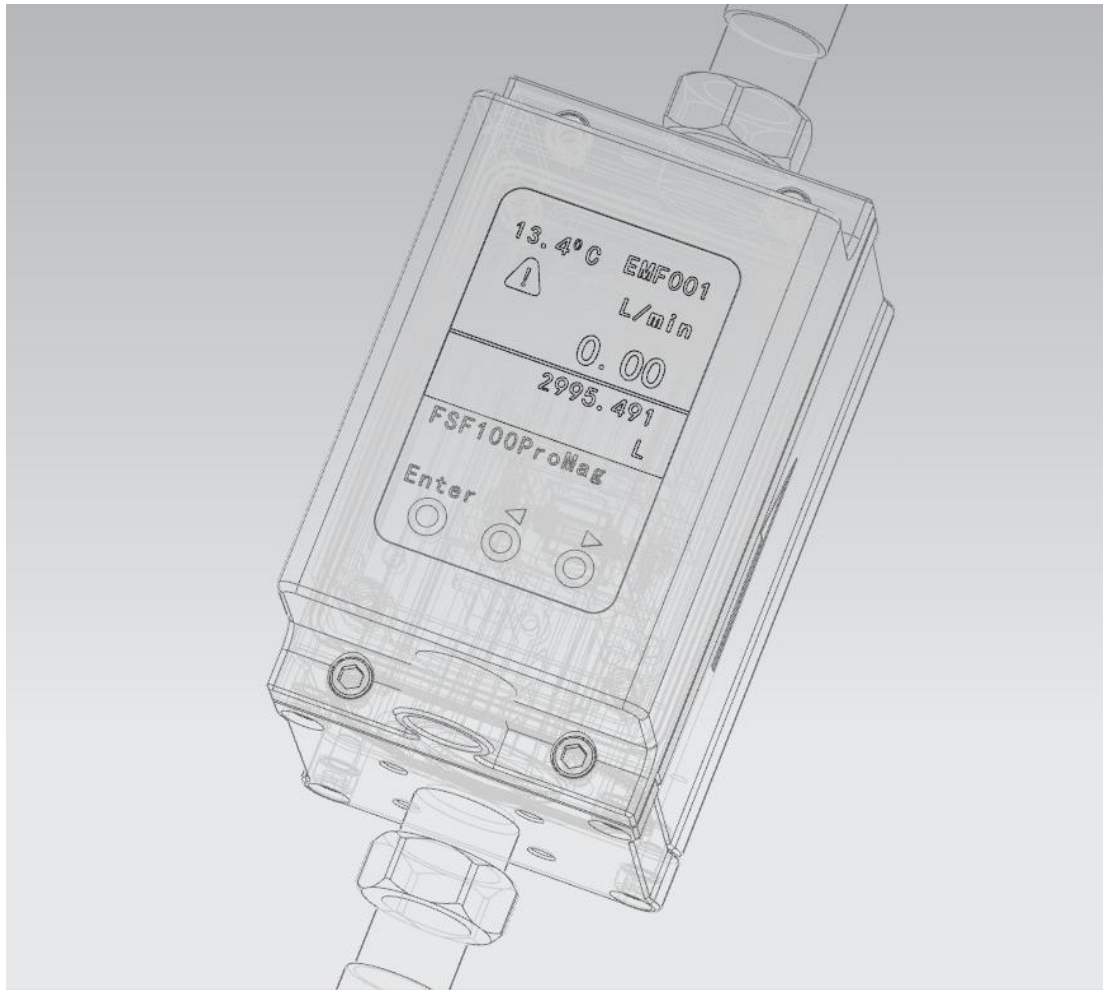


FSF10xProMag Manual

Electromagnetic Flowmeter



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1. Safety Guidance

1.1 Manufacturer's Safety Instructions

This instrument has been fully debugged before leaving the factory and conforms to JB/T 9248-2015 electromagnetic flowmeter and JJG 1033-2007 electromagnetic flowmeter verification regulations.

In order to ensure the normal use of the instrument, please read this manual carefully and fully understand how to use the meter before operation.

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2. Installation



Warning

The installation of electromagnetic products must be done by a professional engineer or technician. Non-professionals are not allowed to perform installation-related procedures.

2.1 Precautions before installation

1) Precautions

- Carefully inspect the box for signs of damage or rough shipping.
- Check the packing list to check if it fully meets the requirements of your order.
- Check on the product nameplate to ensure that the product delivery is in line with your order.

2) Installation conditions

- It should be avoided to install in places where the ambient temperature exceeds the temperature range of the instrument, so as to prevent the insulation performance of the excitation coil from being damaged due to the impermissible temperature rise due to the high ambient temperature.
- It should be kept away from strong magnetic equipment such as large motors, large transformers and welding machines.

- The interference of strong vibration should be avoided, and effective vibration reduction measures should be carried out in vibration occasions.

- It should be kept away from places with corrosive air such as ammonia and fog acid as much as possible. If the on-site environmental conditions are not met, the user needs to raise it when ordering, and the company will try to solve it.

- The pipe section where electromagnetic products are installed is not allowed to generate leakage current, and the grounding resistance should not be greater than 10 ohms.

- The direction of fluid flow should be consistent with the direction of the sensor flow direction.

- The installed pipeline should ensure that the measuring pipeline is always filled with the measured medium to prevent empty pipes.

2.2 Handling

When handling products, the following should be noted:

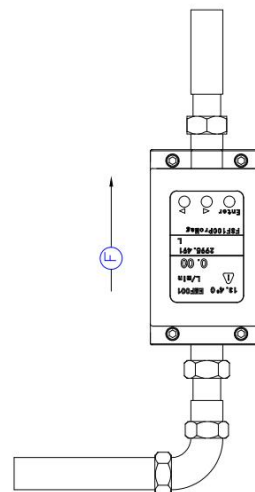
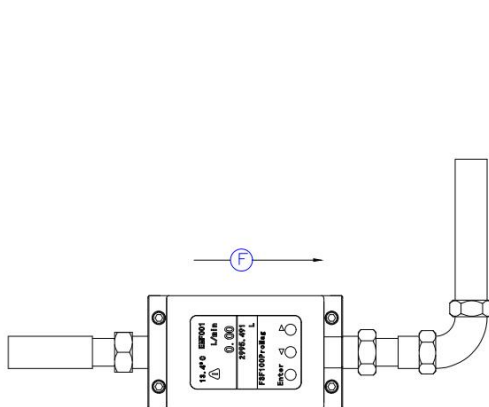
- It cannot be transported through the housing of the converter.

- Do not put a rope or chain into the sensor for transportation.

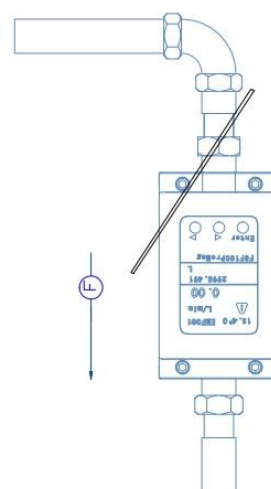
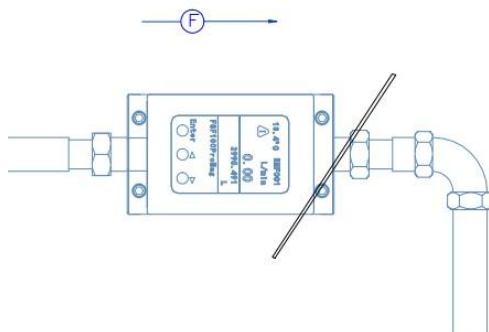
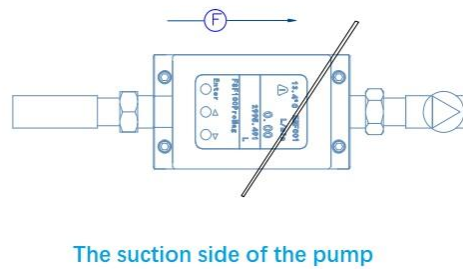
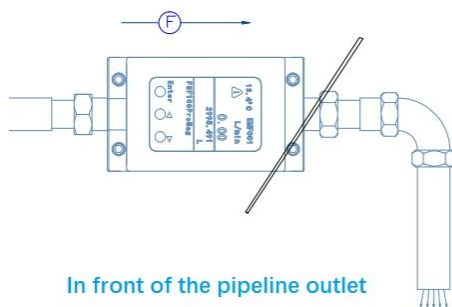
2.3 Recommended installation location

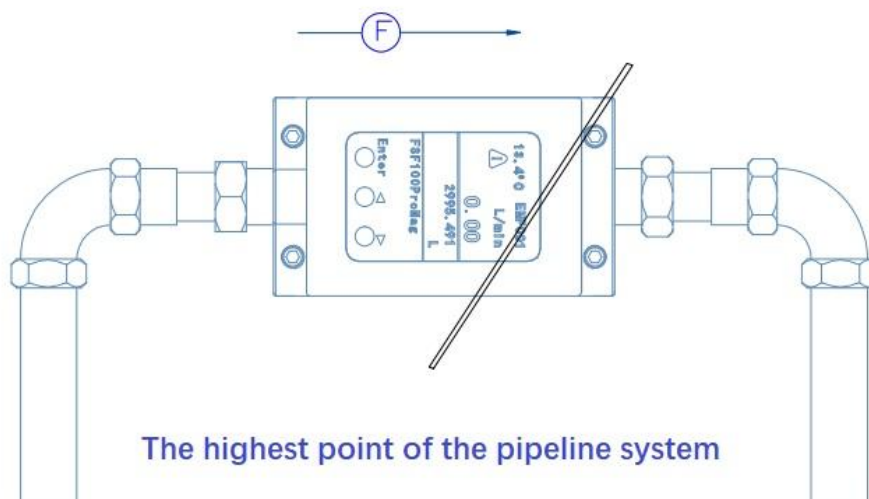
Install the equipment to ensure that the measuring pipe is always fully filled.

