

Test Report

	Standard	Actual
Product		
Model		
Sr. No.		
Line Size:		

Product

Model

Sr. No.

Line Size:

*This is to certify that the products mentioned above have been tested and calibrated at our works and have been found working satisfactorily as per the technical specifications of the product.*

---

## WARANTY CERTIFICATE

---

*We certify that the instrument mentioned above has been tested by us and is guaranteed for a period of 12 months from the date of dispatch. We undertake to make good by replacement or repair defects arising due to faulty design, material and or workmanship within the above mentioned period. Provided that the part in respect to which the complaint is made, is sent at the purchaser's expense.*

***The warrantee is valid subject to :***

*The meter or part there of not being subject to alteration, accident abuse or misuse. The installation having been done as per guide lines in the manual.*

Client: \_\_\_\_\_

Date of Dispatch \_\_\_\_\_ For Vatturkar Industrial



Panel Mounted  
J-510



Field Mounted  
A-510

# FLUID COMPUTER

Rate indicator + Totalizer + 4-20 mA Transmitter + RS-232 interface

## OPERATION MANUAL

*Serving the Industry since 1993*

Dear Customer,

Thanks & congratulations on your purchase of the VATS product. For the care & maintenance of your product, pl. go through the precautions. We wish you a long & trouble free life of our product.

## Index

### A. Sensor Details and Installation

1. Sensor Introduction
2. Technical Specifications
3. Material of Construction
4. Wiring
5. Installation Guidelines

### B. Electronic monitors

1. Technical Specification
2. Wiring Details
3. Getting started
4. Programming
5. 4-20 Current Loop
6. Site Calibration
7. Trouble Shooting



**Precautions: STOP! read this carefully before you proceed**

- Before use of the product, please check for Chemical compatibility, temperature, Pressure parameters of the liquid.
- Before installation or removal of the sensor depressurize & vent the system.
- Sensor Cap to be tightened only with hands, do not use any tools.
- Follow safety measures - Use Helmet, gloves, goggles during installation
- Please do not alter product construction
- VATS sensors may not work properly for downstream liquid flow from a certain height because of gravity.

## A. Sensor Details and Application

### Sensor Introduction

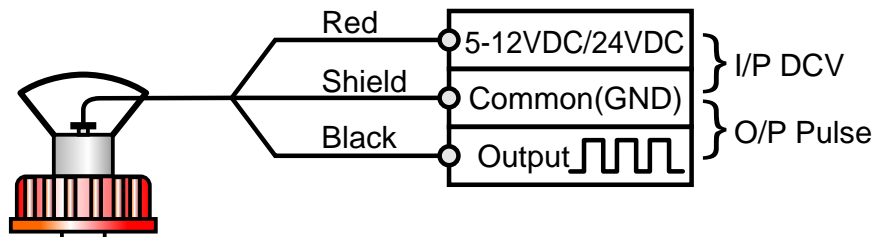
VATS JT-121 Flow Sensor is a paddle wheel insertion type flow sensor, in a robust & compact housing. The sensor makes use of the Faraday's law of electromagnetic induction. It generates a frequency & signal proportional to the flow. The suspended particles or solid content in the liquid should not be more than 1%. The sensor gives excellent, reliable results in the flow velocity range of 0.5m/sec to 5 m/sec & for the flow with Reynolds no. greater than 5000.

### Technical Specifications

<b>Flow-rate range</b>	: 0.5m/sec to 5m/sec.
<b>Accuracy</b>	: +/- 1% of full scale deflection
<b>Input Voltage</b>	: 5 to 12 VDC (Optional 24VDC)
<b>Output Voltage</b>	: Square wave (Sinking) of 5- 12V Open coil o/p amplitude, 15 - 17.5 Hz/meter/second
<b>Cable length</b>	: 0.5 meters for field type, 5 m for panel type
<b>Protecting Rating</b>	: IP-65
<b>Operating Temp.</b>	: with P.P. Sensor upto 50°C with PVDF / SS Sensor - upto 120°C
<b>Operating Pressure</b>	: upto 5Kg, for Plastic body 0 to 20 Kg for metal body.

