

PROSOL PCS Ultrasonic Flowmeter Installation and User Guide – V 18.4.1

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Note : After reading Section 2 regarding Preparation for Installation, A quick setup guide is provided inside the meter, as well as Index 5.

1.0 Component Identification

The PCS Ultrasonic flowmeter is made up of 3 separate components

- Flowmeter (wall mounted box)
- Transducer cables (these may be hardwired to the transducers)
- Transducer assembly and mounting arrangement

It is recommended that each component be visually checked before installation

1.1 System Specifications

Physical Parameters

Operating Temperature Range / Humidity	
Transducers	-20C to 80C / 98%RH
Flowmeter	-20C to 40C / 85%RH
IP Rating	
Transducers	IP68 (submersible 3m)
Flowmeter	IP65 (with lid closed)
Power	240VAC or 24VDC 3 Watts
Weight / Dimensions – Flowmeter	3 kgs / 250mm x 95mm x 80mm.

Operating Parameters (based on correct installation)

Accuracy	+/- 2% (10D upstream 5D down straight pipe) +/- 5% (5D upstream 2D down straight pipe)
Repeatability	+/- 0.2%
Linearity	+/- 0.5%
Installation Guide	As above > 30 D (diameters) from pump outlet or major line impedance

Transducer Sizing

S	15mm - 100mm
M	50mm – 700mm
L	300mm – 3000mm
Cable Length	Standard 10m (can be up to 100m)

Meter Outputs

Pulse (frequency) output (12-9999Hz)	x 1
Analog Current Loop output (4-20mA or 0-20mA)	x 1
Solid state relay switch (OCT output)	x 1
RS485 Terminals	x 1

Meter Inputs

Analog Current Loop output (4-20mA)	x 4
Temperature inputs	x 2

2.0 Preparation for Installation

Flowmeter

The flowmeter should be mounted on a solid wall, in a location where it is easy to see the display through the closed lid. With the lid closed, the flowmeter is IP65 rated, however mounting away from direct adverse weather effects is recommended. Also if possible avoid direct sunlight on LCD display as prolonged exposure may damage the display.

To avoid damage to the meter from lightning strikes, ensure the pipe is properly earthed.

The meter has been supplied with plugs in the unused glands, this is to prevent the ingress of insects which may cause the meter to short circuit. It is recommended these are kept in place unless a cable is required to be fitted.

Power Supply

The PCS Clamp-on meter can be supplied in 2 different power setup configurations

9-36VDC – This is the standard voltage input for the PCS meter, the DC supply is put directly into the PCS terminal block (terminals 21 and 22 (see page 13)).

240VAC – A 1.5m cable and 3 pin (single phase) plug has been supplied with the meter (suit NZ and AUS). If the meter is to be hard wired, or the cable needs to be longer, the transformer can be accessed by removing the display screen – however it is recommended this be carried out by a registered electrician.

Transducer Cables

The transducer cables should be either run through conduit from the transducers to the flowmeter. If conduit is not used, mount the cables in a way that they will not be damaged, or get in the way during normal operation. If cables are to be run along pipes, strap them to the bottom of the pipe to keep them out of the way.

Pipe Surface

The pipe surface should be clean and free from severe pitting. A reasonably smooth paint surface is acceptable, but rubber or epoxy covering will need to be removed at transducer points.

Give the pipe surface a rub over with a plastic sanding block, then dry, apply the transducer gel to the transducer surfaces then apply them to the pipe and secure with the pipe clamps.

Straight pipe run

Recommendation is 10 pipe diameters upstream and 5 diameters downstream for best accuracy (+/- 2%), however, based on testing, The manufacturer has confirmed that a 5 pipe diameter upstream, 2 diameter downstream installation gives an accuracy of +/- 5% .

For best practice, >30D distance from pumps, or other turbulence/cavitation producing devices is also recommended.

