

| INSTALLATION & OPERATION MANUAL

MVF 300 Vortex Flow Meter



MIAL[®]
INSTRUMENTS PVT.LTD.
Measuring & Beyond

www.mialinstruments.com

MVF 300

Vortex Flow Meter

Preface

- Thank you for purchasing our product.
- This manual is about the various functions of the product, wiring methods, setting methods, operating methods, troubleshooting methods, etc.
- Please read this manual carefully before operation, use this product correctly to avoid unnecessary losses due to incorrect operation.
- After you finish reading, please keep it in a place where it can be easily accessed at any time for reference during operation.



NOTE!

Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading. We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us. The content of this manual is strictly prohibited from reprinting or copying.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The MIAL Instruments pvt.ltd. Does not guarantee that the product will be suitable for a particular use by the user.

Warnings and symbols used



HAZARD!

If not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.



WARNING!

Pay special attention to the important information linked to product or particular part in the operation Manual



CAUTION!

Disregarding these instructions can result in damage to the device or to parts of the operator's plant.



INFORMATION!

These instructions contain important information for the handling of the device.



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1. INTRODUCTION

1.1 PURPOSE OF THE MANUAL

Overview:

Welcome to the user manual for the Mial MVF 300 – Vortex Flowmeter. This comprehensive guide is designed to assist operators, maintenance personnel, and system integrators in understanding, installing, operating, and maintaining the Mial MVF 300 – Vortex Flowmeter effectively.

Objectives:

Clarification of Functionality: This manual aims to provide a clear understanding of the principles and functionality of the Mial MVF 300 – Vortex Flowmeter. Users will gain insights into its design, components, and how it precisely measures fluid flow.

Guidance for Installation:

Step-by-step instructions and considerations for proper installation are provided to ensure optimal performance. Safety precautions are emphasized to create a secure working environment.

Training and Familiarization:

Users will be guided through the features, controls, and indicators of the flow meter, facilitating efficient operation. This section aims to serve as a valuable training resource for users at various experience levels.

Maintenance and Troubleshooting Assistance:

Learn about routine maintenance procedures and effective troubleshooting techniques. This manual empowers users to address common issues and perform regular maintenance to enhance the longevity of the Mial MVF 300 – Vortex Flowmeter.

Intended Audience:

This manual is intended for operators, maintenance personnel, and system integrators involved in the installation, operation, and maintenance of the Mial MVF 300 – Vortex Flowmeter. It is suitable for both novice users seeking basic guidance and experienced professionals looking for specific details.

Important Notes:

Please read through the manual carefully, adhering to safety guidelines and following instructions precisely. If any uncertainties arise during the installation, operation, or maintenance processes, seek assistance from qualified personnel or our customer service / support team.

Reference to Other Documentation:

Refer to the accompanying technical specifications document for in-depth details about the Mial MVF 300 – Vortex Flowmeter. Additional resources can be found on our website.

Intended use



CAUTION!

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.



INFORMATION!

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose



Certification

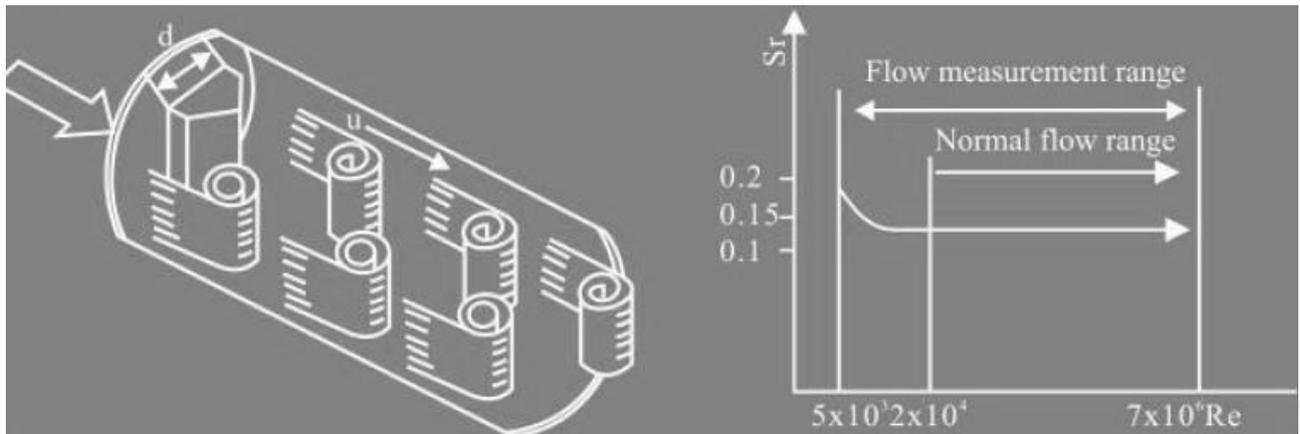


The manufacturer certifies successful testing of the product by applying the ISO marking

1.2 OPERATING PRINCIPLE

Setting a Triangular prism vortex generator in the flow meter, regular vortex will be generated at both sides of triangular prism, which is called Karman swirl. As shown in the drawing, vortex are arranged regularly at the downstream of vortex generator. Suppose the vortex generation frequency is F, the average flow velocity of medium is V, d is the width of the surface of triangular prism incident flow, & D for the nominal diameter of the flowmeter. Then we get the computation Formula.

$$f = Sr \frac{\bar{V}}{(1 \sim 1.25 d/D) d}$$





1.3 TECHNICAL SPECIFICATIONS

Operation and performance

Flow measurement

Vortex

Fluid types

Steam

Fluid properties

Newtonian and non-Newtonian fluids

capable of producing vortices

Pipe Size

DN 15mm – DN 300mm

Flow Range

Steam: 5 -70 m/s

Accuracy

±1%

Measurement parameters

Instantaneous Flow, Totalized Flow,

Frequency, Pressure, Temperature

Density, Current or the percentage

Certification

Calibration certification

Electronics

Enclosures

Aluminium

Transmitter Type

Integral, Remote Type (Converter display)

Enclosure IP rating

IP65

Power supply

24 VDC

Use SMPS when employing AC power

Ambient temperature

-40°F to 149°F (-40°C to 65°C)

Relative Humidity

≤85%

Standard output

Analog output : 4 to 20 mA

Pulse Output

Network Connection

Modbus RTU RS 485

Flow Tube

Operating Temperature range (Fluid)

-40°F to 482°F (-40°C to 250°C)

Nominal Pressure

1.6 Mpa

Process connections

ANSI Class 150 Flanges

Body Materials

Standard: SS304

Optional: SS316

IP rating

IP65



2. DEVICE DESCRIPTION

2.1 SCOPE OF DELIVERY



INFORMATION!

Do a check of the packing list to make sure that you have all the elements given in the order



INFORMATION!

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

2.2 NAME PLATES



INFORMATION!

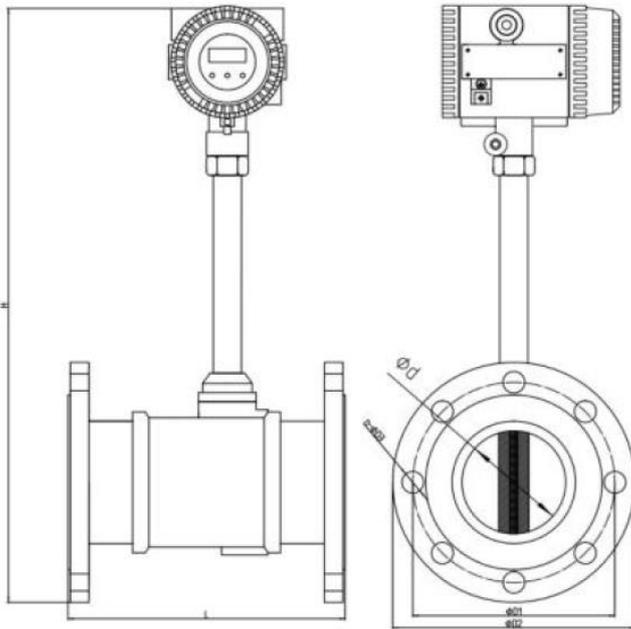
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate

EXAMPLE OF NAMEPLATE OF THE METER

Vortex Flow Meter	
Model: _____	Measuring Range: _____
Factor: _____	Nominal Diameter: _____
Accuracy : _____	Nominal Pressure : _____
Date : _____	Serial Number : _____



2.3 DIMENSION



DIN PN16 Flange Connection Dimension

Size	L	H	d	D1	D2	n-D3
DN15	170	440	15	65	95	4-φ14
DN20	170	445	20	75	105	4-φ14
DN25	170	450	26	85	115	4-φ14
DN32	170	462	32	100	140	4-φ18
DN40	190	465	38	110	150	4-φ18
DN50	190	473	48	125	165	4-φ18
DN65	220	487	62	145	185	4-φ18
DN80	220	500	73	160	200	8-φ18
DN100	240	533	95	180	220	8-φ18
DN125	260	560	118	210	250	8-φ18
DN150	280	608	140	240	285	8-φ22
DN200	300	640	200	295	340	12-φ22
DN250	360	705	250	355	405	12-φ26
DN300	400	752	300	410	460	12-φ26

Noted: Above dimension as per flange DIN PN16.