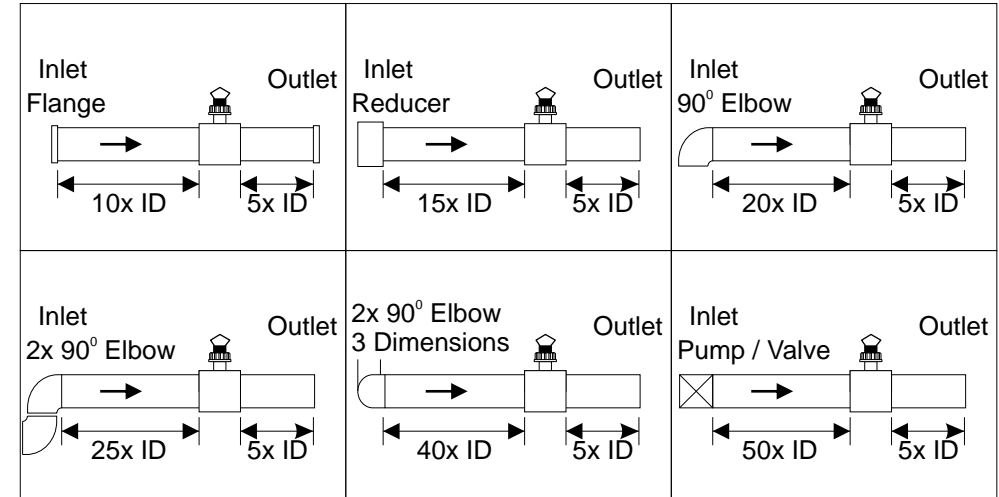
### Material of Construction (MOC)

	Body	Paddle	Pin	O ring
<b>Standard</b>	PP	DELRIN	Hard Steel	Viton
<b>Optional</b>	PVDF / SS 316	PVDF	Ceramic bearing polymer	Viton / PTFE



\*All VATS sensors have Reverse Polarity Protection.  
 \*To extend sensor cable, use 2 Core Teflon cable 24/19/36 (silver coated).  
 \*I/P Dc power supplied from Vats instrument, 10K $\Omega$  pull up resistor recommended for other brands. (connected between black and red wire)

A. Straight Run Guidelines



Because of the obstructions like T, Bend, reducer etc. the flow pattern varies a lot. In Fluid Dynamics - it's called turbulence. In turbulent flow it's not possible to get precise reading. To nullify the turbulence - the only method is to have a straight run.

Installation Guidelines

1. Line Size Selection Chart

Pipe Size (NB)	15	25	40	50	65	80	100
Min Flow M <sup>3</sup> / Hr	0.2	0.8	1.9	3.5	5.8	7.5	14
Max Flow M <sup>3</sup> / Hr	2.1	8.0	19	35	58	75	140

To get the exact output from the sensor, minimum flow velocity will be required is 0.2m/s. And for best results **Reynolds number(R)** is greater than 5000 especially for high viscous liquids. To calculate R use following formula:

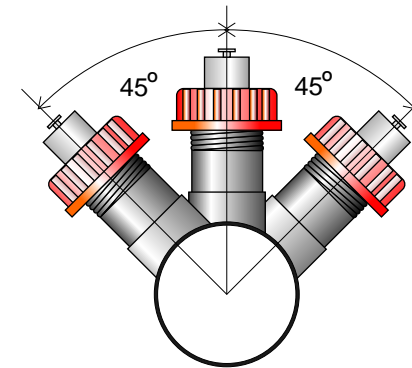
$$R = \frac{F}{0.047 \times D \times \text{Vis}}$$

D = Pipe inner diameter in m.  
 F = Flow Rate in LPM.  
 Vis = Kinematic Viscosity in m<sup>2</sup> / s.  
 (Dynamic viscosity / density).

