	Feet value
IN	Inches value
- -	Designation separators

Main Menu

The main menu consists of the most commonly used functions: Mode, Setup, Serial, and Password.

- Press **MENU** button to enter Scanner Programming
- Press **UP** arrow button to scroll through the menus
- Press **MENU**, at any time, to exit and return to Run Mode
- Changes to the settings are saved to memory only after pressing **ENTER**
- The display moves to the next menu every time a setting is accepted by pressing **ENTER**



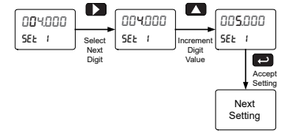
Setting Numeric Values

The numeric values are set using the **RIGHT** and **UP** arrow buttons. Press **RIGHT** arrow to select next digit and **UP** arrow to increment digit value.

The digit being changed is displayed brighter than the rest.

Press and hold **UP** arrow to auto-increment the display value.

Press the **ENTER** button, at any time, to accept a setting or **MENU** button to exit without saving changes.



Serial Communications

The scanner is equipped with RS-485 Modbus RTU serial communications.

The Serial menu is used for programming the Scanner ID, Baud Rate, Transmit Delay, Parity, and Byte-to-Byte Timeout parameters.

The scanner may be connected to a PC for initial configuration via the on-board USB connection. For ongoing digital communications with a computer or other data terminal equipment, an RS-232, or RS-485 option is required.

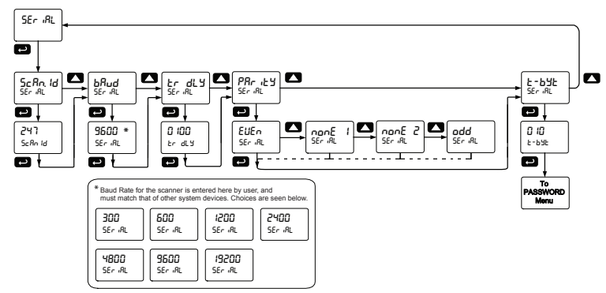
When using more than one scanner in a multi-drop mode, each scanner must be provided with its own unique address. The scanner address (Scan ID) may be programmed between 1 and 247.

The transmit delay may be set between 0 and 4999 ms; this value must be less than (Poll Time/ # of PVs).

The parity can be set to even, odd, or none with 1 or 2 stop bits.

When setting up the scanner to run on a Modbus system, the devices must be programmed with matching Baud Rate and Parity. Failure to match up the network devices' parameters may result in communication breaks.

Notes:
1. *The byte-to-byte timeout setting may be adjusted to fix communication errors with slow devices.*
2. *The Transmit Delay of the Master must be greater than the Snooper or the slave devices being polled.*
3. *When using the M-Link to connect to a Modbus network, the PD6088/PD6089 cannot be used as a Master, but can be used as a Snooper or as a Slave. In order to use the PD6088/PD6089 as a Master, the scanner must connect to the Modbus Network via the three-wire terminal connector on the back of the scanner.*



PROVU PD6088/6089 Modbus® Scanner
Quick Start Guide *Continued*

Scanner Mode Selection

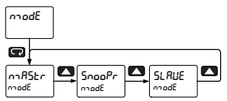
Operating Modes

The Mode menu is used to select how the scanner is to function:

1. **Master:** Reads a slave device, scales the data from it, displays the result, and operates the relays and 4-20 mA output. The Master polls from 1 to 16 process variables from 1 to 16 slave devices. The Master processes and displays PV1 through PV16 and alternately displays the variables being polled.
2. **Snooper:** Listens to the Modbus traffic and picks up a specific register or registers being polled by a Master device from a specific slave device and processes the data being read.
3. **Slave:** Read and controlled by a master device (PLC, DCS, etc). The data sent to it by the master is scaled, displayed, and used to operate the relays and 4-20 mA output.

The Master mode requires additional parameter selection to specify how the slave device is to be read and how to interpret the data.

Press **MENU** to enter Scanner Programming. Press the **ENTER** button to access any menu or press **UP** arrow button to scroll through choices. Press the **MENU** button to exit at any time and return to Run mode.