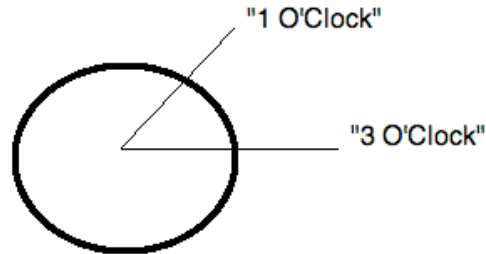
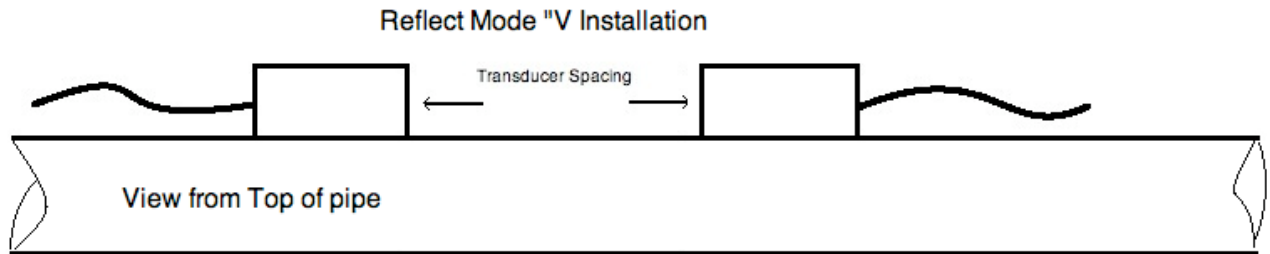
Transducer Location

For installations on pipes smaller than 50mm, V mounting is recommended (transducers on same side of pipe in mounting frame – standard configuration) it is best to mount the transducers at 30deg to 60deg off the top vertical. If this is not possible due to physical restraints, then any position on the pipe is acceptable, however it is recommended to avoid the top, or bottom of the pipe to ensure the reading is not affected by any entrained air, or solids rolling along the bottom of the pipe.

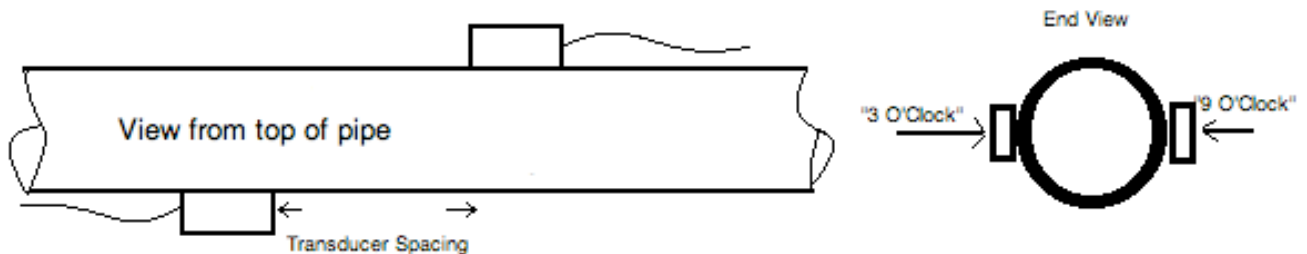
For larger than 50mm pipe diameters, Z installation is recommended (transducers on opposite sides of the pipe – used for large diameter pipes, for low signal strength applications, or where V mounting is not possible) once again the top or bottom of the pipe should be avoided.

Select an appropriate straight length of pipe to mount the transducers. Ideally there should be 5 straight pipe diameters downstream of the transducers, and 10 straight diameters upstream (i.e. if the pipe diameter is 100mm, there should be 500mm downstream, and 1000mm upstream). This will ensure greatest accuracy and repeatability in the meters reading.

The pipe where the transducers are to be located should be dust free, and have a reasonably smooth outer surface. The transducers can be mounted onto a painted surface, Epoxy linings or rubber linings may need to be removed at the transducer mounting points however.



Direct Mode "Z Installation"



3.0 Installation/Set up

Power up the flowmeter, and wait until the screen activates

3.1 Menu Navigation (See Index 1.0 for a complete Menu Command Listing)

Each display and data entry location is accessible by pressing the MENU key , then a two digit code (ie MENU 13 will display the internal diameter of the pipe. When the MENU key is pressed, the display will read [Window No. =].

If data entry is required, pressing ENTER will allow numerical data to be entered via the keypad. Data lists are scrolled through using the up and down arrows . Pressing ENTER once the correct selection is made will change it in the meter.

The Menu can be scrolled through using the up and down arrows to move through subsequent options

Note : While navigating through the menu, the meter will continue measuring/recording the flow readings

Note : If the Date and Time reported by the meter are incorrect, this can be accessed in MENU 60, in the format YY-MM-DD and HH:MM:SS.

3.2 Setting Parameters in Flowmeter

To program the meter to start measuring the flow, the following menu sites need to be accessed and entered;

MENU 30 - Changing the flowmeter measurement units to either metric, or English units). This needs only be done once.

Note : If this is the first time the meter is to be used on this site, MENU 43 (then ENTER) should be activated, this will clear out any zero offsets that may have been entered into the meter previously.

MENU 10 - Pipe outer circumference OR MENU 11 - Pipe Outer Diameter.