Installed before or within the upper pipeline



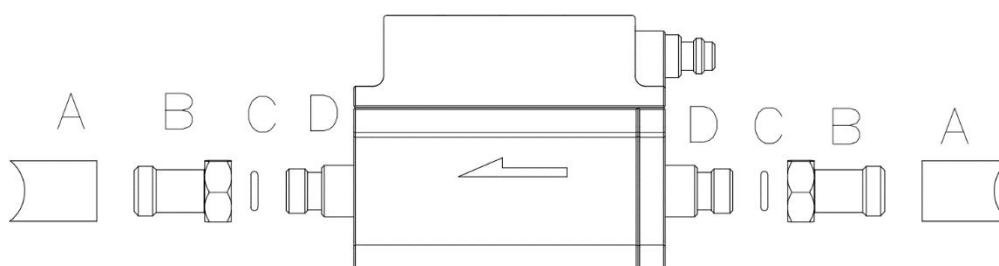
2.4 Installation location is not recommended





2.5 Pipeline installation

Devices with G-threads can be mounted on pipes using adapters.



- 1) Apply lubricating oil to the threads, adapters and sensors of the process connection. Use an approved lubricant that is appropriate for the application.
- 2) Screw the adapter (B) into the pipe (A).
- 3) According to the marked flow direction, place the seal (C) and install the equipment.
- 4) Screw the adapter (B) onto the tubing connector (D) until it is tightened into place by hand.
- 5) Tighten the two adapters separately in opposite directions:
 - Tightening torque: DN15 DN20 DN25: 30 Nm

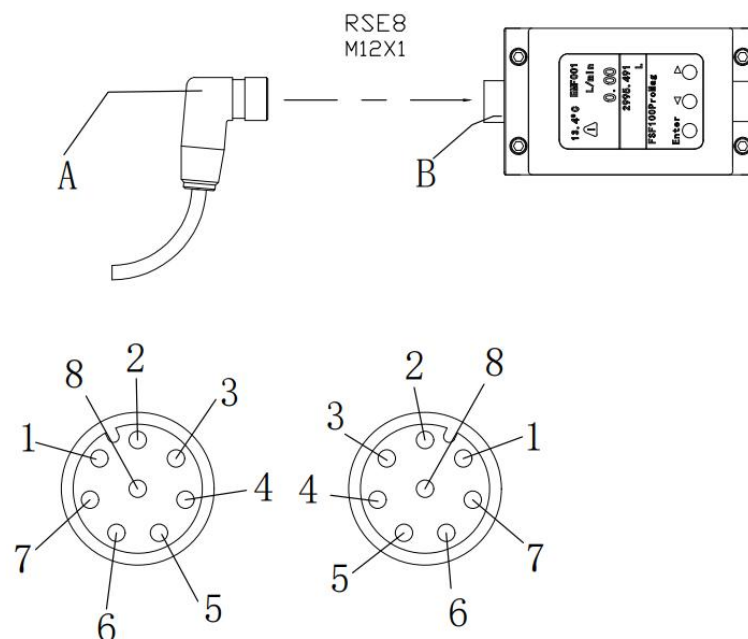
- Tightening torque: DN6 DN8 DN10 DN12: 15 Nm

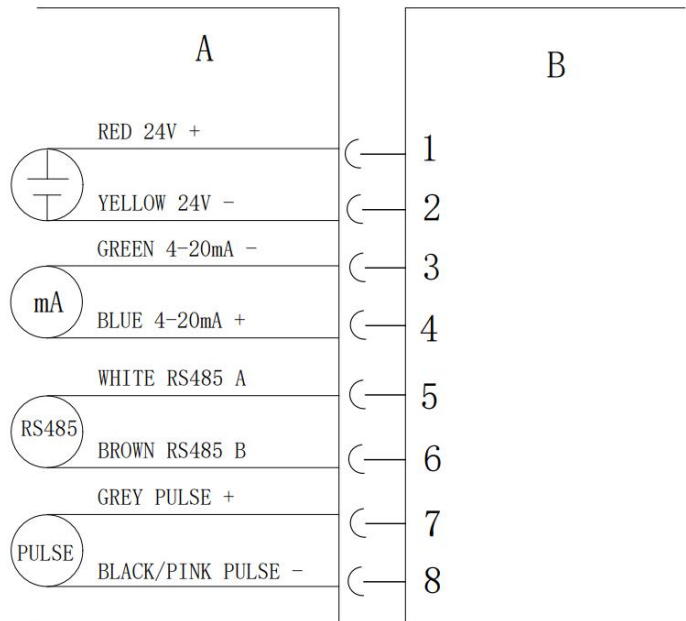
After installation, air bubbles in the system may affect the measurement, allowing the system to be flushed after installation for exhaust.

3. Electrical connection

Always have a qualified electrician connect the device. The voltage supply shall comply with HGT 20509-2014, EN 50178, SELV and PELV standards.

- ▶ Disconnect the power supply.
- ▶ Connect the device as follows:





4. Output signal introduction

4.1 Output signal: Pulse/ Frequency

Function	Can be set to: pulse Pulse equivalent with settable pulse width frequency The upper frequency limit is 2K Hz
Type	Passive signal, open emitter
Maximum input value	30V DC 25mA
Voltage drop	At 25mA: $\leq 2V$ DC
Pulse output	
Pulse width	Adjustable 0.05... 1000ms
Pulse equivalent	0.00-100000000L/P
Pulse value	Adjustable
Measurement variables can be assigned	Volumetric flow rate
Frequency output	
Output frequency	Adjustable: 1....2000Hz
Duty cycle	10%... 90%
Measurement variables can be assigned	Volumetric flow rate

4.2. Output signal: analog output

4-20mA (active), 3.5mA output when the air traffic alarm is generated, 22mA when the range is exceeded by 110%.

Maximum load resistance 500 ohms

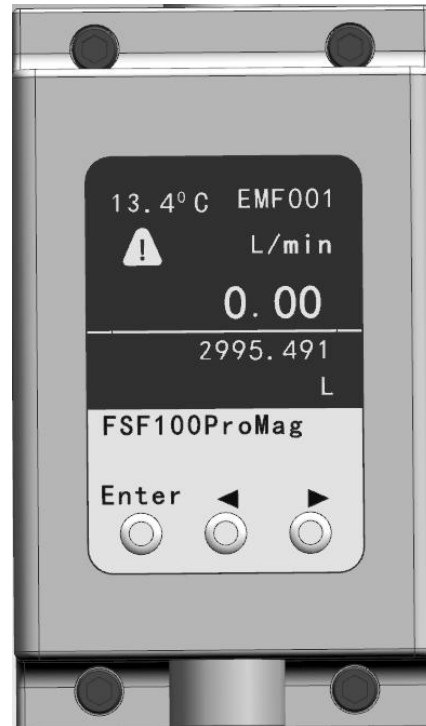
4.3. Output signal: Modbus RS485

Check the Modbus register information sheet

Physical interfaces	EASTERNIA/TIA-485 - Ayers
Agreement	Modbus Application Protocol Specification V1.1
Device type	from the device
From the device address range	1-247
Broadcast address range	0
Feature codes	03: Read hold register 04: Read the input register 06: Write to a single register 08: Diagnosis 16: Write to multiple registers 23: Read/Write Multiplexed Registers 43: Read the device ID
Supported baud rates	4800 Baud 9600 Baud
Data transfer mode	RTU
Data Access	Check the Modbus register information sheet