2. Placement of the fitting

All flow-meter fitting requires a straight run. As per site conditions, the following straight lengths must be provided for best result. Recommended sensor upstream / downstream mounting requirements can be found in the following diagram:

B. Sensor Mounting Positions



- In Horizontal pipes with sediment-free fluids, the best position is at 90°
- If sediment is present the sensor can be mounted at an angle of +/- 45° for better performance.
- In vertical pipes, the mounting position can be freely chosen.

The sensor/indicator can be mounted in vertical as well as horizontal piping  
 Depressurize the line, remove the blind plug and insert the flow sensor gently.  
 Ensure that the sensor O-rings are in place and slightly greased and push the sensor in till the threaded cap touches the T fitting.  
 Before tightening the cap ensure that direction of the sensor is proper & the locating pins lock in the notches provided. Do not use tools to tighten the cap.  
 Ensure that the arrow on the sensor point in the direction of flow.  
 In case of field mounted units the sensor must be mounted such that the display becomes parallel to the pipe line.

## B. Electronic Monitors

All VATS electronic flow monitors are high speed micro-controller based units with a high resolution back-lit display. By using front panel tactile keys, one can view / program different parameters. It is very important to read the manual before installation to make better use of VATS Flow Meters with full efficiency.

A-510 / J-510 is a Digital Rate Indicator suitable for VATS JT-121 sensor or others giving pulse output of 200 Hz max.

A-510 / J-510 one can read the flow rate in LPH, M<sup>3</sup> / Hr only and corresponding Total reading in Litre or M<sup>3</sup> only.

Along with these two consecutive displays these monitors also have relays to operate in various modes such as,

- A. Batcher
- B. Pulser
- C. Rate Switch

As A/J - 510 are most advance monitors with built in Re-Transmission facility. As standard Fluid Computer provide 4-20 mA current output proportional to the flow rate/flow velocity.

With optional / addition on cards these monitors can also provide RS-232 or RS-485 output for further advance connectivity.

With this facility direct printing option or computer connectivity becomes simple.

## Technical Specifications

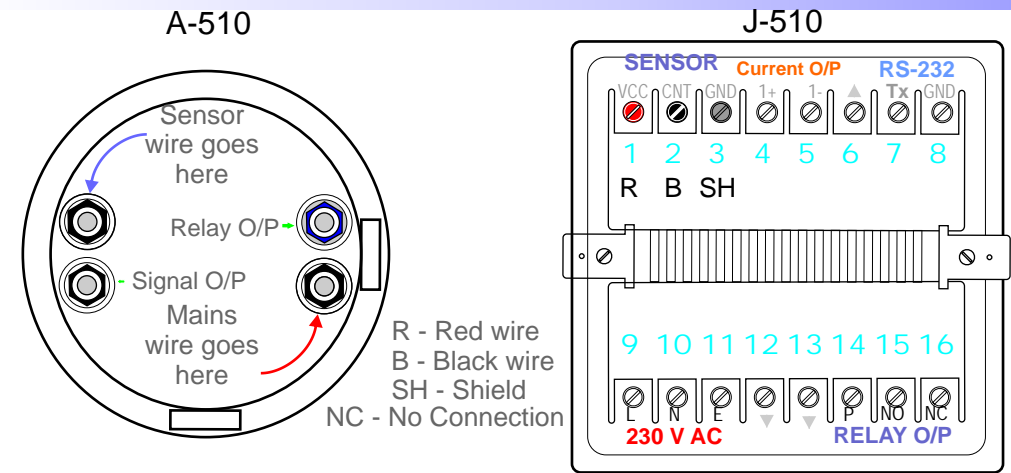
Power Supply	230 VAC, +/- 10%, 50Hz
Function	Rate Indication + Totaliser
Input	From Vats Sensor JT-121
Accuracy	+/- 1% of full scale
Meter Size	A-510 Dia.105 mm x 120 mm deep. J-510:- 96mm x 96mm x 150mm
Display	Alphanumeric LCD with backlit 7 digit for Total and 4 digit for flow rate.
Protection	IP-65
Relay Output	A. 5A Potential free relay @230VAC B.4 to 20 mA isolated current O/P for PLC I/P (External 24VDC loop Powered)