MENU 12 - Pipe Wall Thickness (Measured using separate wall thickness gauge or using accurate pipe charts).

MENU 14 - Pipe Material - A list of standard materials can be scrolled through.

MENU 16 - Liner Material - (Default is None)

MENU 17 - Liner Thickness - (Default is 0)

MENU 20 - Fluid Type - A list of standard fluid types can be scrolled through (Default is Ambient Water) - There is an option for 'Other' where fluid sound velocity, and Fluid Viscosity are required to be entered in MENU 21 and MENU22.

MENU 23 - Transducer Type - For the S type enter S (15 to 100mm dia pipe), For the M Type enter M (50 to 700mm dia pipe) * *(Note for the new black M Transducers, use setting M2 transducers (#22))*

MENU 24 - Transducer Mounting - Default 'V-Mounting', For pipe sizes less than 100mm we recommend the V-mounting, for pipes larger than 100mm we recommend the Z-mounting method. Refer to Index 2 for a detailed description of other configurations.

3.3 Transducer Mounting

MENU 25 will then give the calculated transducer spacing. measure this between the two front faces of the transducers (ends opposite cable entry).

Apply a liberal amount of transducer gel to each of the transducer surfaces.

For reflect mounting (transducers on the same side of the pipe), the transducers should be mounted in the 2 o'clock, or 10 o'clock position (if the cross section of the pipe is looked at like a clock face).

For direct mounting, one transducer should be mounted in the 9 o'clock position, the other in the 3 o'clock position.

Note : Try to avoid mounting the transducers on the top of the pipe (12 o'clock position), as this is the most likely place entrained air will sit, which will block the signal. Likewise the 6 o'clock position may also give problems if any sludge, or solids that travel along the bottom of the pipe are present.

Once the transducers are mounted on the pipe work – check Menu 90 for the signal strength and signal quality values, These should be above 65 and relatively stable, if not then try moving both the transducers to a different location on the pipe to see if these values improve.

Then Check menu 92 (Fluid Sound Velocity) For ambient temperature water this should be around the 1460 – 1470. If it is outside this range, move one transducer slowly -closer or further apart to change this value, then recheck M90 to ensure the signal strength and signal quality is still good.

Other Mounting Tips

- *Also be wary of spiral welded pipes to avoid mounting the transducers over a seam, or have a seam opposite the transducers in reflect mode as this may disperse the signal.*
- *A smooth painted surface is acceptable to mount the transducers to, any epoxy lining or other insulation will have to be removed however (only where the transducers sit).*
- *Avoid mounting the transducers in areas of corrosion as this may also disperse the signal.*
- *When mounting the transducers, be sure to use a liberal amount of transducer gel (smeared over the transducer face). This is to ensure a good seal between the face of the transducer and the pipe. Affix it to the pipe firmly, and make sure it is sitting central to the pipe, and parallel to it as well.*

Ensure a firm contact for each transducer on the pipe, There are magnetic strips in each transducer so if pipe is steel, it will stick to the pipe. Use the bandit straps to firmly fix the transducers in place. If the tamperproof covers are required, these can be fitted now.

3.4 Saving/Loading Site

MENU 26 allows for the solidification of any changes made – this menu should be checked and activated following any minor changes.

Press(enter) cursor 1 will flash and repress (enter) – data will be saved to the non volatile memory

Menu 27 allows for up to 10 different site locations to be saved.

Press ENTER and the cursor site number will flash. Enter a site number 0 to 9 will allow the site parameters to be saved to that selected address (use the up/down arrows to select different sites)

Press Enter – this will allow the user to choose between :-

0:- Load Parameters – will now allow you to choose a previously allocated site

or

1:- Save parameters – save your settings to that site number.

Press ENTER and the menu will immediately go to the transducer spacing screen (menu25).

It is strongly recommended that you again solidify any changes to the settings using menu 26

4.0 Flow Display Options

MENU 00 - Flow rate / Net Totaliser
MENU 01 - Flow rate / Fluid Velocity
MENU 02 - Flow Rate / POS Totaliser (Positive flow only)
MENU 03 - Flow Rate / NEG Totaliser (Negative Flow only)
MENU 04 - Date and Time / Flow Rate
MENU 06 - T1 / T2 Inputs (External 4-20mA inputs)
MENU 07 - AI3 / AI4 Inputs (External 4-20mA inputs)
MENU 08 - System Error Messages (see error message list (Index 3))
MENU 09 - Net Flow Today (from 00:00:00)

Note : Once the flowmeter is operating, and displaying a reading, it is recommended to do a zero flow check (see 5.4)