How to Enable Process Variables (PVs)

In Master or Snooper Mode, navigate to the PV Number menu and press **ENTER**. From there, the user can scroll through all of the sixteen available PVs. In order to enable a specific PV, simply press **ENTER** to access the desired PV, then scroll to EnAbLE and press **ENTER** (Follow the same course of action for disabling PVs).

Enter the Slave ID of the device being polled by the Master, followed by the Function Code, Register Number, Data Type, and Byte Order.

Once the desired PVs are enabled, navigate to the Setup menu and enter the PV Setup in order to select the PV tag, units, format, and decimal point parameters, as well as to scale the PVs.

Once the user has scaled the final PV, the scanner automatically goes to the Display Setup menu to access line 1 and 2 display assignments.

By default, display line 1 is assigned to Display PV (d PU) and line 2 to display the Tag (d tAG) for the corresponding PV.

It is possible to display PVs & Tags on line 1 and 2 simultaneously by selecting Tag & PV Number (tAGPUn). Display line 1 is setup by default to display PV & tag for PV1, 3, 5, 7; while line 2 is setup by default to display PV & tag 2, 4, 6, 8. These can be changed by the user to display any or all PVs. Program either display line 1 or 2 to show the desired parameters and press **ENTER**.

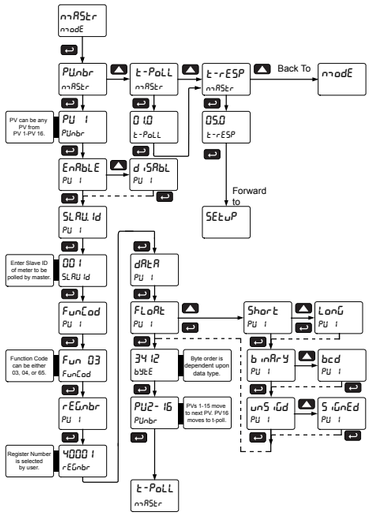
Master Mode

The Master mode contains the PV Number, Poll Time, and Response Timeout menus.

PV Number: Enable/disable PVs, select slave ID, function code, register number, data type & byte order.

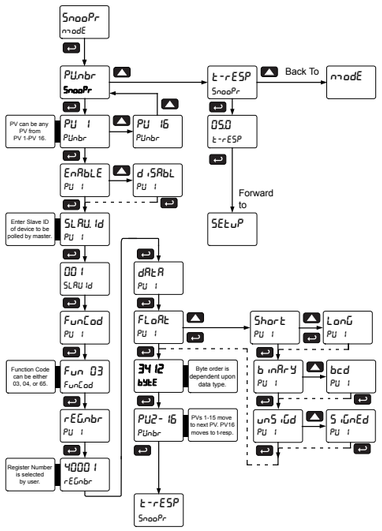
Poll Time: Enter the time interval to poll the slave devices selected.

Response timeout: Enter the time interval to wait after three polls before reporting it as a Communications Break.



Snooper Mode

The Snooper mode is used to listen to data being transmitted on the bus. Multiple Snoopers can be connected to the RS-485 bus and display any process variable. The same process variable can be displayed in multiple locations. Use the menu below to configure Snooper Mode parameters.



Notes:

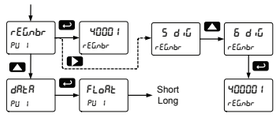
1. *To minimize the possibility of communication errors and communication break conditions, use a poll time of 5 seconds or more with slow baud rates (e.g. 4800 bps or less).*
2. *The response time for scanners set up for Snooper mode must be greater than the Master's poll time. This setting corresponds to the time window during which the Snooper listens to the bus for a reply by the slave device being polled by the master device. As soon as the Snooper detects a new reply on the bus, the display is updated. If there is no reply within the response time setting, the Snooper goes into communications break condition.*

How to Select 5 or 6-Digit Registers

In Master or Snooper Mode, it is possible to select either a five-digit or a six-digit Register Number. Once the operator has enabled a PV, entered a Slave ID, and chosen a Function Code, the scanner will arrive at the Register Number menu (reg.nbr). Press the **RIGHT** arrow to display the number of digits being used and then the **UP** arrow to change the setting for the number of digits to be used for that register (5 dig or 6 dig), then press **ENTER**.