3 INSTALLATION

3.1 SITE SELECTION

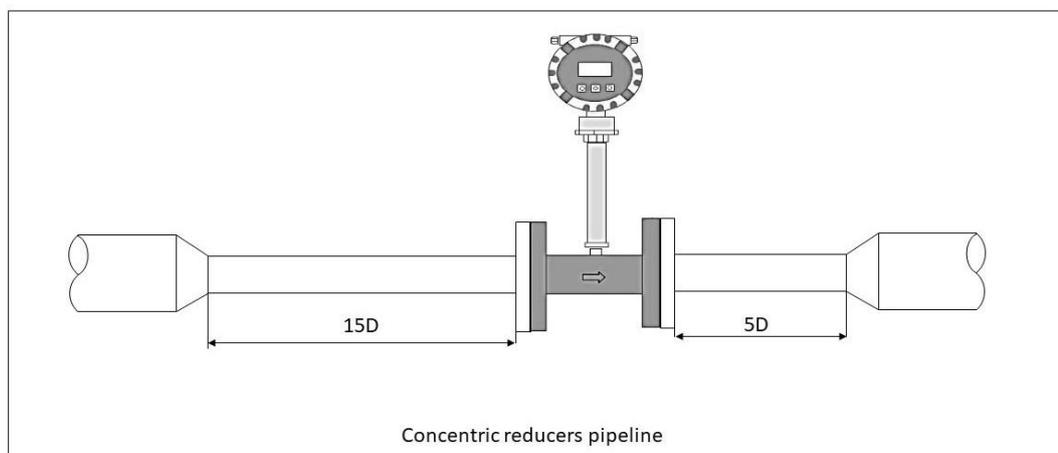
When selecting a site for a flow meter, prioritize accessibility for installation and maintenance. Consider environmental factors like temperature and humidity as per guidelines. Ensure the flow profile is stable and the pipe is in good condition. Safety and ease of access for personnel should also be taken into account to optimize meter performance and longevity.

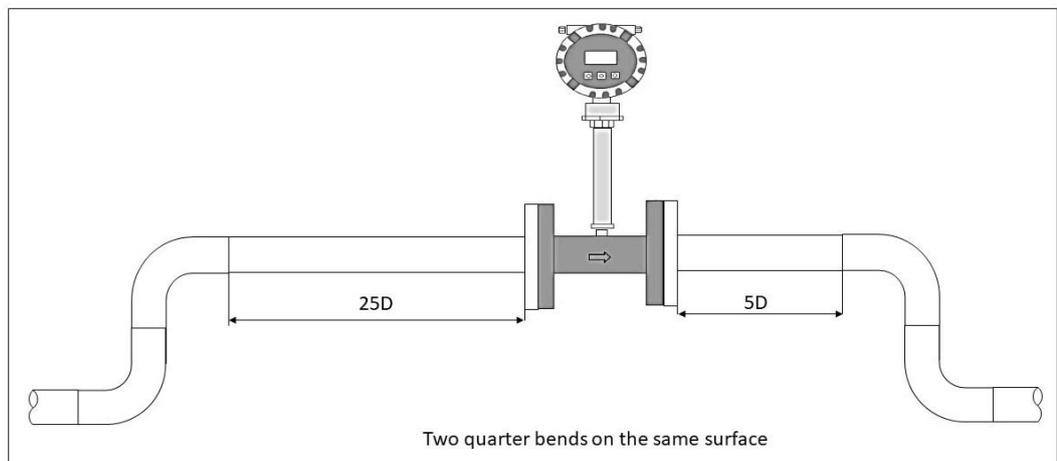
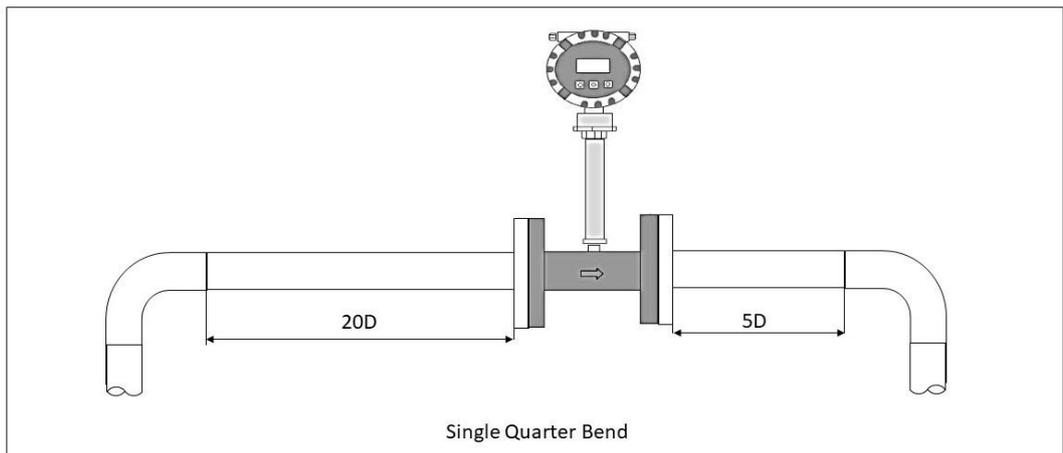
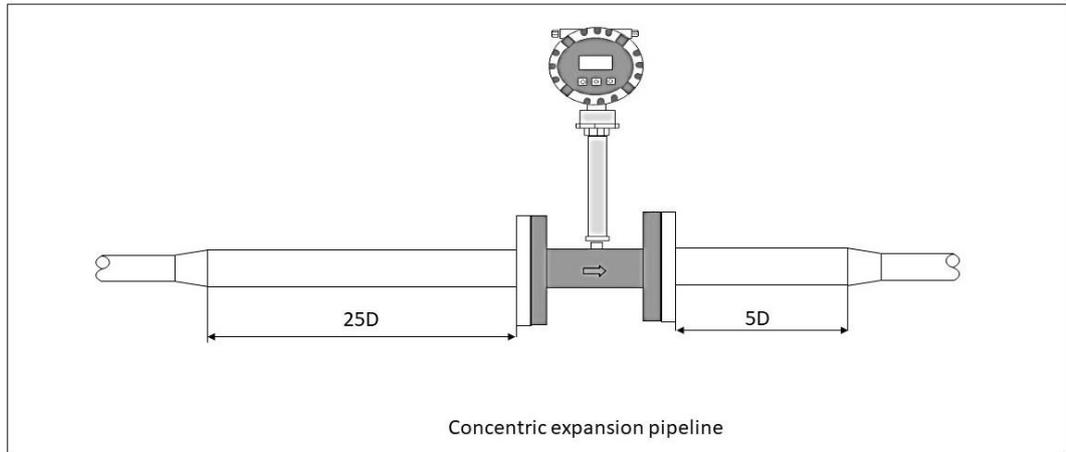
3.1.1 BASIC RECOMMENDATIONS