5.0 Flowmeter Adjustment Parameters

5.1 Totalisers

MENU 31 - Allows selection of the flow rate units, using the up and down arrows select appropriate units then press ENTER to allow the time scale to be selected, pressing ENTER again will complete this selection
MENU 32 - Allows selection of Totaliser reading volume units
MENU 33 - Totaliser Multiplier (shifts decimal point for large volume readings)
MENU 34 - Toggles the NET totaliser (Select ON or OFF). All flow is recorded in NET totaliser (as reported in MENU 00)
MENU 35 - Toggles the POS totaliser (Select ON or OFF). Only flow from upstream to downstream is recorded in POS totaliser (as reported in MENU 02)
MENU 36 - Toggles the NEG totaliser (Select ON or OFF). Only flow from downstream to upstream is recorded in NET totaliser (as reported in MENU 03)
MENU 37 - Allows resetting ALL, or individual totalisers to zero (use up/down arrows and ENTER to select totalisers to reset)
MENU 38 - Additional Manual Totaliser - Press ENTER to Start, ENTER again to stop.

5.2 Flow Damping

MENU 40 - Flow Damping - This allows the user to artificially damp the flow readings to even out fluctuating flow readings. Due to the high sensitivity of the ultrasonic meter, it will detect variations in the flow rate and report these instantly. In many systems, this is often shown as a flow rate that fluctuates rapidly between an upper and lower limit, even with a centrifugal pump. To allow a more stable flow reading, the Damping characteristic can be brought into effect. This is an arbitrary number set between 1 and 90, 1 being no damping. The higher the damping is set, the longer it will take the flow reading to respond to a change in the flow rate, but the more stable the reading will be to a fluctuating flow (The default value is 30).

5.3 Low Flow Cutoff

MENU 41 - This is a fluid velocity, below which the meter will ignore any flow rate. It allows any cross currents or eddies within the pipe which the meter could record as flow to be cancelled out (Default value is 0.03m/s).

5.4 Zero Point

As the ultrasonic meter has no moving parts, or insertion in the flow stream, the zero flow point is not affected by mechanical variation. However, electrical drift can sometimes occur in any electrical measuring instrumentation, and it is recommended that a zero point reset be done on a periodical basis if possible. This involves stopping the flow (with the pipe remaining full), and activating the zero flow routine in MENU 42, once ENTER is pressed, the meter will go through a series of iterations for approx 38 seconds where it resets its electronic zero point to the actual zero point.

5.5 Loss of Signal /Holding with Poor signal

MENU 28 - On temporary loss of signal (ie large slug of solid matter or air comes down pipeline), the meter can be set to either go directly into fault (will resume measuring when cause of fault disappears), or the meter can hold the last reading until normal flow resumes- This may be useful to prevent the system shutting down based on a temporary loss of signal from the meter (Default = yes)

5.6 Empty Pipe

MENU 29 – If there is a possibility the pipe may empty (due to sudden large downstream demand, or slow leak), the meter should read 0 flow, with an error message of *H (See Index 3). If the meter continues to report a reading, then the empty pipe threshold is set too low. The best way to set this is to wait for an occasion where the pipe is empty, then increase this figure until the flow rate reports 0 flow, and the error status is *H (Check on any of the flow screens (Menu 00 thru MENU 03). The standard setting is 39, but this may need to be increased in some situations. If this is not possible you can arbitrarily set this at around 80. Be aware however that, some pipe and/or fluid conditions can cause the meter to report an empty pipe even if the pipe is full if this setting is too high. If this is the case, and you are sure the pipe is completely full, reset the empty pipe value lower until the meter reports a standard status of *R

5.7 Calibration Setting

MENU 45 – This setting allows for onsite calibration adjustment. Each meter has been independently tested at a accredited testing laboratory and its adjustment recorded on its accompanying test certificate. If onsite adjustment is necessary please consult a Prosol representative before doing so condition and reset this if necessary

6.0 Meter Security Features

MENU 47 - System Lock Code - Entry of 4 digit PIN prevents data entry, data can be viewed but not changed

7.0 Data logging Access

MENU 82 - The In Built Datalogging Function - stores the following data which includes date, Net Volume, Total hrs + Heat) - Press ENTER for required selection

- 0 = Day (Last 64 Days)
- 1 = Month (Last 64 months)
- 2 = Year (100 years)

Screen will then switch to displaying the most recent figure (upper LH corner shows the data allocation, then the date (yy-mm-dd). Using the up and down arrows scrolls through the previous / next value.

8.0 Data Transmittal via RS485 connection - Setup and Operation

MENU 50 - Datalogger Activate - When this is selected (with up/down arrows an ENTER), a sub menu will appear with the following items which can all be logged. Using the UP/DOWN arrows, and pressing ENTER on the values you wish to log will select these values.