5. Panel description

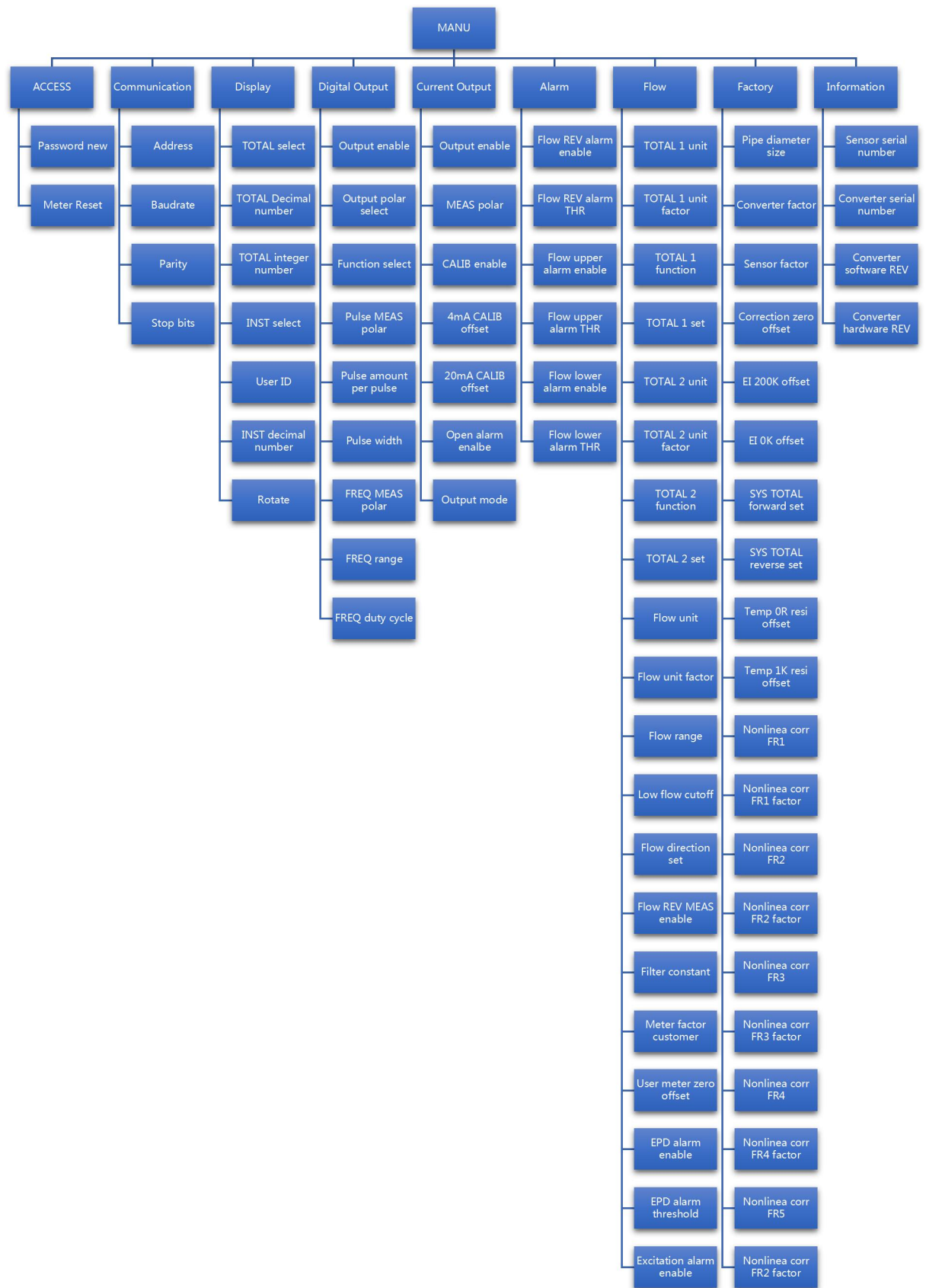
- ◆Temperature
- ❖Product name number
- ◆Alarm Message
- ☒Flow Unit
- ☒Flow Rate
- ⌘Total
- ⌘Total Unit
- ⌘Keys



Key Description:

1. Press and hold the first key (Enter) to display the flow data for the first time, and press again to display the alarm information.
2. Press the first key (Enter) and the second key() at the same time, to enter the password menu setting, with the highest authority 4, password 000000.
3. The second key () is to turn up, the third key () is to turn down, and press the first key(Enter)and third key() at the same time to shift.
4. After entering the menu, press the first (Enter) and second key () at the same time to return to the previous menu, and press and hold the first key (Enter) to enter the current menu
5. Press and hold the second and third key( + )at the same time, press and hold for 5 seconds, the display screen will rotate 90 degrees, this operation is limited to the operation of the main interface.