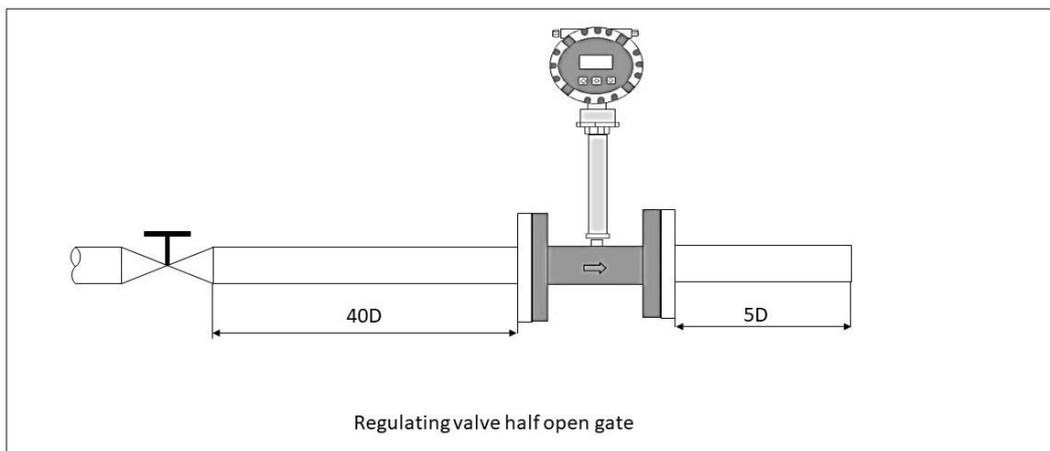
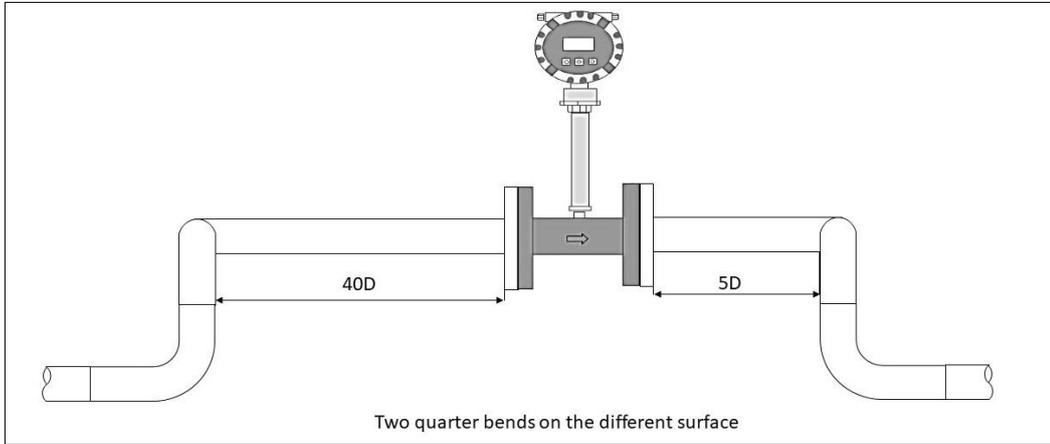
In general guidelines, it's recommended to find a location where the pipe has the longest straight segment with a clear run. This ensures smooth and consistent flow of the fluid through the meter, which is crucial for accurate measurement. A longer clear run of pipe minimizes disturbances and turbulence that could affect the meter's performance. This approach helps optimize the meter's accuracy and reliability by providing a stable flow profile for measurement. Installation of the vortex flow meter must be performed by expert Engineer or skilled personnel. Suggest to select an area subject to minimize mechanical vibration the flowmeter is subject to vibrations it is recommend to provide pipe line supports. No collusion by hard subject, when the flow meter is being installed, otherwise the accuracy will be influenced, even the flowmeter will be damaged. Horizontal or Vertical direction the meter can be installed but the flow direction should always be upwards while vertical installation.

3.1.2 STRAIGHT LENGTH REQUIREMENT

The diagrams below demonstrate the minimum straight length necessary to ensure accurate readings from the flow meter. Having additional straight length beyond this minimum requirement offers additional advantages, such as enhanced measurement precision and reduced potential for turbulence or flow disturbances that could affect meter performance. Therefore, maximizing the straight length of the pipe where the flow meter is installed can contribute to optimizing the overall effectiveness and reliability of the measurement process.



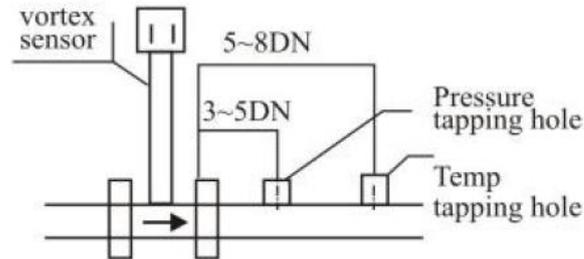






VALVE POSITION:

Flow regulating valve must be installed at the downstream of flow sensor.



PRESSURE & TEMPERATURE TAPS(FOR REMOTE TYPE VORTEX FLOW METER WITH T&P COMPENSATION ONLY.)

Remote type vortex flow meter with pressure & temperature compensation need to place pressure & temperature tap according to the requirement. Install pressure tapping point at 3-5D downstream of flow sensor & temperature taking point at 5-8D downstream of flow sensor.

VIBRATION

Flow Sensor should be not installed on a strong vibration pipeline.

If install the flow sensor on a vibration pipeline, there are following methods to decrease the disturbing of vibration: Installing a fixed support on pipeline at 2D upstream of flow meter. At the condition of meeting the straight length, install a hosepipe as a transmission.

HIGH TEMPERATURE PIPE LINES:

If the heat preservation not good, the flow meter should be installed downward vertical

Note : If the length of upstream can not meet the requirement, suggest to install a flow regulator at the upstream pipeline.



4.ELECTRICAL CONNECTIONS



CAUTION!

The wiring of the vortex flow meter must be performed by expert engineer or skilled personnel.



CAUTION!

Before wiring check that no voltage is applied to the power cable.

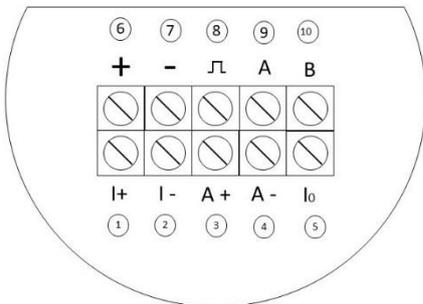


CAUTION!

The supply voltage is within the range of the instrument.
According to different functions there are two types of terminal boards.

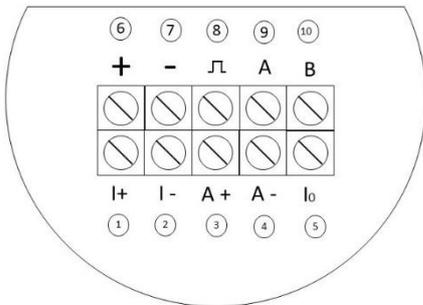
1. Normal type without compensation, 4-20mA+Pulse+RS485
2. With compensation 4-20mA+Pulse+RS485

4.1 NORMAL TYPE WITHOUT COMPENSATION, 4-20mA+PULSE+RS485



Connection	Description
Power Supply (two wire)	DC 24V + → 6
	DC 24V - → 7
4 - 20mA	4 - 20mA + → 5
	4 - 20mA - → 7
Pulse	Pulse + → 8
	Pulse - → 7
RS 485	RS485 + → 9
	RS485 - → 10

4.2 WITH COMPENSATION 4-20mA+PULSE+RS485



Connection	Description
Power Supply (two wire)	DC 24V + → 6
	DC 24V - → 7
4 - 20mA	4 - 20mA + → 5
	4 - 20mA - → 7
Pulse	Pulse + → 8
	Pulse - → 7
RS 485	RS485 + → 9
	RS485 - → 10





5. OPERATION



CAUTION!

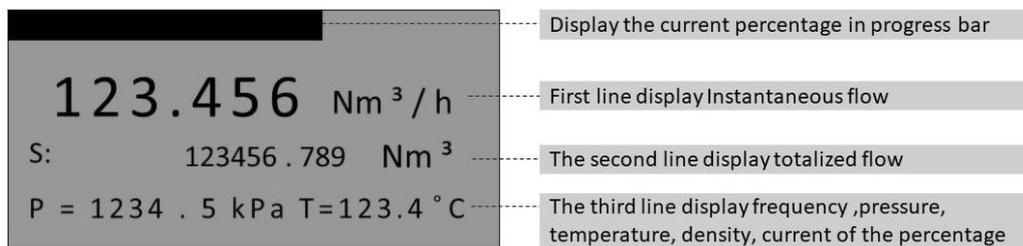
Do not open the cover with wet hands



CAUTION!