- 0 Date/Time
- 1 System Status
- 2 Current Window
- 3 Signal Strength
- 4 Flow Rate
- 5 Flow Velocity
- 6 NET Totaliser
- 7 POS Totaliser
- 8 NEG Totaliser
- 9 Energy Flow rate
- 10 Energy NET Total
- 11 Energy POS Total
- 12 Energy NEG Total
- 13 Fluid Velocity
- 14 RTD T1
- 15 RTD T2
- 16 Analog Input A13
- 17 Analog Input A14
- 18 Analog Input A15
- 19 Work Timer (Total Hours the flowmeter has been running)
- 20 Todays Flow (Daily total from 12 midnight)
- 21 Serial Number

MENU 51 - Datalogger Time Setup –

(Press enter)

1 Start Time : Enter time (in 24hr format hh:mm:ss) that data transmittal is to start. Pressing the '.' key will display a '*'.

Entering **::** will cause data transmittal to start immediately**

2 Interval : Set the time interval between data transmittal (min=1sec max=24 hrs)

3 Logger Times : (Default = 1000) events or Enter 9999 for infinite logging

The display now shows when the next reading will occur

MENU 52 – Send Log Data to (select)

0 - Internal serial bus

1 – send to RS-485

MENU 62 Serial Port Setup - To set the output data transmittal of the RS485/RS232 connection

The data bit rate is selected first Baudrate - ranging from 110 to 9600 (default is 9600)

Then parity (NONE, EVEN or ODD)

Then Data Bits (8)

Then Stop Position (1, 1.5 or 2)

9.0 Flowmeter Outputs

9.1 RS485 Output

See Section 8.0

9.2 Analogue 4-20mA Output

MENU 55 - Sets Current Output Mode - scroll thru list using up/down arrows and select using ENTER

MENU 56 - Sets flow value that corresponds to the 4mA (or 0 mA) current loop value (units as selected in MENU 31)

MENU 57 - Sets flow value that corresponds to the 20mA (or 0 mA) current loop value (units as selected in MENU 31)

9.3 Frequency output

MENU 67 - OCT - Press ENTER, then ENTER again, then input the output frequency corresponding to the low level. ENTER again, then press the down arrow, ENTER allows entering of maximum flow level frequency, press ENTER again to finalize set up

MENU 68 - Enter flow rate corresponding to the low frequency point

MENU 69 - Enter flow rate corresponding to the high frequency point

MENU 78 - OCT Output Setup - Select Frequency output here.

9.4 Alarm #1 and #2 output

MENU 79 - Relay Output Setup , To select a wide range of hardware Relay outputs, use the up/down arrows and press ENTER to select. (see 9.6)

MENU 73 - Alarm #1 Low value set point : Flow values below this will cause an alarm if it is selected in MENUs 78 ,or 79

MENU 74 - Alarm #1 High value set point : Flow values above this will cause an alarm if it is selected in MENUs 78 ,or 79

MENU 75 - Alarm #2 Low value set point : Flow values below this will cause an alarm if it is selected in MENUs 78 ,or 79

MENU 76 - Alarm #2 High value set point : Flow values above this will cause an alarm if it is selected in MENUs 78 ,or 79

9.5 Buzzer Setup

MENU 77 - There are several sources that can be selected to activate the internal meter buzzer, scroll with the up/down arrows, select with ENTER (see 9.6).

9.6 Selection Criteria for Alarm, OCT and Buzzer

0	No Signal
1	Poor Signal
2	Error status
3	Reverse Flow
4	AO over 100%
5	FO over 120%
6	Alarm #1 Activation
7	Reverse Alarm #2 Activation
8	Batch Control
9	POS Int Pulse
10	NEG Int Pulse
11	NET Int Pulse
12	Energy Pos Pulse
13	Energy Neg Pulse
14	Energy Net Pulse
15	Media Vel => Threshold
16	Media Vel < Threshold
17	ON/OFF RS485 signal
18	Timer (m51 Daily)
19	Timed Alarm #1
20	Timed Alarm #2
21	Batch Total Full
22	Timer by m51
23	77: Key Stroke on (78: Oct Not Using) 79: Disable relay
24	Disable Beeper (menu 77 only)

10.0 Flowmeter Inputs

10.1 Analogue 4-20mA Inputs

MENU 64 – AI3 - To set the upper and lower limits corresponding to the 4-20mA signal into the AI3 slot (Press ENTER then input the lower (4mA) level, press the down arrow and ENTER, and input the upper (20mA) level)