### Precautions: STOP! read this carefully !

Ensure proper connection of mains, wrong connection may spoil the meter. While extending the cable, use recommended type only, with proper insulation. Avoid noise interference. Do not pass the sensor wire parallel to power cable. If this is unavoidable - pass the sensor cable through noise protected tray.

## Wiring - The backside of meter



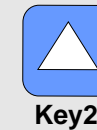
## Getting Started

Before programming understand the keys.

Key1 is used to enter program (code 11) and move the cursor left to right



Key1



Key2



Key3

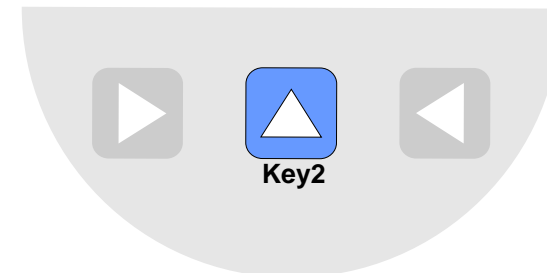
Key2 is for scrolling the numbers from 0 to 9

Key3 is the ENTER key, it's used to confirm & go to next step.

## Programming - View Mode

In all Vats Flow Monitors with just the press of key2 momentarily one can see all the parameters which are preprogrammed one after the other.

In this mode one can not make any change. It is just to view what is programmed in advance for one second only.



The sequence of different parameters changes as per the desired mode.

<b>SCALE</b> 0.100000	It indicates the amount of liquid equal to one pulse generated by the sensor. This function is present in all modes. Format is 0.abcdef
<b>EXPONENT</b> 10 e+0	It indicates the scale factor is setted in what engineering unit from ml to M <sup>3</sup> . This function is present in all modes.
<b>MANUAL RESET!</b>	It indicates resetting of batch is set as manual. We can set it as automatic reset in setting mode. This function is present in only in Batch mode.
<b>RELAY</b> 000000.0	It indicates relay setting. In Batch / Pulser mode relay set point in terms of quantity of liquid. In rate switch mode relay set point in terms of Flow rate.
<b>HYSTERIS</b> 000000.0	In case of Batch, hysteresis equal to process error. In case of rate switch this is a percentage(%) deviation to be programmed to protect relay from chattering.
<b>TOTAL</b> 000000.0	It indicates the total quantity of liquid is passed.
<b>BAT. CNT.</b> 0000000_	It indicates no. of batches taken in Batch and Pulser mode.
<b>DISPLAY BATCH?</b>	It indicates in Batch / Pulser mode user setting is to indicate batch in spite of total.
00000.00 20 ma = ?	It indicates user settings at which value one needs 20 mA current. For more information pl refer page 12.
<b>VATS</b> -----	After showing all above parameters the display shows VATS & returns to the main display

## Programming - Enter The Code

Vats advance flow meters are microcontroller based unit . User friendly units provide site calibration and settings of different functions.

To enter the setting mode Vats have provided code no. Entry; so that only concerned person can change the parameters. Different code nos. For different parameters are provided.