6. Main menu structure



7. Menu introduction and operation

Press Enter+  then into start interface

Password Input

Access Level: 1/2/3/4

Password:*****

7.1. Access

Access

Password new

Meter reset

Password new

Please enter a new
password

000000

Meter reset

The meter will restart

Disable/Enable

7.2. Communication

Communication

Address

Baudrate

Parity

Stop bits

Address

1~247

001

Baud rate

9600、4800

Cancel OK

Parity

none , even odd

Stop bits

1 bit 、 2 bits

7.3. Display

Display

TOTAL select

TOTAL decimal number

TOTAL integer number

INST select

User ID

INST decimal number

Rotate

TOTAL select

Totalizer1

Totalizer 2

Cancel OK

TOTAL decimal number

0/1/2/3/4 decimal place

Cancel OK

TOTAL integer number

5~15

08

Cancel OK

INST select

Value flow, flow speed,
flowrate percent

Cancel OK

User ID

Maximum 10 CHARS

EMF 0001

INST decimal number

0/1/2/3/4 decimal place

Cancel OK

Rotate

0° 90° 180° 270°

Cancel OK

7.4. Digital output

Digital Output

Output enable

Output polar select

Function select

Pulse MEAS polar

Pulse amount per pulse

Pulse width

FREQ MEAS polar

FREQ rang

FREQ duty cycle

Output enable

Enable/ Disable

Cancel OK

Output polar select

Low High

Cancel OK

Pulse MEAS polar

Forward/Reverse/Bilateral

Cancel OK

Pulse amount per pulse

0.0~100000000.0

1.0 L/P

Cancel OK

Function select

Frequency/ Pulse

Cancel OK

FREQ MEAS polar

Forward/Reverse/Bilateral/

Absolute

Cancel OK

FREQ range

1~2000

1000 Hz

Cancel OK

Pulse width

0.05~1000

1.00 ms

Cancel OK

FREQ duty cycle

10~90

50 %

Cancel OK

7.5. Current output

Current output

Output enable

MEAS polar

CALIB enable

4mA CALIB offset

20mA CALIB offset

Open alarm enable

Output mode

Output enable

Enable/ Disable

Cancel OK

MEAS polar

Forward/Reverse/Bilat
eral/Absolute

Cancel OK

4mA CALIB offset

Enable 4mA CALIB first

4.0000 mA

Cancel OK

20mA CALIB offset

Enable 20mA CALIB first

20.0000 mA

Cancel OK

CALIB enable

Disable

4mA /20mA calibration enable

Cancel OK

Output mode

4-20mA/ 0-20mA

Cancel OK

Open alarm enable

Disable:/ Enable

Cancel OK

7.6. Alarm

Alarm

Flow REV alarm enable

Flow REV alarm THR

Flow upper alarm enable

Flow upper alarm THR

Flow lower alarm enable

Flow lower alarm THR

Flow REV alarm

enable

Disable: /Enable

Cancel OK

Flow REV alarm THR

-10~10

0.00 %

Cancel OK

Flow upper alarm THR

-200~200

90.00 %

Cancel OK

Flow Lower alarm enable

Disable/ Enable

Cancel OK

Flow upper alarm enable

Disable/ Enable

Cancel OK

Flow lower alarm THR

-20~200

10.00 %

Cancel OK

7.7. Flow

Flow

TOTAL 1 unit

TOTAL 1 unit factor

TOTAL 1 function

TOTAL 1 set

TOTAL 2 unit

TOTAL 2 unit factor

TOTAL 2 function

TOTAL 2 set

Flow Unit

Flow unit factor

Flow range

Low flow cut off

Flow direction set

Flow REV MEAS enable

TOTAL 1 unit

Maximum 5 CHARS

L

Cancel OK

TOTAL 1 unit factor

0.000001~1000000

1000.00

Cancel OK

TOTAL 1 function

Positive/Negative/Total/

Net accumulation

Disable

Cancel OK

TOTAL 1 set

0.001~999999999

0.000 L

Cancel OK

TOTAL 2 unit

Maximum 5 CHARS

L

Cancel OK

TOTAL 2 unit factor

0.000001~1000000

1000.00

Cancel OK

Flow Unit

Maximum 8 CHARS

L/min

Cancel OK

TOTAL 2 function

Positive/Negative/Total

/Net accumulation

Disable

Cancel OK

TOTAL 2 set

0.001~999999999

0.000 L

Cancel OK

Low flow cut off

0.0001~1.0000

0.0050 m/s

Cancel OK

Flow unit factor

0.000001~1000000

16.6667

Cancel OK

Flow range

0.0001~999999

100.000 L/min

Cancel OK

Filter constant

0~10

00

Cancel OK

EPD alarm threshold

2.0~200.0

100.0 K Ω

Cancel OK

Excitation alarm enable

Disable/ Enable

Cancel OK

EPD alarm enable

Enable/ Disable

Cancel OK

Flow direction set

Forward/ Reverse

Cancel OK

Flow REV MEAS enable

Enable/ Disable

Cancel OK

Meter factor customer

0.5~1.5

1.0000

Cancel OK

User meter zero offset

-0.01~0.01

0.00000 m/s

Cancel OK

Converter factor

0.01~10.0

1.0000

Cancel OK

7.8. Factory

Factory

Pipe diameter size

Converter factor

Sensor factor

Correction zero offset

EI 200KΩ offset

EI 0KΩ offset

SYS TOTAL forward set

SYS TOTAL reverse set

Temp 0R resi offset

Temp 1K resi offset

Nonlinea corr FR1

Nonlinea corr FR1 factor

Nonlinea corr FR2

Nonlinea corr FR2 factor

Nonlinea corr FR3

Nonlinea corr FR3 factor

Nonlinea corr FR4

Nonlinea corr FR4 factor

Nonlinea corr FR5

Nonlinea corr FR5 factor

Pipe diameter size

6~300

015 mm

Cancel OK

Correction zero offset

-0.2~0.2

0.00000 m/s

Cancel OK

Temp 0R resi offset

-50.0~50.0

0.00 Ω

Cancel OK

Sensor factor

0.01~10.0

1.0000

Cancel OK

Temp 1K resi offset

950.0~1050.0

1000.00 Ω

Cancel OK

Nonlinea corr FR1

0.00~15.0

0.0000 m/s

Cancel OK

EI 200K offset

Connect the two SE to the GE
with a 200K R resp

021.6 K Ω

Cancel OK

EI 0K offset

Short circuit the two SE to the
GE

0.000K Ω

Cancel OK

SYS TOTAL forward set

0.001~999999999

00000000.000 m³

Cancel OK

SYS TOTAL Reverse set

0.001~999999999

00000000.000 m³

Cancel OK

Nonlinea corr FR1 factor

0.0~10.0

0.0000

Cancel OK

Nonlinea corr FR2

0.00~15.0

0.0000 m/s

Cancel OK

Nonlinea corr FR2 factor

0.0~10.0

0.0000

Cancel OK

Nonlinea corr FR3

0.00~15.0

0.0000 m/s

Cancel OK

Nonlinea corr FR3 factor

0.0~10.0

0.0000

Cancel OK

Nonlinea corr FR4

0.00~15.0

0.0000 m/s

Cancel OK

Nonlinea corr FR4 factor

0.0~10.0

0.0000

Cancel OK

Nonlinea corr FR5

0.00~15.0

0.0000 m/s

Cancel OK

Nonlinea corr FR5 factor

0.0~10.0

0.0000

Cancel OK

7.9. Information

Information

Sensor serial number

Converter serial number

Converter software REV

Converter hardware REV

Sensor serial number

Maximum 14 CHARS

Cancel OK

Converter serial number

Maximum 14 CHARS

Cancel OK

Converter software REV

Maximum 14 CHARS

V1.14-20240122

Cancel OK

Converter software REV

Maximum 14 CHARS

Cancel OK

8. Technical parameters and performance:

Measuring principle:

According to Faraday's law of electromagnetic induction, a conductive liquid flows through the inside of an insulated pipe, and under the action of the internal magnetic field, a voltage signal U is generated at both ends of the electrode.

$$U = K \cdot B \cdot D \cdot V$$

K : Geometric correction factor

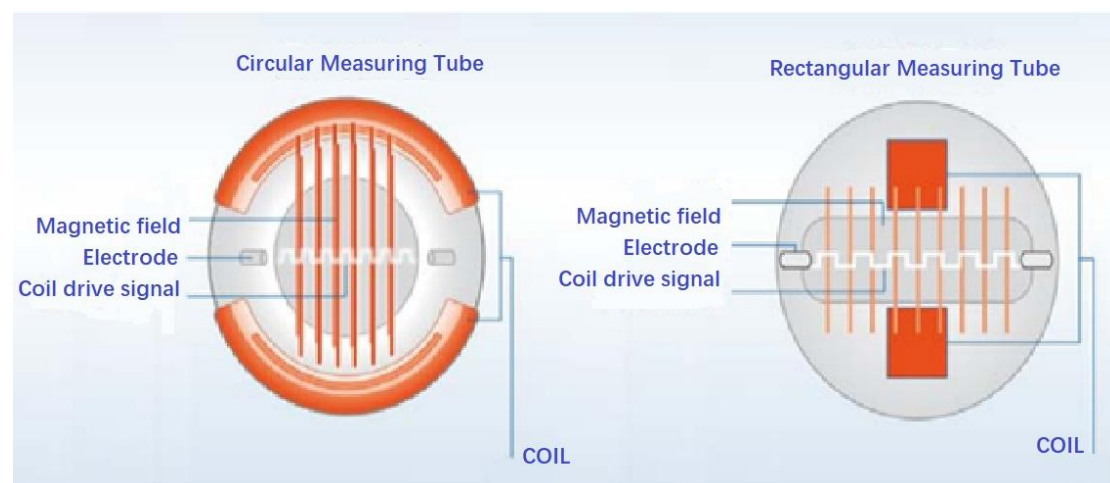
B : Magnetic field strength

D : Diameter of the sensor

V : Flow rate

The signal voltage U is acquired by the electrodes on both sides of the sensor and is proportional to the fluid flow rate and therefore to the fluid flow rate.

The signal is amplified, filtered, and then accumulated, recorded, and output.



Technical Indicators

The following data is used for general applications. If you need data more relevant to your specific application, please contact us or your local sales office.

Additional information (certificates, special tools, software, etc.) and complete product documentation can be downloaded free of charge from the website (Download Center).

Volumetric flow rate

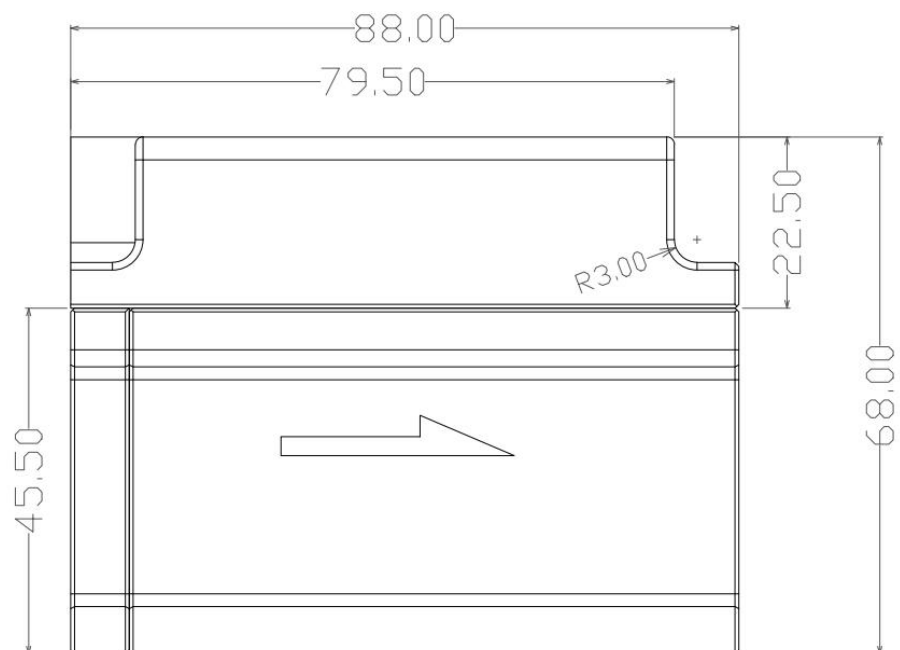
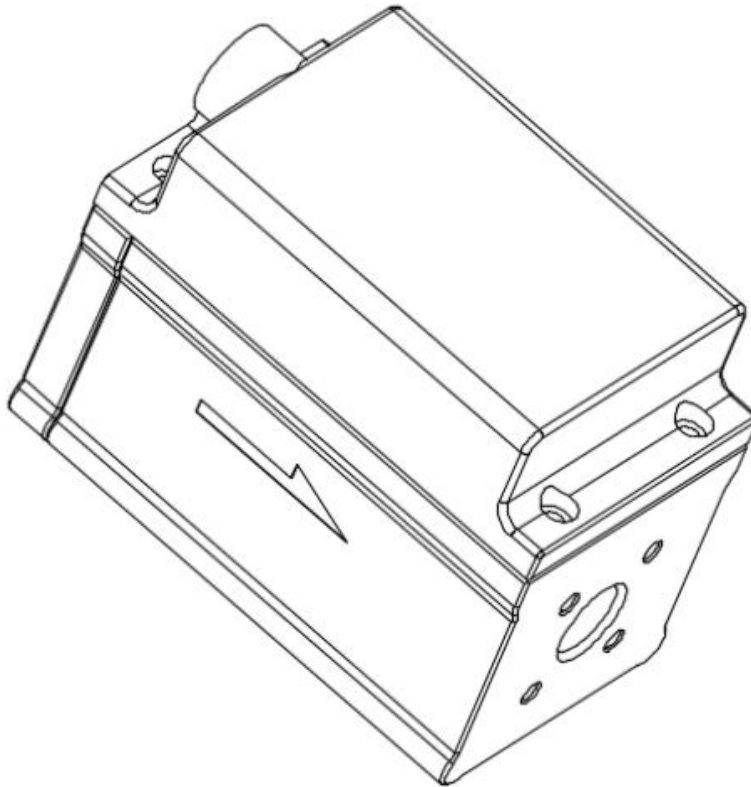
Measuring principle	Faraday principle of electromagnetic induction
Scope of application	Conductive liquid media
Measured values	
Main measurements	velocity of flow
Secondary measurements	Volumetric flow rate