When opening the cover, wait for more than 2 minutes after turning off the power

5.1 DISPLAY CONFIGURATION



NOTES:

If the pressure sensor is set to "automatic acquisition" mode, when pressure sensor failure is detected, the corresponding value will be replaced by the manual setting value (the value set in basic menu "Gauge pre.Kpa") and the value will flash on display

If the temperature sensor is set to "automatic acquisition" mode when temperature sensor failure is detected, the corresponding value will be replaced by manual setting value (the value set in basic menu "Temperature") and the value will flash on display.

When the mode is set "sat Steam (P)", it means saturated steam with pressure temperature value will display as "....." which means the acquisition of temperature sensor is not activated.

When the flow mode is set as "Sat Steam (T)", it means saturated steam with temperature compensation only. At this time pressure value will display as "....." which means the acquisition of pressure sensor is not activated

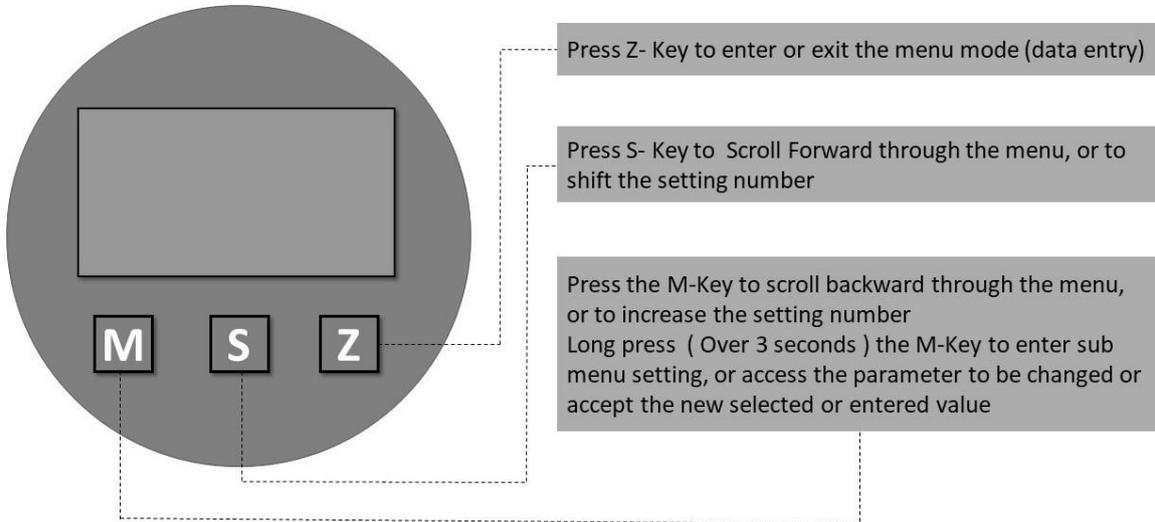
You can press Key to change the third line display variables. Use indicator to distinguish between display variables shown in the second line

Indicator	F:	Den:	P:	T:	Curr:	Per:	P = T =
variable	Frequency	Density	Pressure	Temperature	Loop current	percentage	Pressure & Temperature



5.2 DATA SETTING METHOD

Data setting can be performed with the three keys on the front panel (M,S & Z)



5.3 ENTER OR EXIT MENU MODE

ENTER MENU MODE

In the operation mode press the “Z” Key to Enter the menu mode (data entry)

EXIT MENU MODE

In the menu mode, press the “Z” key to back to the operating mod.

DATA ENTRY METHOD

Press M-Key for 2 seconds to enter setting, and the menu option will start flashing. Short press M-Key or S-Key to Scroll backward or forwards the menu press M-Key for 2 seconds to save (access) the parameter.



6. MENU LIST

6.1 BASIC FUNCTION



CAUTION!

Menu setting have been done by our engineer. In normal case do not suggest user to change menu by themselves which may Cause the meter work improperly

Menu	Description	Setting method
Contrast	1 -5 Normal set as 3.	Menu selection
Protection	ON / OFF	Press "M" Button for 2 seconds to change
Min Alarm (%)	Set low alarm value unit: %	Direct input
Max alarm	Set high alarm value unit: %	Direct input
Meter size	View meter size setting	Read only
Flow mode	Liquid Qv: Liquid Volume Liquid Qm: Liquid mass Gas Qv: Gas volume Gas Qm: Gas mass Steam Qv: Steam Volume Steam (P/T): Steam mass Sat Steam (T): Saturated steam mass (temperature compensation) Sat Steam (P): Saturated steam mass (Pressure compensation)	Menu Selection



Unity-Qv Unit-Qm	Volume units supported: Nm ³ / h, Nm ³ / m, Nm ³ / s l/s, l/m, l/h m ³ / s, m ³ / m, m ³ / h, m ³ / d scf/s, scf/m, scf/h cf/s, cf/m, cf/h USG/s, USG/m, USG/h UKG/s, UKG/m, UKG/h bbl/h, bbl/d Mass Unit Supported g/s, g/m, g/h kg/s, kg/m, kg/h, kg/d t/m, t/h, t/d lb/h, lb/d Note: accumulative flow unit based on the instant flow unit.	Menu Selection
Range 100 %	Set Qmax value for selected flow mode (=20mA)	Direct input
Density (kg/m ³) Density (g/c m ³)	Set gas density (unit: kg/m ³) Set liquid density (Unit: g/m ³)	Direct input
Gauge pre (kPa)	Use for gas or steam measure. Unit : kPa	Direct input
Temperature (°C)	Use for gas or steam measure. Unit :°C	Direct input
PV Cutoff (%)	Range:0% - 20%	Direct input
Damping	Range:0 ~ 64 S	Direct input
Disp.Point	Set the first line display point, can be 0,1,,2,3	Menu selection



Display mode	Set display mode	Menu Selection
Totalizer reset	When Lcd display “Yes” long press M-Key to reset the totalizer and overflow counter	Menu Selection
Number of totalizer overflow	Display of the number of totalizer overflow 1 overflow = 10,00,000	Read only
K-Factor	View the K-Factor	Read only

6.2 FLOW UNIT & TOTAL FLOW UNIT RELATION

Flow Unit	Total Flow Unit
Nm ³ / h, Nm ³ / m, Nm ³ / s	Nm ³
l/s, l/m, l/h	L
m ³ / s, m ³ / m, m ³ / h, m ³ / d	m ³
scf/s, scf/m, scf/h	Scf
cf/s, cf/m, cf/h	cf
USG/s, USG/m, USG/h	USG
UKG/s, UKG/m, UKG/h	UKG
bbl/h, bbl/d	bbl
g/s, g/m, g/h	g
kg/s, kg/m, kg/h, kg/d	kg
t/m, t/h, t/d	t
lb/h, lb/d	lb

6.3 ADVANCED FUNCTION (PASSWORD PROTECTION)

Below menus are expert engineers only. All settings had been done properly during flow meter calibration in factory. Do not Suggest user to change any of the setting which may cause flow meter work improperly.