Vats A/J- 210 Fluid Monitor Operates in Four different functions:

1. Rate Indicator + Totaliser only
2. Rate Indicator + Totaliser + Batcher
3. Rate Indicator + Totaliser + Pulser
4. Rate Indicator + Totaliser + Rate Switch

<b>OPER. AS TOTALIZER</b>	It is the basic mode in which we can see the flow rate as well as total at the same time on the dual line display
<b>OPER. AS BATCHER</b>	Batcher mode is a popular mode in chemical industries, to get a batch of large quantity consistently. Reset can be manual or automatic. It also displays flow rate as well as total.
<b>OPER. AS PULSER</b>	It is a repetitive batcher most useful for dosing application. In this mode the unit gives short pulses to dosing / metering pump repetitively. It also displays flow rate as well as total.
<b>OPER. AS RATE SW.</b>	It is another important mode widely used in cooling tower and process industries. It gives a totalizer relay output on the basis of flow rate. Here relay will switch ON at set value and above.

Following is the chart which summarizes different parameters available in different modes & the relevant programming codes.

Parameter	Batcher	Pulser	Rate Switch	Totalizer	Program Code
Scale	✓	✓	✓	✓	0000031
Exponent	✓	✓	✓	✓	0000031
Set Relay	✓	✓	✓	✗	0000011
Hysteresis	✓	✓	✓	✗	0000011
Batch Counter	✓	✓	✗	✗	0000011
Reset Batch counter	✓	✓	✗	✗	0000011
Reset Total	✓	✓	✗	✗	0000012
Auto/Manual Reset	✓	✗	✗	✗	0000012
Display Total / batch	✓	✗	✗	✗	0000012
4-20 mA current O/P	✓	✓	✓	✓	0000012

## Code no. 0000011 set relay + Hysteris + reset Batch Counter

This code no. is valid only for key 1. To Enter the this code, press key 1 momentarily. After that we enter in relay setting mode. This is not applicable in totaliser mode.

In **Batcher mode**, we can set relay for desired batch quantity At which the relay will be ON and stop the batching.  
 In **Pulsar mode**, we can set the relay in such way that it gives pulse to dosing pump after every quantity of liquid was set.  
 In **Rate switch mode**, relay can set for desired flow rate at which relay will be ON.

SETRELAY  
000000.0

In Batcher mode, hysteresis is nothing but process error & is calculated as, Hysteresis = Set quantity - Obtained quantity  
 In Pulsar mode, ignore this parameter.  
 In rate switch mode, hysteresis is counted in terms of percentage and used to protect relay from chattering. (when the flow rate is fluctuating between set value & nearby value)

SET-HYST  
000000.0

In Batcher & Pulsar mode it displays no. of batches taken.  
 This is the number of counts the relay turned ON.  
 To reset batch counter press any key.

BAT. CNT.  
000000.0

This step asks to reset batch counter. To reset press key1, otherwise press other any key.

RESET  
BAT. CNT.

After last parameter, unit go backs to main display.

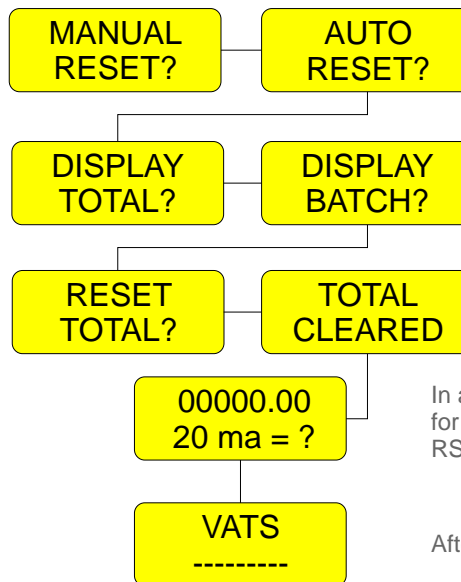
VATS  
-----

### Note:

In above procedure if user does not make any change within 10 sec. the unit will automatically go back to main display.

After making any change , do not forget to press ENT key.  
 Please check all parameters that you have changed in View mode for confirmation.

## Code no. 0000012 Auto/Mannual Reset +Display Batch/Total + Reset total



Only in Batcher mode, this function is used to set batcher manual/auto reset.