MENU 65 – AI4 - To set the upper and lower limits corresponding to the 4-20mA signal into the AI4 slot (Press ENTER then input the lower (4mA) level, press the down arrow and ENTER, and input the upper (20mA) level)

MENU 66 – AI5 - To set the upper and lower limits corresponding to the 4-20mA signal into the AI5 slot (Press ENTER then input the lower (4mA) level, press the down arrow and ENTER, and input the upper (20mA) level)

Note : Some of these Analogue inputs can be data logged through the RS485 ports, or control the Batch Control Process (see 11.0)

11.0 Batch Control Setup

MENU 80 - Select Method of Starting Batch Control

0	Start with Key Input - MANUAL START, ONE OFF
1	serial port - SELECT IF BATCH CONTROL BUTTON IS FITTED
2	AI3 Rising Edge
3	AI3 Falling Edge
4	AI4 Rising Edge
5	AI4 Falling Edge
6	AI5 Rising Edge
7	AI5 Falling Edge
8	Timer – Periodical
9	Timer – Daily

MENU 81 - ENTER Batch Control amount

If Key Input was entered for MENU 80, press ENTER to start the batch control

Note : If Batch Control was set in Menu 79, the relay will activate when the batch amount is reached.

12.0 Flowmeter Operation

MENU 70 - LCD Backlight option , select (0 to 99999 secs)

MENU 71 - LCD Contrast controller (0 to 31)

13.0 Miscellaneous Flowmeter Information

MENU 72 - Working Timer - This shows the total time the meter has been operating

MENU 92 - Measured Sound Velocity - Actual value measured.

MENU 94 - Measured Reynolds Number

MENU +2 - Last OFF time

MENU +5 - Calculator

MENU 90 - Strength and Quality of Signal - Shows the signal strength of the upstream and downstream signals.

(0=no signal, 99 = full signal)

Signal Strength should be ≥ 60

Signal Quality should be ≥ 60

MENU 91 - Ratio of Transfer time - This takes the difference between the upstream and downstream signal and displays it as a percentage (Should be 100% +/- 3%).

Note : Try realigning transducers, and checking internal parameters if these are below the prescribed limits.

It is strongly recommended that you again solidify any changes to the settings using menu 26

Index 1 - Complete MENU Display Listing

Flow Totaliser/Display Menu

- 00 Flow Rate / Net Totaliser
- 01 Flow Rate / Velocity
- 02 Flow Rate / POS Totaliser
- 03 Flow Rate / NEG Totaliser
- 04 Date, Time / Flow Rate
- 06 T1, T2 Inputs
- 07 AI3, AI4 Inputs
- 08 System Error Codes
- 09 Net Flow Today

Initial Setup Menu

- 10 Pipe outer Perimeter
- 11 Pipe outer Diameter
- 12 Pipe Wall Thickness
- 13 Pipe Inner Diameter
- 14 Pipe Material
- 15 Pipe Sound Velocity
- 16 Liner Material
- 17 Liner Sound Velocity
- 18 Liner Thickness
- 19 Inside ABS Thickness
- 20 Fluid Type
- 21 Fluid Sound Velocity
- 22 Fluid Viscosity
- 23 Transducer Type
- 24 Transducer Mounting
- 25 Transducer Spacing
- 26 default Settings – Solidify or Use RAM Settings
- 27 Save/Load Parameters
- 28 Holding with Poor Signal
- 29 Empty Pipe Setup

Flow Units Setup

- 30 Overall Measurement Units (Metric/English)
- 31 Flow Rate Units
- 32 Totaliser Units
- 33 Totaliser Display Multiplier
- 34 Activate NET Totaliser
- 35 Activate POS Totaliser
- 36 Activate NEG Totaliser
- 37 Totaliser Reset (Scrolls through each totaliser option)
- 38 Manual Totaliser (ENT to Start/Stop)
- 39 language
- 39.1 Local LCD Windows

Options Setup Menu

- 40 Damping Control
- 41 Low Flow Cut off
- 42 Set Zero Point
- 43 Reset Zero to Electronic Default
- 44 Offset Zero
- 45 Scale Factor

Security

- 46 Network IDN
- 47 System Lock
- 48 Entry to Calibrate Data
- 49 Communication Tester
- 50 Data Logger Option
- 51 Logger Timing Setup
- 52 send Log Data to RS465 or internal Mod bus

Input/Output Setup

- 53 Analogue Input AI5
- 54 OCT Pulse width
- 55 Current Output Selection
- 56 Set Current Output 4mA Corresponding Value
- 57 Set Current Output 20mA Corresponding Value
- 58 Check Current Loop Outputs
- 59 Display Current Loop Output