Menu		Description	Password	Setting method
M51	Signal monitor	LCD display: 450.00 this is the PGA gain CH2 CH2 is signal channel	*****50	Read only
M52	Meter size	Option: 15 mm – 600mm		Menu selection
M53	Fluid Type	Option: Gas or Liquid		Menu selection
M54	Low Flow Limit	According to the meter size and measuring media, set the corresponding low limit of the flow The unit of Low Flow Limit is fixed as m ³ / h		Direct Input
M55	High Flow Limit	The 'High Flow Limit' defaults to 10 times the 'Low Flow Limit' the actual measurement of the upper limit of 2.5 times the set value The unit of 'High Flow Limit' is fixed as m ³ /h when the actual required range ratio exceeds 20:1 ,can manually modify the 'High Flow Limit'		Direct Input
M56	Max AMP	Between 200 and 1000 Suggested. Typically about 400		Direct Input
M57	K-Factor	Set average calibration K-Factor (1/m ³) Means how many pulse corresponding to 1m ³ flow		Direct Input
M58	Pulse Factor unit	Option : m ³ , Nm ³ , t, kg, Scf, cf, USG, UKG, bbl, lb.		Menu Selection
M59	Pulse Factor	Set the number of output pulse corresponding to one 'Pulse Factor Unit' Note : If you want to output the original pulse, set 'K-factor (57)'and 'pulse factor (59)' to the same value, and ' Pulse Factor Unit (58)' must set to m ³	*****50	Direct Input



M60	K-Factor Trim Fi K-Factor Trim Yi	Five-point K-Factor correction Where Fi is the reference frequency, Yi is the correction coefficient K. i=1,2,3,4,5.	****60	Direct Input
M61	Frequency Factor	The reference frequency value of the five-point correction is multiplied by the frequency factor, and then the new reference frequency value of the correction point is obtained. Normally this value should be 1. When calibrated with water for gas measurement, you can set the coefficient so that the five point correction factors remains in effect	****61	Direct Input
M62	AMP Channel	There are CH_1,CH_2,CH_3 three options CH_3 gain maximum CH_1 gain minimum Note: CH_2 generally used for liquid measurement, which corresponds to the configuration software, Select X1 and X2. CH_3 generally used for gas measurement which corresponds to the configuration software, select X1,X2 and X3	****62	Menu selection
M63	Work Mode	There are F_1, F_2, F_3, F_4, four option F_1: Anti-vibration mode F_2: Normal mode F_3: Turbine Mode F_4: Test Mode Note: Generally choose F_2	****63	Menu Selection
M40	Trim 4mA	Step: 1. Press M-Key for 2 seconds enter trim; 2. Short press M-Key to decrease current .press S-Key to increase current . Stepping is 16 microamperes	****40	
M41	Trim 20mA			



M70	Temp measure	Temperature acquisition mode setting. Options: Manual, or Auto. Manual: Temperature uses the input reference value. Auto: Temperature is automatic acquisition should be use external Pt1000 or Pt100	****70	Menu Selection
M71	Pressure measure	Pressure acquisition mode setting. Option: Manual, or auto. Manual: If select manual, the pressure value will be replaced by the manual setting value (the value set in basic menu "Gauge Pre Kpa"). Auto: If select auto, pressure value is by automatic acquisition need to connect with external pressure sensor		Menu selection
M72	Temperature Low Trim	Enter the lower calibration resistance value. Unit: ohms. Use standard resistance as input. For example :1000 for pt1000 or 100 for pt100.		Direct Input
M73	Temperature Low Trim	Enter the high calibration resistance value. Unit: ohms. Use standard resistance as input. For example :2500 for pt1000 or 250 for pt100.		Direct Input
M74	Pressure Low Trim	Enter the calibration reference pressure value . Unit: KPa Apply the standard pressure to the sensor. For Example:0 KPa		Direct Input
M75	Pressure Low Trim	Enter the calibration reference pressure value . Unit: KPa Apply the standard pressure to the sensor. For Example:0 KPa		Direct Input
M76	Pre. Cutoff	Set low pressure Cutoff value, Unit :KPa. If the measured pressure value is less than "pre cutoff" , the pressure will be set to 0 kpa		Direct Input
M77	Set	Set the pressure bias value. Unit : KPa. Enter the current actual pressure value	****70	Direct Input



	Pre.Biass	to achieve bias. The pressure value will be set as the entered value		
M38	Min Pre. (KPa)	This parameter is only used for steam measurement. In the steam mass measurement mode, if the pressure is less than the set 'minimum pressure' When the pressure compensation is activated, the flow will automatically return to zero.	****38	Direct Input
M39	Min Temp (°C)	This parameter is only used for steam mass measurement In the steam mass measurement mode, if the temperature is less than the set ' minimum temperature value ' when the temperature compensation is activated ,the flow will automatically return zero		Direct Input
M11	Version	To view the embedded software version	****11	Read only
M12	Max frequency	The internal conversion frequency value corresponds to the ' High Flow Limit '		Read only
M13	Min Frequency	The internal conversion frequency value corresponds to the ' Low Flow Limit '		Read only
M90	Modbus Addr.	1 ~ 247	****90	Direct Input
M91	Modbus Boud	" 9600" , "4800" , "2400" , "1200" , "600"		Menu selection
M111	Total Preset	Used to directly set the current total flow value	****111	Direct Input
M721	Temp.Data X0; Temp. Data Y0; Temp. Data	You can directly view and modify the temperature sensor calibration values. Temp. Data X0 and Temp. Data X1 are internal ADC measurement. Temp. Data Y0 [73] and Temp. Data	****721	Direct Input



	X1; Temp.Data Y1;	Y1 [74] are the input calibration value.		
M741	Pre. Data X0; Pre. Data Y0; Pre. Data X1; Pre. Data Y1;	You can directly view and modify the pressure sensor calibration values. Pre. Data X0 and Pre. Data X1 are internal ADC measurements. Pre. Data Y0 [75] and Pre. Data Y1 [76] are the input calibration value	****741	Direct Input



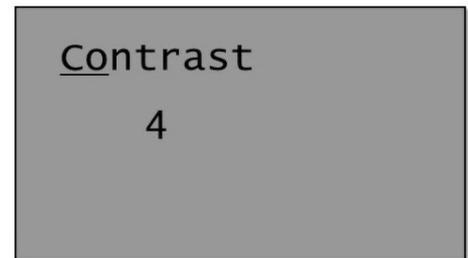
APPENDIX -1

HOW TO ADJUST THE LCD CONTRAST?

Power on display

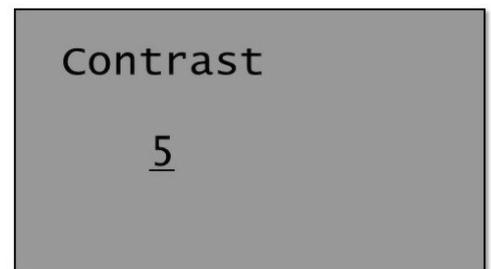


Press "Z" button and then Press "S" button to find menu "Contrast"



Press "M" button for 2 seconds to enter into this menu press "S" button to chose the option

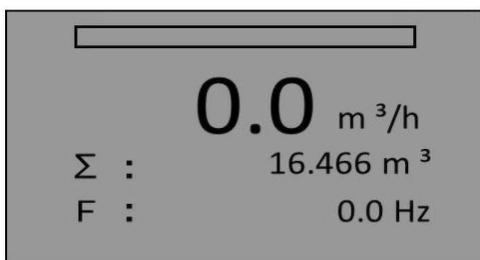
Default is "4",max number is "5"



Press "M" button for seconds to save the settings, and then Press "Z" button to back to main display

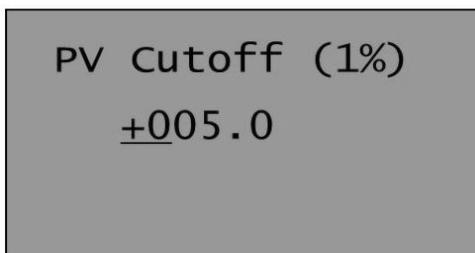
How to set low flow cutoff?

Power on display



Press "Z" button and then press "S" button to find menu "PV Cutoff (%)"