Only in Batcher mode, this function is used to set meter display to view only total quantity / batch quantity Of liquid.

In all modes, this function is used to reset earlier totalised reading.

In all modes, this function is used to set flow rate value for 4 to 20 mA output. Optional facility is available as RS-232.

After last parameter, unit go backs to main display.

## Code no. 0000031 set / change scale factor (Site Calibration)

SETSCALE  
0.000000

In case of total / batcher recalibration. This is done by changing the scale factor. This is nothing but site calibration.  
 e.g. - Batch is set say 100 lit and by physical measurement the quantity is not matching to the displayed one then one needs to recalibrate as follows by the simple formula below.

EXPONENT  
10 e+0

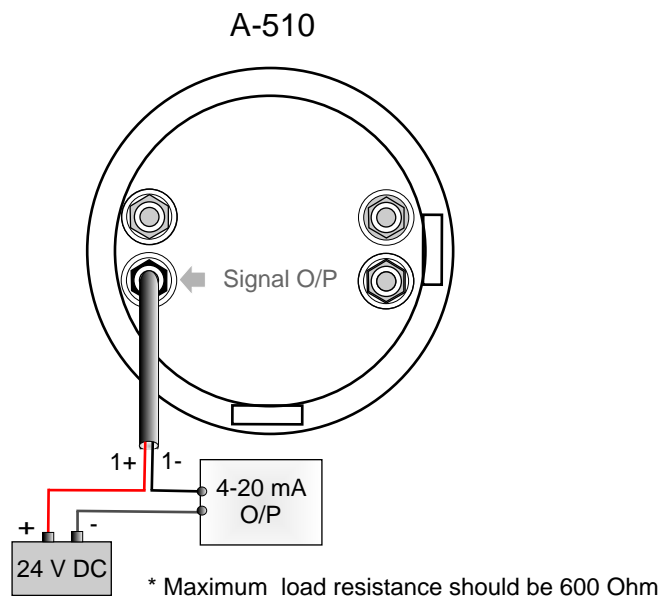
$$\text{New scale Factor} = \frac{\text{MEASURED Qty./Flow rate}}{\text{DISPLAYED Qty./ Flowrate}} \times \text{Old scale factor}$$

By doing this - one will get exact reading. If there is error in set and display due to hysteresis. i.e. Process time to finally stop the flow. Then adjust hysteresis as per page 10 - code 11

**Important:** The product comes to you pre-calibrated, Do not alter Scale factor without proper technical knowledge. This may result in unreliable readings.

Following figure shows loop power method for taking 4-20 mA current output from our field meter i.e. A-510.

This is required to connect external DC power supply of +24 V.



The 4-20 mA current loop is a very robust sensor signaling standard. Current loops are ideal for data transmission because of their inherent insensitivity to electrical noise. In a 4-20 mA current loop, all the signaling current flows through all components; the same current flows even if the wire terminations are not perfect.

You can set desired flow rate at which you get 4 mA o/p i.e. low end of measurement range and also at which you get 20 mA o/p i.e. high end measurement range.

Current supplied from the power supply flows through the wire to the transmitter and the transmitter regulates current flow within the loop. The current allowed by transmitter is called as loop current and it is proportional to flow rate.

*That finishes the preliminary installation guidelines & tips towards the proper care & maintenance your flow meter. If you face any problems during & after installation, refer to the trouble-shooting section of this manual.*



*This Check Sheet is provided for you, in case you are not able to solve the problem your self. You can fill up the check sheet & fax it to us. Or you can download the check sheet from our website, fill it in word & save & send it by email. Or take a printout & mail it to us at our address.*

**General Information:**

Name of Client / Dealer:  Date:

Sr. No.:

Select Model: **Select from drop-down list** write here if not in the list:

Application: **Select from drop-down list** write here if not in the list:

Installation location  Open field  In-doors  
Line Pressure  Kg/cm2,

**Define your Problem – check whichever is applicable**

- No Display
- Reading remains zero
- Steady but wrong Reading
- Reading different than Actual flow
- Other – pl. define
- Gradual Fading of Display
- Fluctuating Reading
- Breakgae
- meter shows reading at no flow.