General Flowmeter Setup/Information

- 60 Date/Time Setup
- 61 Software Version + Serial number
- 62 **RS485/RS232 setup**
- 63 select coms protocol

Input/Output Setup

- 64 AI3 Value Range
- 65 AI4 Value Range
- 66 AI5 Value Range
- 67 **Frequency Output Selection**
- 68 Value of low frequency output
- 69 Value of high frequency output

General Flowmeter Setup/Information

- 70 LCD Backlight Setting
- 71 LCD Contrast
- 72 Total Working time since last reset
- 73 Alarm #1 Low Value
- 74 Alarm #1 High Value
- 75 Alarm #2 Low Value
- 76 Alarm #2 High Value
- 77 Buzzer Setup
- 78 OCT Output Setup
- 79 Relay Output Setup
- 80 Batch Control Source (If batch control button fitted, this is remain on A1 Up Edge)
- 81 Flow Batch Controller
- 82 In Built Totaliser - (includes date, Net Volume, Total hrs + Heat)
 - 0 = Day (Last 64 Days)
 - 1 = Month (Last 64 months)
 - 2 = Year (100 years)

- 83 Automatic Amending
- 84 Energy units
- 85 Temperature select
- 86 Specific Heat select
- 87 Energy Totaliser
- 88 Energy Multiplier
- 89 Temperatures Differential

Diagnostic Menu

- 90 **Signal Strength and Quality**
- 91 **Signal Time Delay difference**
- 92 **Measured Fluid Sound Velocity**
- 93 Total Signal Length Time
- 94 Calculated Renyolds Number and Factor

- +0 Power on/off time
- +1 Total Working Time
- +2 Last Power Off
- +3 Last Flow Rate
- +4 on/off times
- +5 Calculator
- +6 Media velocity threshold
- +7 Total Flow for the month
- +8 Total Flow for the year
- +9 No - ready timer

INDEX 2 - Wiring Configuration

Note : Connection terminals are accessed by opening flowmeter lid.

Disconnect power to meter before commencing wiring changes.

Power supply changes should be executed by a registered electrician.

		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td> </tr> </table>							51	52	53	54	55	56	57	58										
51	52	53	54	55	56	57	58																			
21	22	23	24	25	26	27	28	29	30	31	32	41	42	43	44	45	46									

21	24v DC +
22	24v DC -
23	4-20mA + out
24	4-20mA - out
25	LPIN
26	RS485 +
27	RS485 -
28	OCT +
29	OCT -
30	Relay
31	Relay
32	AI3 (4-20mA input 3)
41	Upstream Sensor Connection (+ White)
42	Upstream Sensor Connection (- Blue)
43	Not used
44	Downstream Sensor Connection (+ White)
45	Downstream Sensor Connection (- Blue)
46	Not Used
51	TX1 - Not used for flowmetering
52	T1 - Not used for flowmetering
53	Ground
54	T2 - Not used for flowmetering
55	TX2 - Not used for flowmetering
56	Ground
57	AI3 (4-20mA input 3)
58	AI4 (4-20mA input 4)

INDEX 3 - System Status Codes

Note : System Status Code is shown in the top right hand corner of the screen in MENU's 00 to 05 also MENU 08.

<u>Code</u>	<u>Description</u>	<u>Possible Cause</u>	<u>Action</u>
*R	System Normal	No Changes Necessary	
*J	CPU Error	Try turning power off for at least 30 sec then turn on again	Refer PROSOL for assistance
*I	Signal not Detected	Weak Ultrasonic Signal Sensors not close enough to pipe Pipe surface too rough, oily, or has extra coating. Remove transducers and re-clean pipe. Ultrasonic Gel dried up or not applied correctly Check initial parameters, move transducers and recheck MENU 90 for signal strength.	Check MENU 90 MENU 91, and MENU +8
*H	Low Signal Strength Poor Signal Quality	As per above	
*Q	Frequency Output Over	Maximum flow rate higher than input value	Check MENU 66 to MENU 69.
*E	Current Loop Over	Can occur for very high, or very Low flows The actual flow is over 120%, or under the parameters set for the 4-20mA signal.	Check MENU 56
*F	Hardware fault	Try turning power off for at least 30 sec then turn on again	Refer PROSOL for assistance
*G	Gain Adjustment ADJ GAIN => S1 ADJ GAIN => S2 ADJ GAIN => S3 ADJ GAIN => S4	Flowmeter is doing an internal correction to try and improve Signal strength. If meter stalls at S1, or changes between S1 and S2, signal strength Or signal quality is weak	Try steps above to improve signal