Press "M" button for 2 seconds to enter this menu, Default value is 5.0



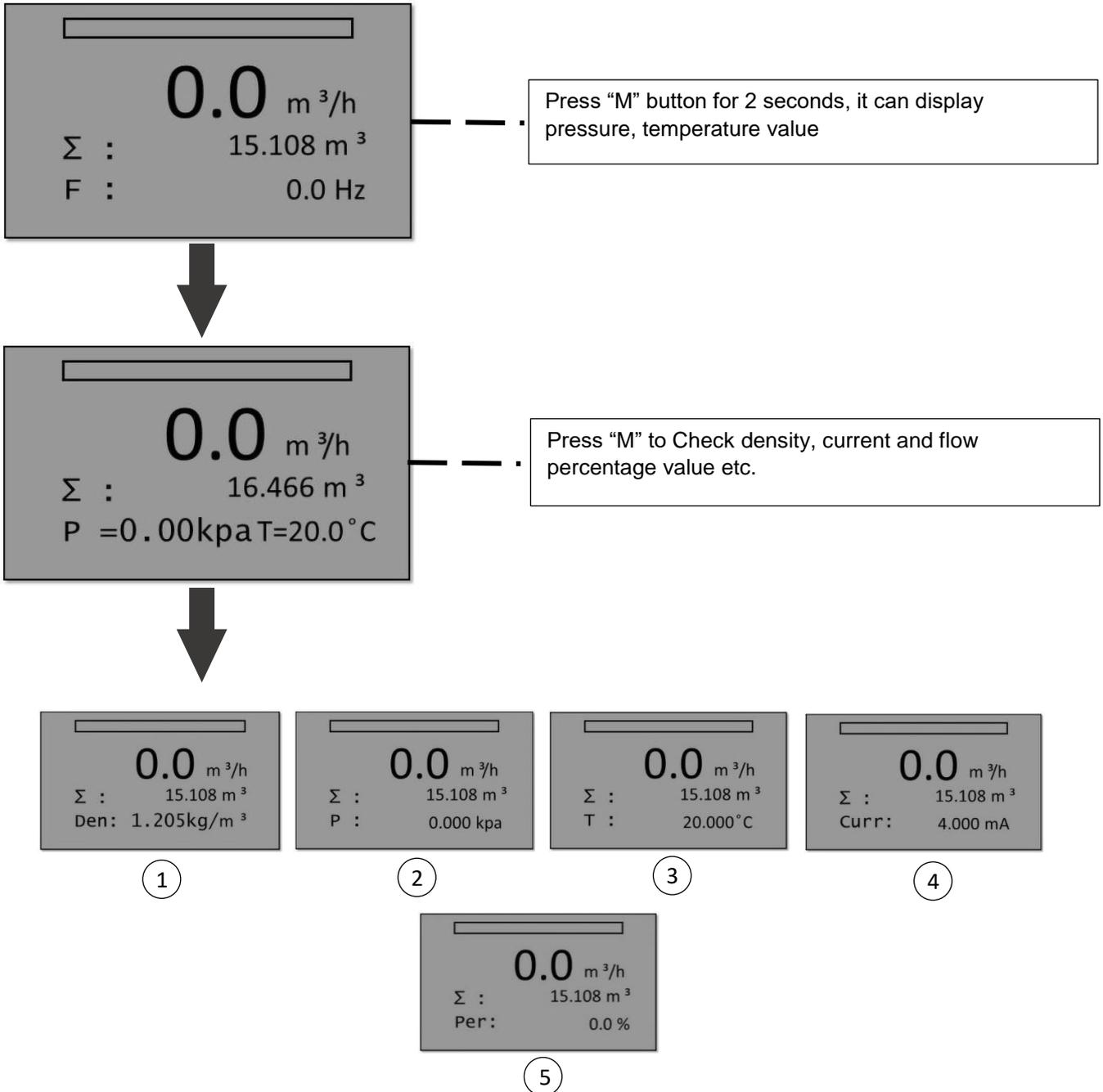
Press "S" button to move cursor and "M" button to set value you need.

Then press "M" button for 2 seconds to save settings, and then press "Z" button to back to main ..



HOW TO CHECK FREQUENCY, TEMPERATURE, PRESSURE, FLOW PERCENTAGE VALUE ETC?

Power on display can check the frequency on the bottom line.

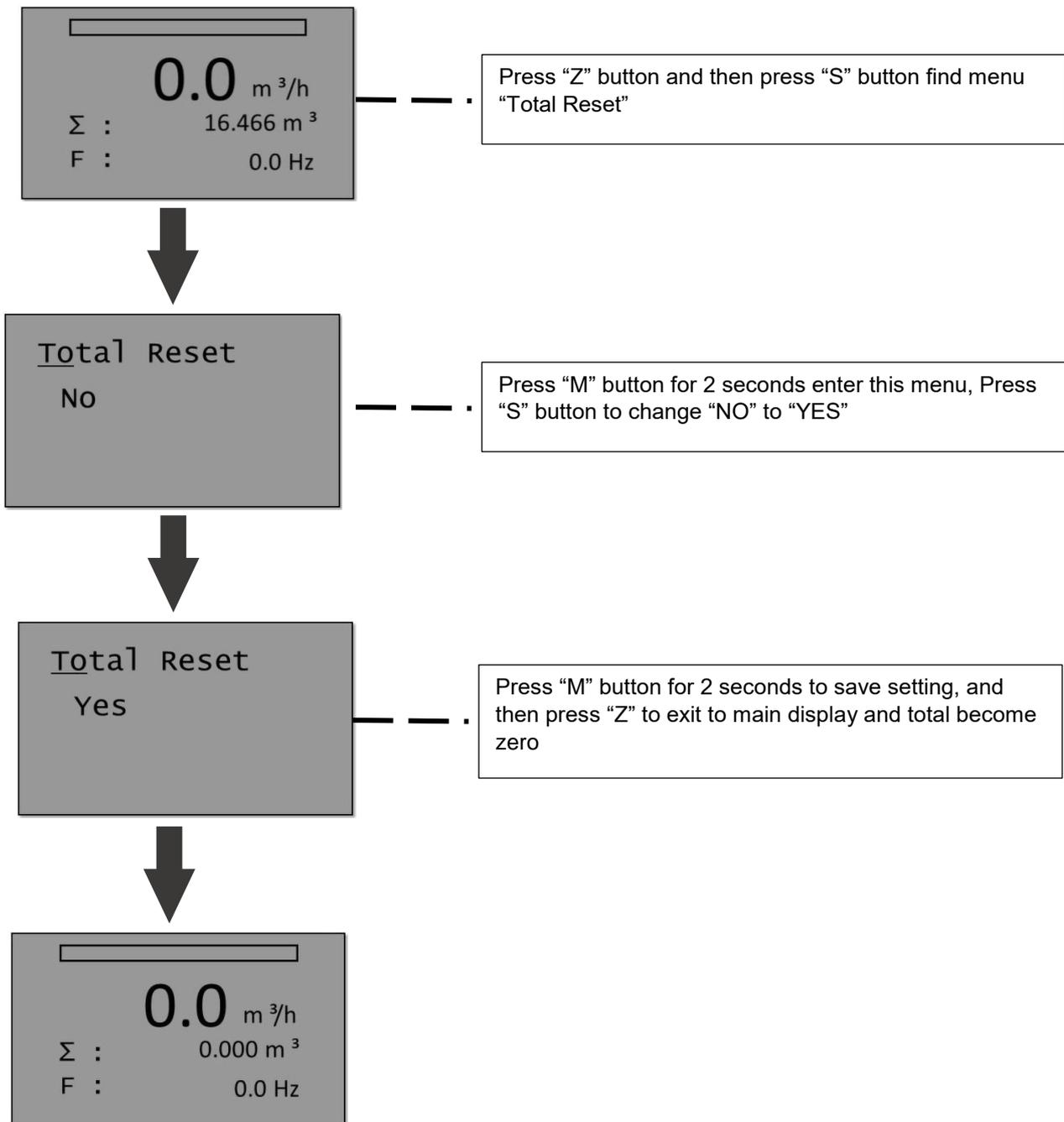




HOW TO CLEAR TOTAL FLOW?

Power on display

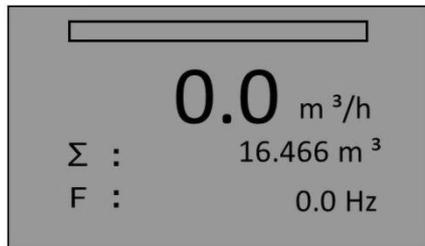
For example, total flow value is 16.466 m³



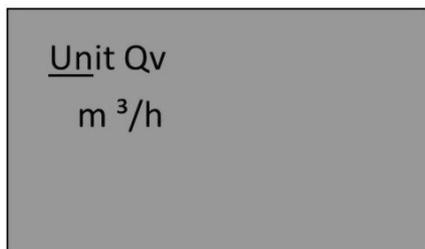


HOW TO CHANGE FLOW UNIT? (TAKE AN EXAMPLE, CHANGE VOLUME FLOW UNIT FROM M³/H TO L/S)

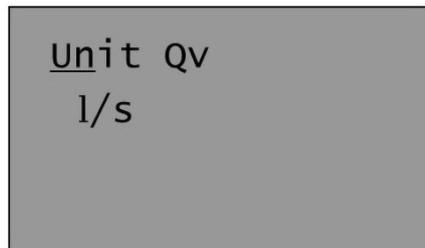
Power on display



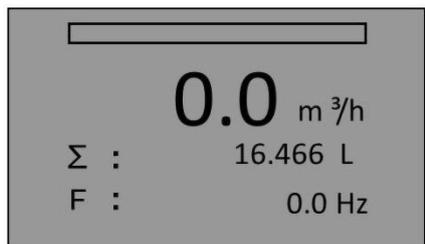
Press "Z" button, and then press "S" button to find menu "Unit Qv" (This is to set volume flow unit)