Notes:

1. *If Function Code 03 is selected, the Register Number defaults to 40001; if Function Code 04 is selected, the Register Number defaults to 30001.*
2. *Default Data Type is Float*
3. *Default Slave ID for PV1=001, for PV2=002, for PV3=003, etc.*



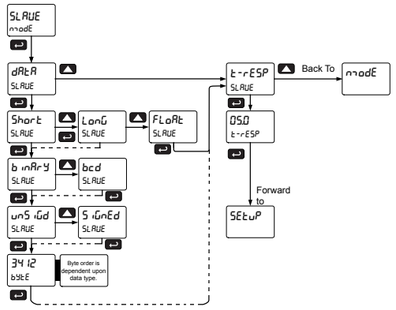
The Master ignores the decimal point setting for slave devices that specify a Short or Long integer. For example, a slave that is displaying 12.34 is read as 1,234. Floating point data may or may not utilize the decimal point. Refer to the slave's operating manual to make sure.

The Register Number range is based on the Function Code and the number of digits selected. See the following table:

Function Code	5 Digit	6 Digit
03	40001 – 49999	400001 – 465536
04	30001 – 39999	300001 – 365536
65	65001-65999	N/A

Slave Mode

The Slave mode is capable of accepting Short, Long, and Float data types. Refer to the Modbus Register Tables at www.predig.com for details of all the predefined parameters. Follow the menu below to navigate and set all parameters for Slave Mode.

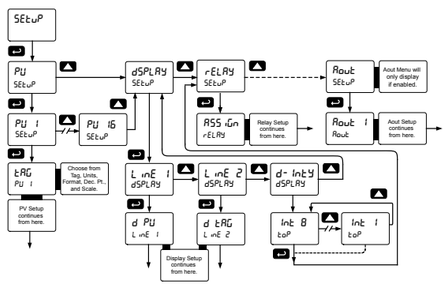


Setting Up the Scanner

The Setup menu is used to select:

1. PV Setup
 a. PV Tags
 b. PV Units
 c. Format: Decimal point or Feet & Inches
 d. Decimal Point
 e. Scale input data
2. Display assignment & Intensity
3. Relay assignment and operation
4. 4-20 mA analog output scaling

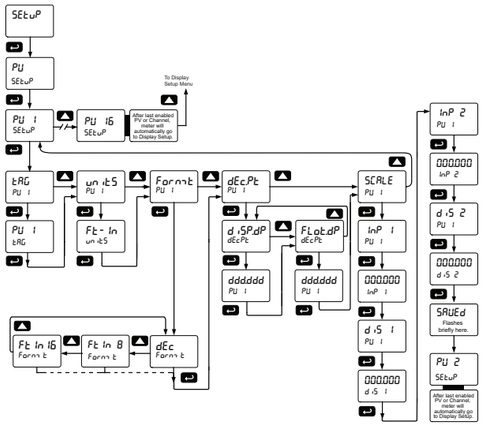
Press the **MENU** button to exit at any time.



Setting Up the Process Variables (PVs)

Enter the PV Setup menu to set up all the criteria associated with each enabled PV. Once you have selected the desired PV, you can select parameters for each. These include tag, units, format, display decimal point, float decimal point (resolution), and scaling of the input data.

Note: PV1 and PV2 can have multiple points for linearization. Only two points are available for all other PVs and for either the Square Root or Programmable Exponent functions.



Math Functions

The Math menu is used to select the math function that will determine the channels' C1-C4 value. These math functions are applied to PVs and other math channels. The results are displayed by selecting Display Channel C (d Ch C) in the Display menu. Most math functions may be applied to all PVs: For example, it is possible to add up to 16 PVs and calculate the total volume of all the tanks in a field. The Math2 function allows for further calculations on the results of other math channels (e.g. C4 = C2/C1).