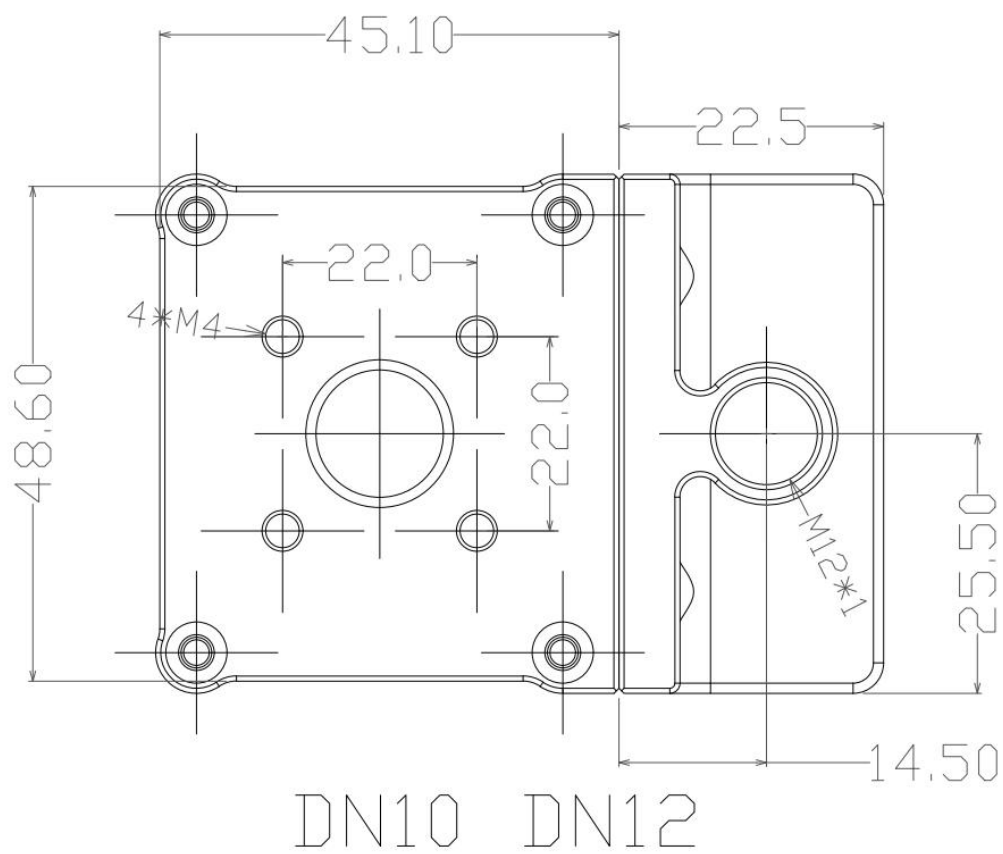
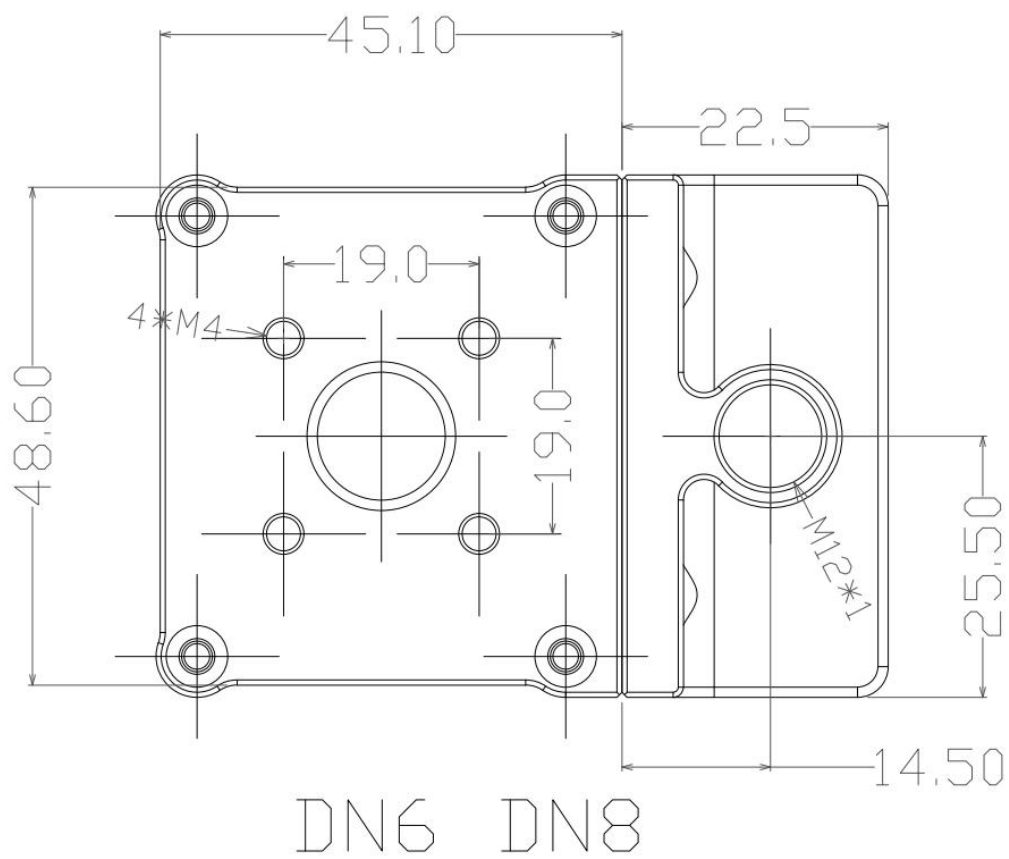
Design System

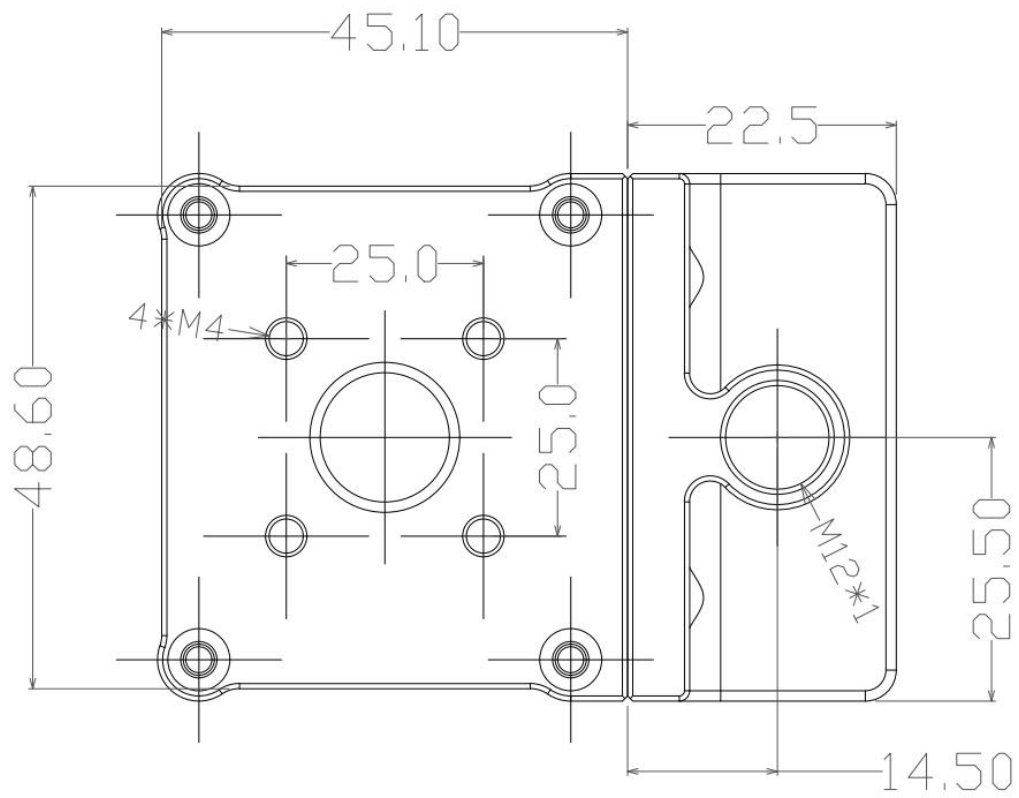
peculiarity	Standard wet calibration
Modular construction	The measuring system consists of a flow sensor and a signal converter. Compact design.
Design the product model	FSC11XProMag
Nominal diameter	DN6, DN8, DN10, DN12, DN15, DN20
Measuring range	-6.5...+6.5m/s
UI	Instantaneous flow, cumulative flow, temperature, alarm prompt, meter number
Operational data	The factory is set to customer specifications
Human Machine Interface (HMI) options	FSC11XProMag RS485 software
Cable connection standard	1x M12, 8-pin connector