Press "M" button for 2 seconds enter this menu press "S" button to find menu L/s"



Press "M" button for 2 seconds to save settings.
Press "Z" button to exit menu and back to main display

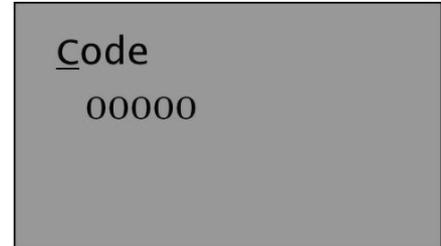




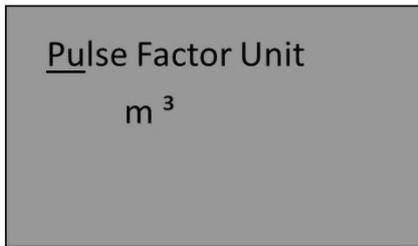
HOW TO SET PULSE PARAMETERS?



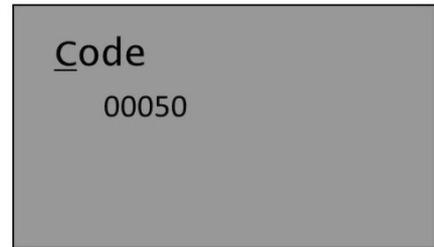
Press "Z" button and then press "S" button to find menu "Code"



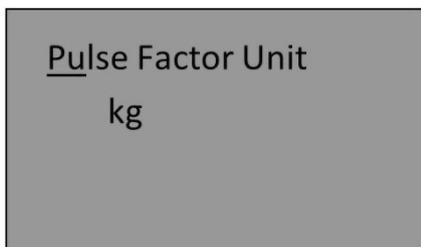
Press "M" button for 2 seconds to enter this menu, and then press "S" button move cursor and press "M" button set number "00050"



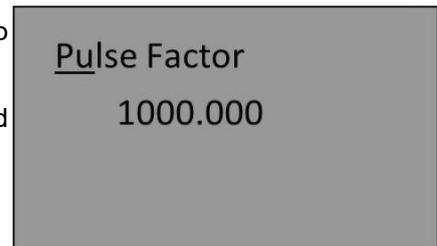
Press "M" button for 2 seconds to enter. Press "S" button to find menu "Pulse Factor Unit" (Defaults is m³)



For example, if need to change to "kg" Press "M" button for 2 seconds to enter this menu, and press "S" button to change to "kg"



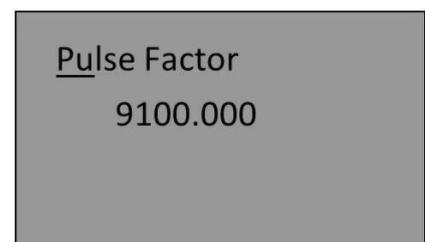
Press "M" button for 2 seconds to save setting.
And then press "S" button to find the next menu "Pulse Factor")



Press "M" button for 2 seconds to enter this menu press "S" button to move cursor and press "M" button to set values for example change to "1000"



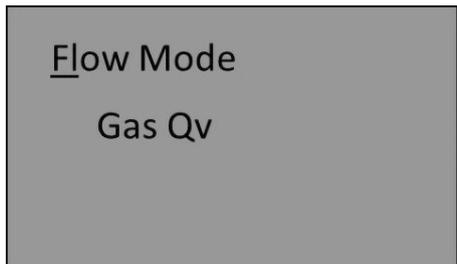
Press "M" button for 2 seconds to save setting and press "Z" button to exit and back to main display





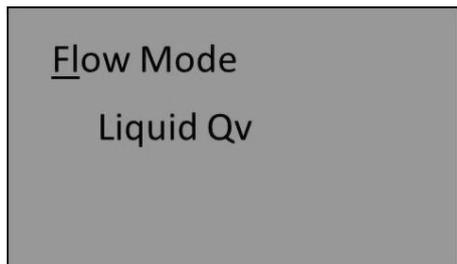
HOW TO ADJUST THE MEDIUM TYPE? (FOR EXAMPLE, CHANGE GAS FLOW TO LIQUID FLOW)

Power on display



Option in this menu:

Flow Mode	Description
Gas Qv	Gas Volume flow
Gas Qm	Gas mass flow
Steam Qv	Steam volume flow
Steam (P/T)	Steam mass flow with both temperature and pressure compensation
Sat_Steam (T)	Saturated steam mass flow with temperature compensation only
Sat_Steam (P)	Saturated steam mass flow with pressure compensation only
Liquid Qv	Liquid volume flow
Liquid Qm	Liquid mass flow



Press "M" button for 2 seconds to enter this menu and press "S" button to choose "Liquid Qv"

Press "M" button for 2 seconds to save setting. Press "S" button to find menu "Unit Qv" (For liquid Qv flow unit need in volume flow unit) Set "Unit QV" as "m³/h"





Unit Qv
m³/h



Press "S" button to find menu "Range 100 %" and set according to the recommend flow range for your medium type.

Range 100%
100.000



Press "S" button to find menu "code"

Code
00000



Press "M" button for 2 seconds to enter this menu, and then press "S" button to move cursor and press "S" button to move "M" button to set number "00050"

Code
00050

Press "M" button for 2 seconds to save and then press "S" button to find menu "fluid type"



Set the number according to the min flow of your medium type and size correctly

Low Flow Limit
35.000 m³/h

Press "M" button for 2 seconds to save setting.

Then press "S" button to find "Low Flow Limit"



Fluid Type
Liquid

Options in this menu

Fluid Type	Description
Gas	For gas, and steam
Liquid	For liquid flow

Press "M" button for 2 seconds enter this menu, and press "S" button to choose "Liquid"



Fluid Type
Gas



APPENDIX -2 LIQUID & Air Flow Range Table m3/h)

Nominal DN(mm)	Liquid (m ³ /h)		Air (m ³ /h)	
	Standard Range	Extended Range	Standard Range	Extended Range
15	0.8-6	0.5-8	6-40	5-50
20	1-8	0.5-12	8-50	6-60
25	1.5-12	0.8-16	10-80	8-120
32	2-20	1.5-25	15-150	10-200
40	2.5-30	2-40	25-200	20-300
50	3-50	2.5-60	30-300	25-500
65	5-80	4-100	50-500	40-800
80	8-120	6-160	80-800	60-1200
100	12-200	8-250	120-1200	100-2000
125	20-300	12-400	160-1600	150-3000
150	30-400	18-600	250-2500	200-4000
200	50-800	30-1200	400-4000	350-8000
250	80-1200	40-1600	600-6000	500-12000
300	100-1600	60-2500	1000-10000	600-16000
400	200-3000	120-5000	1600-16000	1000-25000
500	300-5000	200-8000	2500-25000	1600-40000
600	500-8000	300-10000	4000-40000	2500-60000



AP[PENDIX -3 Saturated Steam Mass Flow Range Table (kg/h)