INDEX 4 – Frequency and analogue outputs

Pulse Set up for PCS

Method 1

Say Menu 32 is set to cubic meters
And Menu 33 is set to X1 meaning (1 pulse = 1 cubic meter)
Adjusting this setting to say 10 or 100 would mean 1 pulse every 10 or 100

Menu 78 – set to 9. Pos Int Pulse

If we set this to #10 or #11 we can pulse for either neg flows or nett flows (pos + neg - but your system needs to recognise from the 4-20mA output which way the flow is going to allocate the pulse under a pos pulse Total or a neg pulse Total

Method 2

Taking note of what menu 31 is set to – say litres/sec

Please Note;- frequency Flow rate MUST be Higher than the maximum expected flow rate

Menu 67 – FO Frequency range – press Enter
Set Low FO Frequency to 0 – press Down Arrow key
Set high frequency output to 100 (100 cycles/sec)

Menu 68 – Low Frequency Flow rate – 0 l/s
Menu 69 – high frequency Flow rate – 100 L/s

Menu 78 – to be set to 13. FO
This indicates 1 cycle (Pulse)/litre (100/100)

Menu 67 – FO Frequency range – press Enter
Set Low FO Frequency to 0 – press Down Arrow key
Set high frequency output to 10 (10 cycles/sec)

Menu 68 – Low Frequency Flow rate – 0 l/s
Menu 69 – high frequency Flow rate – 100 L/s

Menu 78 – to be set to 13. FO
This indicates 1 cycle(pulse)/ 10 litres (10/100)

Menu 67 – FO Frequency range – press Enter
Set Low FO Frequency to 0 – press Down Arrow key
Set high frequency output to 1 (1 cycle/sec)

Menu 68 – Low Frequency Flow rate – 0 l/s
Menu 69 – high frequency Flow rate – 100 L/s

Menu 78 – to be set to 13. FO
This indicates 1 cycle (pulse)/100 litre (1/100)

All wiring inc 10Kohm resistor is to be wired as per our wiring diagram above

Flow rate Analogue Output set up for PCS

4-20mA Set up for positive flows

example – flow rate range 0 L/s to 150 L/s

Menu 31;- ensure this is set to litres/ sec

Menu 55 id set to 4-20mA

Menu 56 is set to 0 Ls

Menu 57 is set to 150 l/s

The current output can be tested on menu 58 and the actual flow rate current is indicated on menu 59

4-20mA Set up for positive + negative flows flows

example – flow rate range -150 L/s to 150 L/s

Menu 31;- ensure this is set to litres/ sec

Menu 55 id set to 4-20mA

Menu 56 is set to -150 Ls

Menu 57 is set to 150 l/s

The current output can be tested on menu 58 and the actual flow rate current is indicated on menu 59

There are two methods for setting up pulse outputs

Both methods require you to use the OCT output and not the relay output.

INDEX 5 – Quick Set up Guide

MENU 00 Displays - Flow rate and Net Totaliser

Step 1 (Menu 11) Enter **Pipe outer Diameter**

Step 2 (Menu 12) Enter **Pipe Wall Thickness**

Step 3 (Menu 14) Choose **Pipe Material**

Step 4 (Menu 16) Choose **Liner Material** (if applicable)

Step 5 (Menu 20) Choose **Fluid Type**

Step 6 (Menu 23) Choose **Transducer Size (Standard-S, Standard-M or Standard-L)**

Step 7 (Menu 24) Select **Transducer Mounting (usually V (<100mm pipe) or Z (>100mm pipe))**

Step 8 (Menu 25) Install the first transducer on the pipe
Apply a good coating of the transducer gel to the face of the transducer, apply to the pipe
(between 1 and 3 o'clock position)

Step 9 (Menu 90) Check the Signal Strength (Up and Down) and Signal Quality, if these are not stable, or less than 60 try moving transducers to a different part of the pipe.

Step 10 (Menu 92) Check the Sonic Velocity of the fluid (Ambient Water @ 17 Deg C is approx 1466) if the reading is much different move one Transducer left or right to bring the reading into line.

Step 11 Recheck Menu 90 as per step 9 then secure using pipe clamp transducers provided

Step 12 (Menu 26) **Save** Parameters, Press Enter, Press '1' then Enter again.

Step 13 (Menu 31) Select - Flow Rate Units

(Menu 32) Select - Totaliser Units

Step 14 (Menu 42) Set Zero Point – Stop flow, then press ENTER

**** IMPORTANT - HAVE YOU SAVED THE SETTINGS (MENU 26) ?? ****