9. Product size drawing

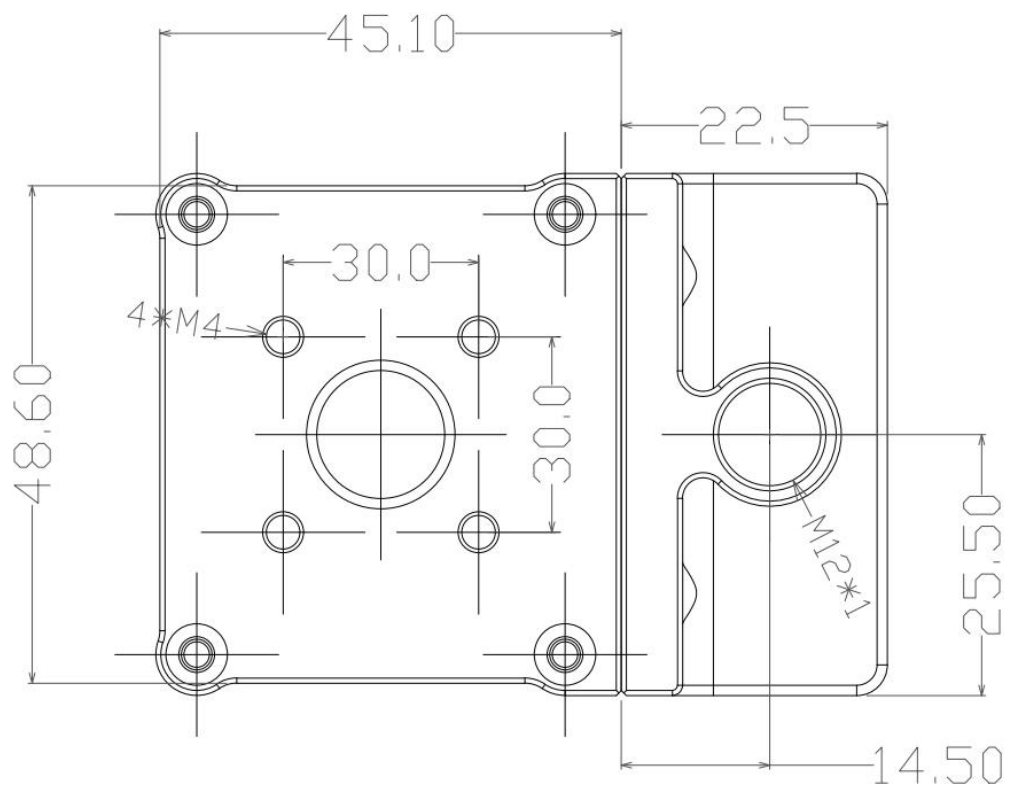
9.1 Clamp type without Display: FSF100ProMag





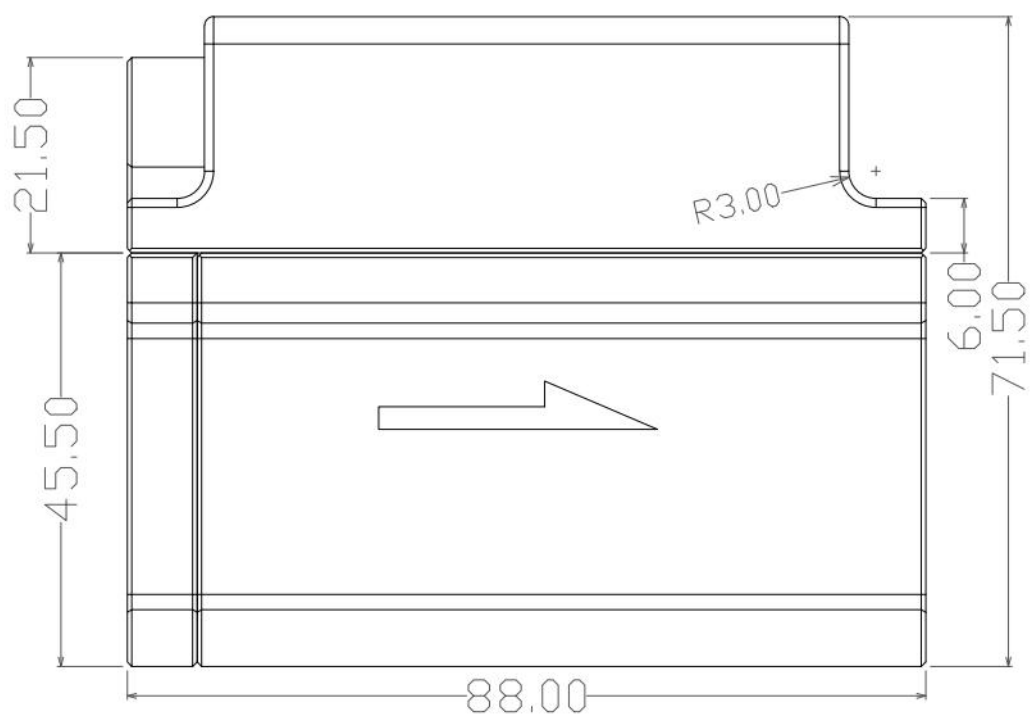
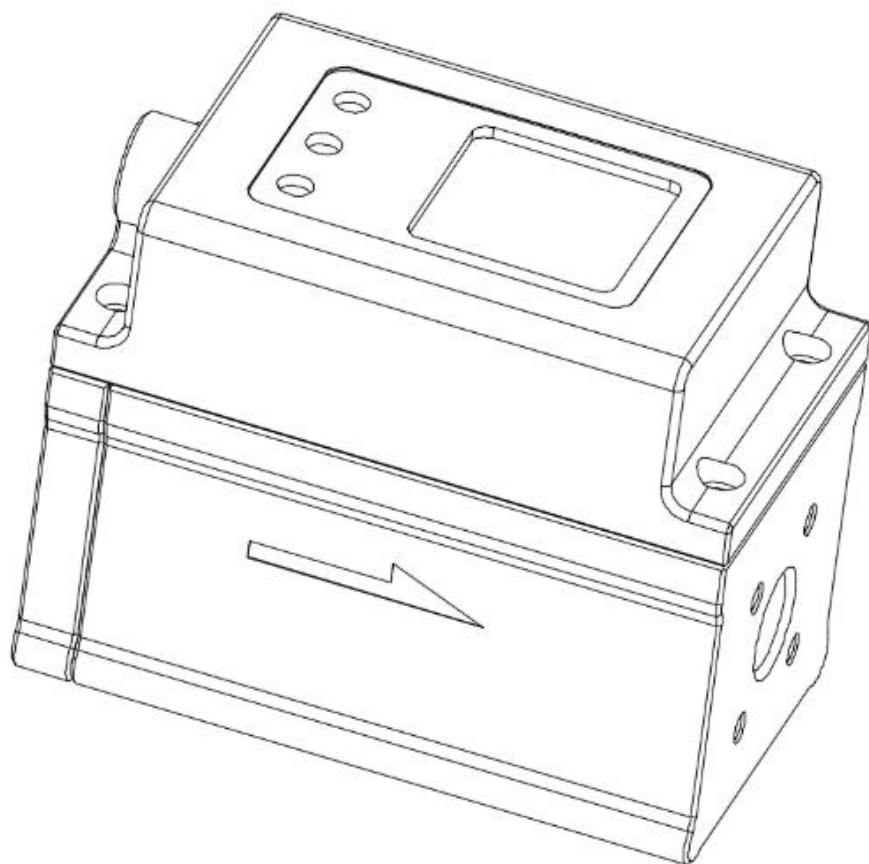