Absolute Pressure (MPa)		0.2	0.3	0.4	0.5	0.6	0.7	0.8
Temperature (°C)		120.2	133.5	143.62	151.84	158.94	164.96	170.41
Density (kg/m ³)		1.129	1.651	2.163	2.669	3.17	3.667	4.162
DN15	Qmin	5.645	8.255	10.815	13.345	15.85	18.335	20.81
	Qmax	56.45	82.55	108.15	133.45	158.5	183.35	208.1
DN20	Qmin	6.774	9.906	12.978	16.014	19.02	22.002	24.972
	Qmax	67.74	99.06	129.78	160.14	190.2	220.02	249.72
DN25	Qmin	9.032	13.208	17.304	21.352	25.36	29.336	33.296
	Qmax	135.48	198.12	259.56	320.28	380.4	440.04	499.44
DN32	Qmin	20.322	29.718	38.934	48.042	57.06	66.006	74.916
	Qmax	203.22	297.18	389.34	480.42	570.6	660.06	749.16
DN40	Qmin	22.58	33.02	43.26	53.38	63.4	73.34	83.24
	Qmax	338.7	495.3	648.9	800.7	951	1100.1	1248.6
DN50	Qmin	28.225	41.275	54.075	66.725	79.25	91.675	104.05
	Qmax	564.5	825.5	1081.5	1334.5	1585	1833.5	2081
DN65	Qmin	45.16	66.04	86.52	106.76	126.8	146.68	166.48
	Qmax	903.2	1320.8	1730.4	2135.2	2536	2933.6	3329.6
DN80	Qmin	67.74	99.06	129.78	160.14	190.2	220.02	249.72
	Qmax	1354.8	1981.2	2595.6	3202.8	3804	4400.4	4994.4
DN100	Qmin	112.9	165.1	216.3	266.9	317	366.7	416.2
	Qmax	2258	3302	4326	5338	6340	7334	8324
DN125	Qmin	169.35	247.65	324.45	400.35	475.5	550.05	624.3
	Qmax	3387	4953	6489	8007	9510	11001	12486
DN150	Qmin	225.8	330.2	432.6	533.8	634	733.4	832.4
	Qmax	4516	6604	8652	10676	12680	14668	16648
DN200	Qmin	395.15	577.85	757.05	934.15	1109.5	1283.45	1456.7
	Qmax	9032	13208	17304	21352	25360	29336	33296
DN250	Qmin	564.5	825.5	1081.5	1334.5	1585	1833.5	2081
	Qmax	13548	19812	25956	32028	38040	44004	49944
DN300	Qmin	677.4	990.6	1297.8	1601.4	1902	2200.2	2497.2
	Qmax	18064	26416	34608	42704	50720	58672	66592



Absolute Pressure (MPa)		0.9	1.0	1.2	1.4	1.6	1.8	2.0
Temperature (°C)		175.36	179.68	187.96	195.04	201.37	207.11	212.37
Density (kg/m ³)		4.665	5.147	6.127	7.106	8.085	9.065	10.05
DN15	Qmin	23.325	25.735	30.635	35.53	440.425	45.325	50.25
	Qmax	233.25	257.35	306.35	355.3	404.25	453.25	502.5
DN20	Qmin	27.99	30.882	36.762	42.636	48.51	54.39	60.3
	Qmax	279.9	308.82	367.62	426.36	485.1	543.9	603
DN25	Qmin	37.32	41.176	49.016	56.848	64.68	72.52	80.4
	Qmax	559.8	617.64	735.24	852.72	970.2	1087.8	1206
DN32	Qmin	83.97	92.646	110.286	127.908	145.53	163.17	180.9
	Qmax	839.7	926.46	1102.86	1279.08	1455.3	1631.7	1809
DN40	Qmin	93.3	102.94	122.54	142.12	161.7	181.3	201
	Qmax	1399.5	1544.1	1838.1	2131.8	2425.5	2719.5	3015
DN50	Qmin	116.625	128.675	153.175	177.65	202.125	226.625	251.25
	Qmax	2332.5	2573.5	3063.5	3553	4042.5	4532.5	5025
DN65	Qmin	186.6	205.88	245.08	284.24	323.4	362.6	402
	Qmax	3732	4117.6	4901.6	5684.8	6468	7252	8040
DN80	Qmin	279.9	308.82	367.62	426.36	485.1	543.9	603
	Qmax	5598	6176.4	7352.4	8527.2	9702	10878	12060
DN100	Qmin	466.5	514.7	612.7	710.6	808.5	906.5	1005
	Qmax	9330	10294	12254	14212	16170	18130	20100
DN125	Qmin	699.75	772.05	919.05	1065.9	1212.75	1359.75	1507.5
	Qmax	13995	15441	18381	21318	24255	27195	30150
DN150	Qmin	933	1029.4	1225.4	1421.2	1617	1813	2010
	Qmax	18660	20588	24508	28424	32340	36260	40200
DN200	Qmin	1632.75	1801.45	2144.45	2487.1	2829.75	3172.75	3517.5
	Qmax	37320	41176	49016	56848	64680	72520	80400
DN250	Qmin	2332.5	2573.5	3063.5	3553	4042.5	4532.5	5025
	Qmax	55980	61764	73524	85272	97020	108780	120600
DN300	Qmin	2799	3088.2	3676.2	4263.6	4851	5439	6030
	Qmax	74640	82352	98032	113696	129360	145040	160800



APPENDIX -4 Superheated Steam density & Relative Temperature & Pressure (Kg/m3)

Absolute Pressure (MPa)	Temperature (°C)					
	150	200	250	300	350	400
0.1	0.52	0.46	0.42	0.38		
0.15	0.78	0.70	0.62	0.57	0.52	0.49
0.2	1.04	0.93	0.83	0.76	0.69	0.65
0.25	1.31	1.16	1.04	0.95	0.87	0.81
0.33	1.58	1.39	1.25	1.14	1.05	0.97
0.35	1.85	1.63	1.46	1.33	1.22	1.13
0.4	2.12	1.87	1.68	1.52	1.40	1.29
0.5	-	2.35	2.11	1.91	1.75	1.62
0.6	-	2.84	2.54	2.30	2.11	1.95
0.7	-	3.33	2.97	2.69	2.46	2.27
0.8	-	3.83	3.41	3.08	2.82	2.60
1.0	-	4.86	4.30	3.88	3.54	3.26
1.2	-	5.91	5.20	4.67	4.26	3.92
1.5	-	7.55	6.58	5.89	5.36	4.93
2.0	-	-	8.968	7.97	7.21	6.62
2.5	-	-	11.5	10.1	9.11	8.33
3.0	-	-	14.2	12.3	11.1	10.1
3.5	-	-	17.0	14.6	13.0	11.8
4.0	-	-	-	17.0	15.1	13.6



APPENDIX -5 Trouble Shooting

Fault	Reason	Solution
Measurement Error	<ol style="list-style-type: none"> 1) Straight pipe section is not enough 2) Supply voltage changes too much 3) The instrument exceeds the verification 4) The inner diameter of the flow meter and the pipe are quite different 5) The installation is not concentric or the gasket is protruding into the flow tube 6) The sensor is stained or damaged 7) There is two phase flow or pulsating flow 8) There is leakage in the pipe line 	<ol style="list-style-type: none"> 1) Lengthen the straight pipe selection or install a regulator 2) Check power supply 3) Timely inspection 4) Check the piping inner diameter to correct the meter coefficient 5) Adjust and install, rest the gasket 6) Clean or replace the sensor 7) Eliminate two-phase flow or pulsating flow 8) Eliminate leakage
Unstable/irregular output signal	<ol style="list-style-type: none"> 1) There is a strong electrical interference 2) The sensor is Stained or damp and the sensitively is reduced 3) The sensor is damage or the lead is not in contract 4) Two phase flow or pulsating flow 5) The impact of pipe line vibration 6) Unstable process 	<ol style="list-style-type: none"> 1) Strengthen Shielding grounding 2) Clean or replace the sensor 3) Check the sensor and lead 4) Strengthen process management and eliminate two phases flow or pulsating flow 5) Take measures to reduce vibration 6) Adjust the installation position



Unstable/irregular output signal	<ul style="list-style-type: none">7) The sensor installation is not concentric or the gasket protrudes into the tube8) Upstream and downstream valve disturbance9) The pipe is not fully filled with fluid10) The vortex generator has windings11) There is cavitation phenomenon	<ul style="list-style-type: none">7) Check the installation and correct the inner diameter of the gasket8) Lengthen straight pipe section or install adjuster9) Installation location and method of replacing the sensor10) Eliminate entanglement11) Reduce the flow rate and increase the pressure in the pipe
Leakage	<ul style="list-style-type: none">1) The pressure in the pipe is too high2) The nominal pressure of the sensor is damaged3) The seal is damaged4) The sensor is corroded	<ul style="list-style-type: none">1) Adjust the pipe pressure and change the installation position2) Choose a higher nominal pressure sensor3) Replace the gasket4) Take anti-corrosion and protection measure
Abnormal Noise	<ul style="list-style-type: none">1) The flow rate is too high, causing strong tremor2) Cavitation phenomenon occurs	<ul style="list-style-type: none">1) Adjust the flow or replace a large-caliber instrument2) Adjust the flow rate and increase the liquid pressure



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