**No Display :**

1. Have you checked power supply with multimeter?  YES  NO reading -
2. Is there water / moisture inside the meter?  YES  NO
3. Does the back light turn on?  YES  NO

**Reading Remains ZERO:**

1. Is the flowrate within the min & max flowrate limit of the meter?  YES  NO
2. Have you checked the sensor for free movement of Paddle?  YES  NO
3. Does the meter show reading when paddle rotated by hand?  YES  NO
4. Have you checked sensor wiring for proper connections?  YES  NO
5. If you connect other sensor to the meter, does it show reading?  YES  NO

## Fluctuating reading:

1. Is the sensor located just after any valve/reducer?  YES  NO
2. Have you checked the sensor for free movement of Paddle?  YES  NO
3. Are there any air bubbles in the line  YES  NO
4. Have you checked sensor wiring for proper connections?  YES  NO
5. Is the sensor wiring extended?  YES  NO Is there shorting in wires?  YES  NO

## Steady but wrong reading:

1. Mention the actual flowrate  ; Mention the Displayed flowrate
2. The Serial no of Sensor, Meter & Fitting are matching -  YES  NO
3. Line size mentioned on the indicator same as the fitting -  YES  NO
4. Scale factor of the meter same as that mentioned on the sticker  YES  NO
5. Is There is an adequate straight run for the inlet/ outlet -  YES  NO
6. If straight run is inadequate – Did you adjust scale factor? -  YES  NO
7. After adjusting the scale factor Is the reading found OK? -  YES  NO

**Breakage:** Specify the components broken & likely cause for the same.

## Gradual fading of display:

- Is the unit is exposed to direct sunlight?  YES  NO

## Meter shows reading even at no flow:

1. Is there an induction motor/coil very close to meter/sensor  YES  NO
2. Is the extra sensor cable kept looped near to sensor?  YES  NO
3. Is the plant piping properly grounded?  YES  NO
4. If the sensor removed from the fitting, reading becomes zero  YES  NO
5. If sensor wire disconnected from meter reading becomes zero  YES  NO

## Any Other Comments / your Feedback / Suggestions:

Check Sheet filled by:

Company Name

Trouble	Probable Cause	Action Required
Display remains zero even when the actual flow is present.	Flow less than the minimum sensing value	Check if any downstream valve is closed. Open valve, remove the sensor from the fitting and check change in reading by physically rotating the paddle. If meter shows reading check the actual flow. Change the fitting if the normal flow is lower than the minimum sensing velocity.
	Sensor not inserted in the correct plane	Ensure that the arrow on the sensor is in the same direction as the flow.
	Paddle not moving freely	Remove the sensor, clean the pin & paddle and ensure free movement of the paddle
	Wrong sensor wiring. (mainly applicable to meters with extended sensor wire)	Connect the sensor wires as per wiring connection details on the meter.
	Meter and sensor are not matching. (for panel mounted meters)	Ensure that the meters are connected to its corresponding sensor and fitting only.
Reading getting displayed but not correct.	Adequate straight run is not provided on either side of sensor. Presence of a pressure reducing valve before the sensor can result in error.	Provide straight run as per guide lines. OR adjust the scale factor to match the actual flow. Provide a bend between the valve and the sensor. Try to use fittings with strengtheners wherever possible. Refer p. 4 for proper placement of sensor
	Scale factor disturbed	Check factor. Correct factor as mentioned on meter or sensor.
No display	No supply	Checks input supply and make proper connections.
	Micro-Processor hanged	Switch off supply for 1 minute and then switch On the supply again