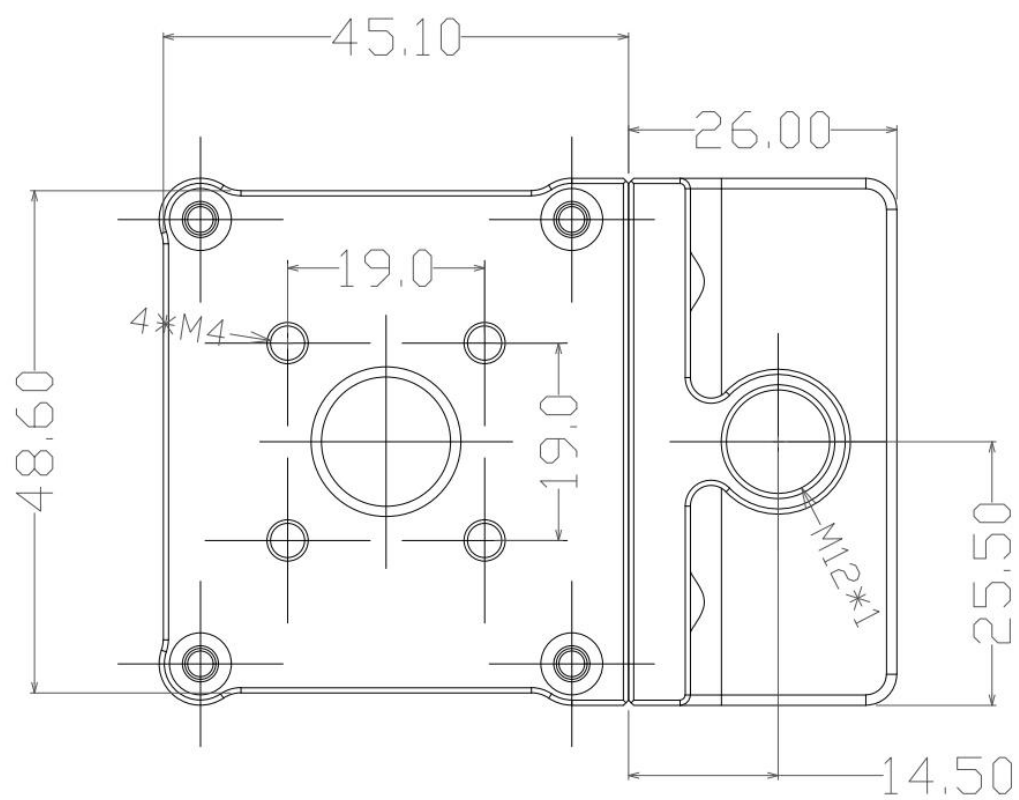
DN15



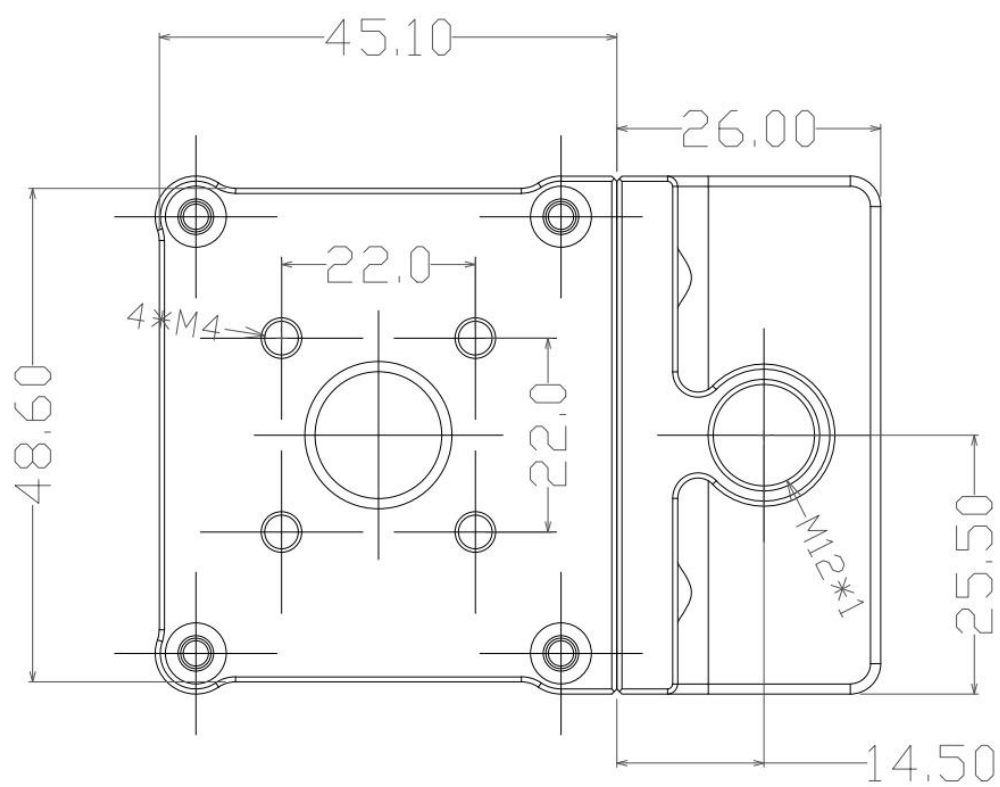
DN20

9.2 Clamp type with Display: FSF101ProMag

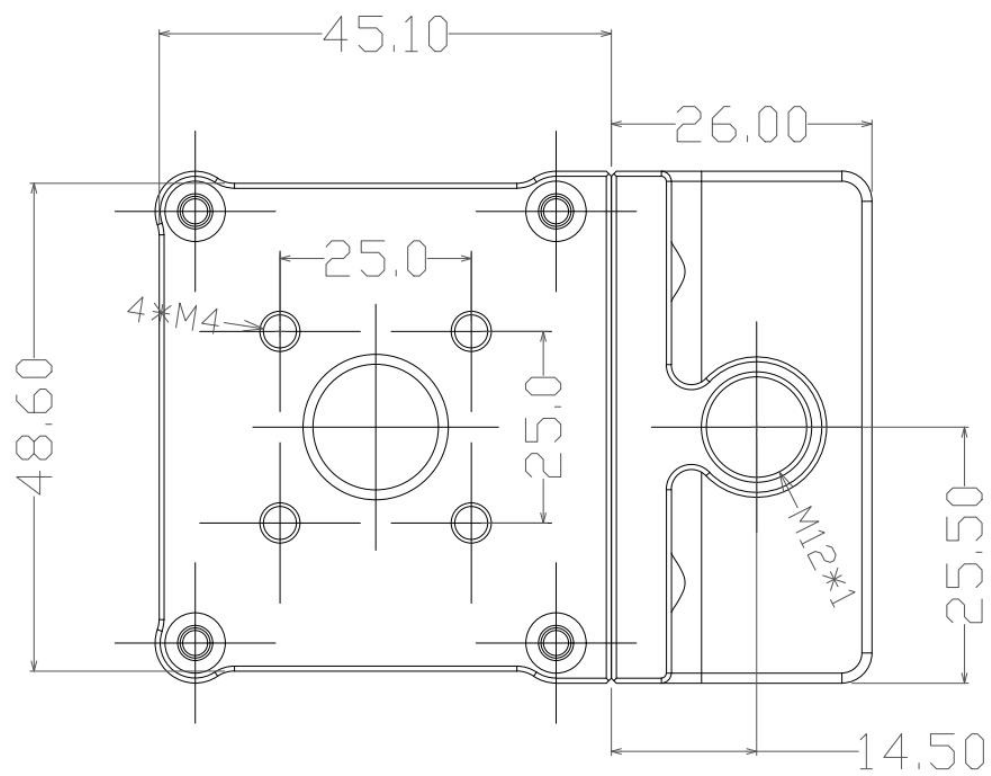




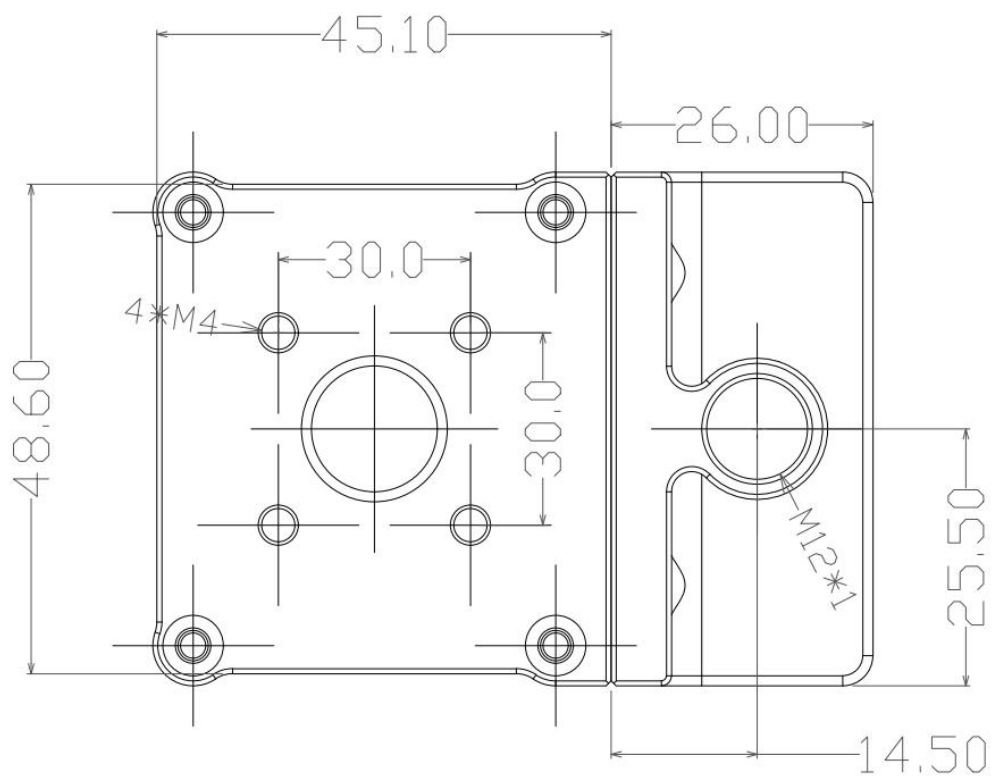
DN6 DN8



DN10 DN12

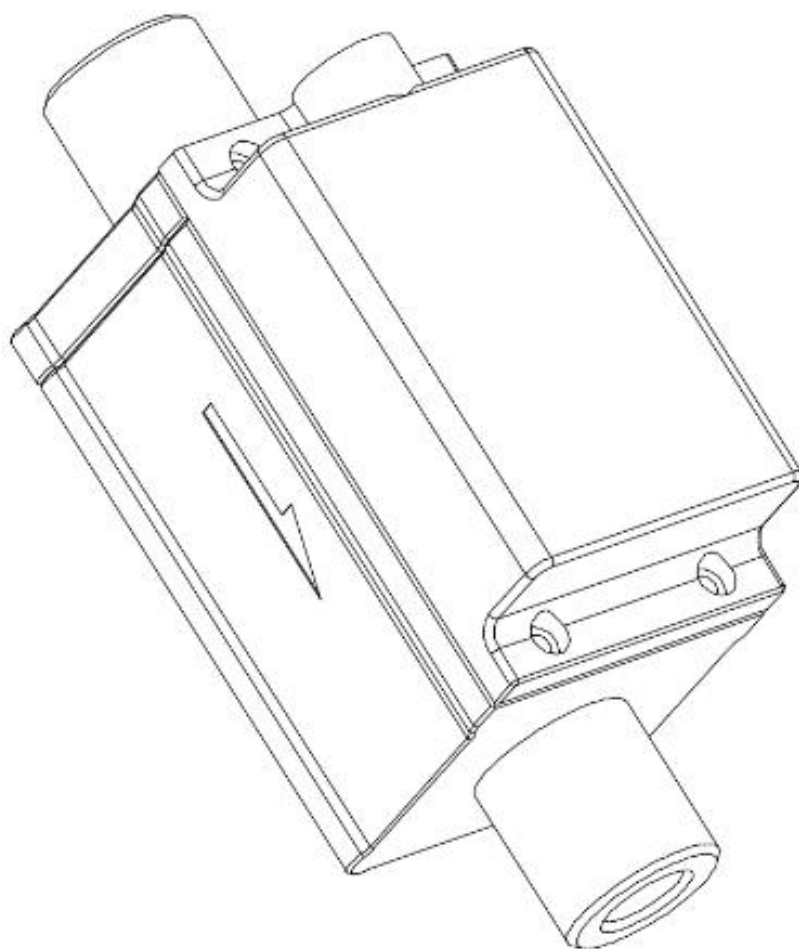
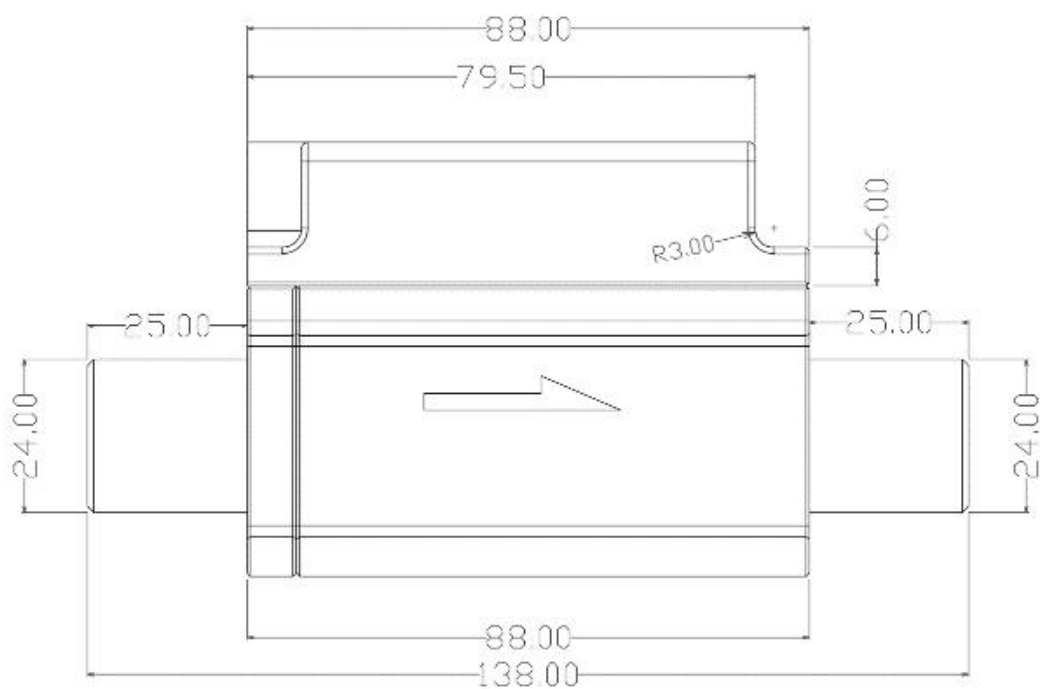


DN15

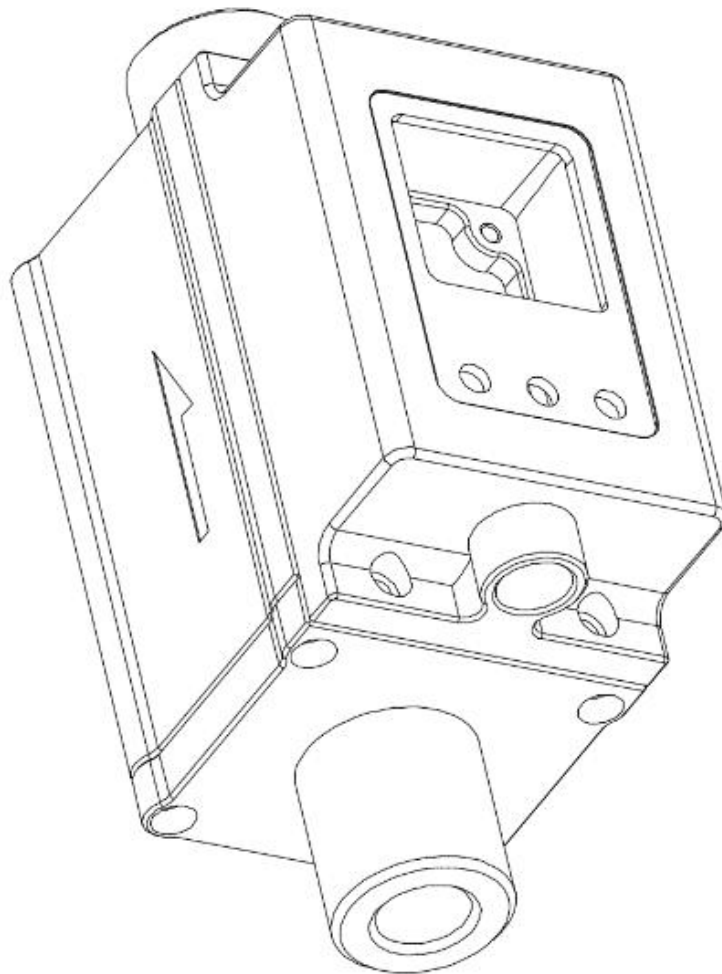
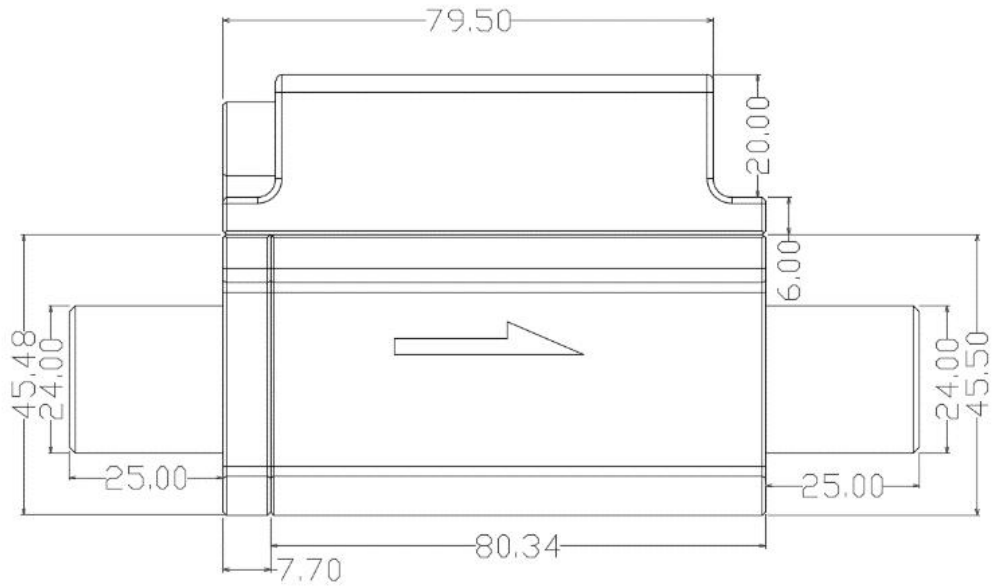


DN20

9.3 Screw thread type without Display: FSF103ProMag



9.4 Screw thread type without Display: FSF104ProMag



Appendix:

1. Modbus Address

MODBUS registers	Number of registers	data type	Parameter	unit	Access Permissions	description
0000	2	float	Flow rate	m/s	R	It is updated once per measurement cycle
0002	2	float	Volumetric flow	Same as the user unit	R	
0004	2	float	Percen of flow	%	R	Volumetric flow as a percent of full scale
0006	4	double	User Totalizer 1	Same as the user unit	R/W	This can be changed via the multi-register write command
0010	4	double	User Totalizer 2		R/W	
0014	4	double	System forward accumulator	m3	R	–
0018	4	double	System Reverse Accumulator	m3	R	–
0022	2	float	temperature	°C	R	–
0024	2	uint32_t	alarm	–	R	0x0000: No 0x0001: Empty Alarm 0x0002: Flow Reverse Alarm 0x0004: Flow Upper Limit Alarm 0x0008: Lower Flow Limit Alarm 0x0010: Excitation Coil Alarm 0x0020: Storage

						Abnormal Alarm 0x0040: Electrode Low Resistance Alarm 0x0080: Upper Temperature Alarm 0x0100: Lower Temperature Limit Alarm 0x0200: Current Open Circuit Alarm
0026	1	uint16_t	Flow Direction	–	R	0 : forward 1 : reverse
0027	2	float	Electrode impedance	ohm	R	–
0029	2	float	PT1000 resistance value	ohm	R	

2. Flow Range

SIZE(DN)	Lower limit of Flow (L/min)	Upper limit of Flow (L/min)
DN6	0.0085	11.0214
DN8	0.0151	19.5936
DN10	0.0236	30.615
DN12	0.0339	44.0856
DN15	0.053	68.8838
DN20	0.0942	122.46