The following math functions are available:

Name	Math Operation (Examples) (P = Adder, F = Factor)	Setting
Addition	(PV1+PV2+P)*F	Sun
Difference	(PV1-PV2+P)*F	d iF
Absolute difference	((Abs(PV1- PV2)+P)*F	d iFAbS
Average	(((PV1+PV2)/2)+P)*F	AVG
Multiplication	((PV1*PV2)+P)*F	nULt
Division	((PV1/PV2)+P)*F	d iU idE
Max PV	Max value of all selected PVs	H i-PU
Min PV	Min value of all selected PVs	Lo-PU
Draw	((PV1/PV2)-1)*F	drAu
Weighted average	((PV2-PV1)*F)+PV1	UAVG
Ratio	(PV1/PV2)*F	rAt io
Concentration	(PV1/(PV1+PV2))*F	ConcEn
Math 2	Math on other math channels	nAtH2
Addition	C3 = (C1+C2+P)*F	Sun
Difference	C4 = (C1-C2+P)*F	d iF
Absolute difference	C3 = ((Abs(C1- C2)+P)*F	d iFAbS
Average	C4 = (((C1+C2)/2)+P)*F	AVG
Multiplication	C3 = ((C1*C2)+P)*F	nULt
Division	C4 = ((C1/C2)+P)*F	d iU idE

Math Constants

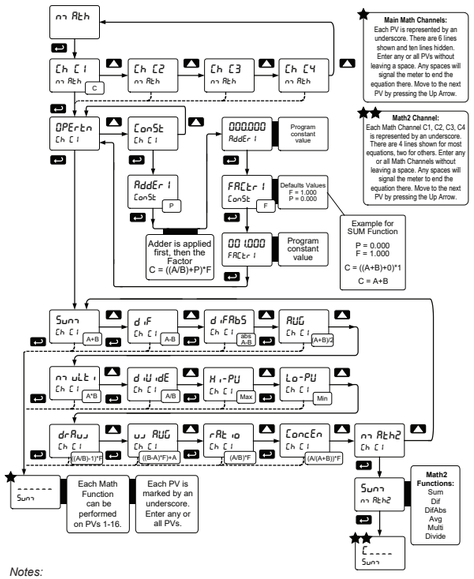
The Math Constants menu is used to set the constants used in the math channel. The math functions include the selected PVs, as well as the constants P (Adder) and the Factor F (Multiplier) as indicated in the above examples.

The Adder constant (P) may be set from -99.999 to 999.999.

The Factor constant (F) may be set from 0.001 to 999.999.

The above chart details the math functions that may be selected in the Math Function menu.

Math Function Menu

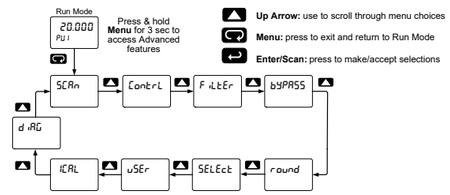


Notes:

1. *In the above menu, "A" & "B" in equations can represent any PVs (PV1-PV16). See table in previous column.*
2. *Each digit represents one PV in hexadecimal format, except PV16 (G).*
3. *PV1 – PV9 = 1 - 9, PV10 – PV16 = A – G*
4. *No PV selected = "underscore symbol"*
5. *Digit range: 1-G, then "_"*
6. *If there is an empty digit, the scanner will end the equation at that point.*
7. *For Math2 Channel, "C" is fixed, indicating which Math Channels are being processed.*

Advanced Features Menu

For features and capabilities not commonly used during setup, see the complete instruction manual found at www.predig.com for details on the *Advanced Features* menu.



Setting Up the Password

The Password menu is used for programming three levels of security to prevent unauthorized changes to the programmed parameter settings.

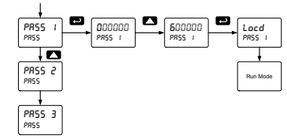
Pass 1: Allows use of function keys and digital inputs

Pass 2: Allows use of function keys, digital inputs and editing set/reset points

Pass 3: Restricts all programming, function keys, and digital inputs.

Protecting or Locking the Scanner

Enter the Password menu to program a six-digit password.

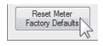


Return Scanner to Factory Defaults

If a mistake has been made while programming the scanner and it is unclear where the error occurred, the best option may be to perform a factory reset of the scanner and begin again.

ScanView Software

1
On the *Advanced Features* tab, in the bottom left-hand corner, click the *Reset Meter Factory Defaults* button.



2
In the confirmation window that appears, click *OK*. The scanner will reset to factory defaults.



LIM6088QS_A
SFT039 Ver. 4.010 & up
10/23

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