



EPT1 Thermal Mass Flow Meter

Product Operation Manual



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1. Read Labels

Thank you for purchasing a product from FineTek. This operating manual explains the product's features, working principles, operation, maintenance methods, and usage precautions. It is designed to help users fully understand the correct usage of the product, preventing equipment damage and potential hazards to the operator.

- Before using this product, please read this operating manual thoroughly and carefully.
- If this manual does not meet your needs, please contact our company.
- The contents of this operating manual may vary with version updates and will be uploaded to our company's website for user download.
- Please do not attempt to disassemble or repair the product yourself, as this will void your warranty. Send the product back to our company for repair and calibration or contact us.
- Explanation of warning symbols:



Danger Warning → Indicates the risk of fatal or serious accidents if operated incorrectly



Caution Warning → Indicates that incorrect operation may result in a certain degree of injury and equipment damage.



Electric Shock Warning → Indicates a warning of potential electric shock.



Fire Warning → Indicates a warning of potential fire hazards.



Prohibition Warning → Indicates actions that are prohibited.

2. Product Warranty

2.1 New Product Warranty

- Our products come with a twelve-month warranty from the delivery date. If a failure occurs within this period and meets warranty conditions, there will be no charges for inspection, parts, or repairs.
- If the product has defects due to shipping and not human error, it can be replaced within 7 days by contacting our company.
- When returning a product for repair, please send the complete unit back without disassembling any parts, and ensure it is properly packaged to avoid damage during transit, which could lead to further losses.
- The warranty applies only to customers using the product under normal conditions. It does not cover special applications, abnormal use, or excessive usage.
- The warranty will not apply in the following situations, and charges may be incurred for inspection, parts, and repairs:
 - The product or any parts are beyond the warranty period.
 - Failures or damages resulting from not using the product according to the operating manual or the specified usage environment.
 - Damage caused by force majeure (natural disasters, floods, fires, earthquakes, lightning, typhoons, etc.), human actions (scratches, drops, broken parts, strikes, cracks, heavy impacts, etc.), human negligence (using inappropriate voltage, high humidity, water ingress, stains, corrosion, loss, inadequate storage, etc.), or other abnormal factors. Failures resulting from irresistible external forces due to natural disasters.
 - Damage caused by the customer or a third party installing, adding, expanding, modifying, or repairing parts that are not authorized or approved by our company.
 - When the product label information is inconsistent or damaged, making it impossible to verify the product serial number.

2.2 Repair Warranty

Our company offers a six-month warranty on the repaired parts of the product. If the same component experiences the same failure within this period, you will be entitled to free repair service.

2.3 Service Network

Company	Address	Telephon	Fax
Taipei Headquarters (Taiwan)	No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678	+886 2-2269-6789	+886 2-2268-6682
Taichung Sales office (Taiwan)		+886 4-2465-2820	+886 4-2463-9926
Kaohsiung Sales office (Taiwan)		+886 7-333-6968	+886 7-536-8758
Fine automation Co., Ltd. (China)	No. 451, Duhui Road, Zhuanqiao Township, Minhang District, Shanghai City 201109	+86 021-64907260	+86 021-6490-7276
Aplus FineTek Sensor Inc. (America)	355 S. Lemon Ave, Suite D, Walnut, CA 91789	1 909 598 2488	1 909 598 3188
FineTek Pte Ltd. (Singapore Branch)	37 Kaki Bukit Place, Level 4 Singapore 416215	+65 6452-6340	+65 6734-1878
FineTek GmbH (Germany Branch)	Bei den Kämpen 26 21220 Seevetal-Ramelsloh, Germany	+49 (0) 4185 8083 0	+49 (0) 4185 8083 80
FineTek Co., Ltd. (Indonesia Branch)	PERGUDANGAN TUNAS BITUNG JL. Raya Serang KM. 13,8, Blok C3 No. 12&15, Bitung Cikupa, Tangerang 15710	+62 021-2958-1688	+62 021-2923-1988

3. Product Inspection

3.1 Item Verification

- Flow sensor 1 set
- Operating Manual 1 copy

3.2 Safety Inspection

- Before unboxing, please check the outer packaging for any deformation or damage and take photos as proof for future compensation claims.
- After unboxing, please check the contents for any deformation, damage, or quality issues, and take photos as proof for future claims.
- After opening the box, please immediately verify that the contents match your order, and that the quantity is correct.
- If there are any irregularities, please contact our company within 7 days of receipt (including photos). Otherwise, we will not provide free replacement or repair.

3.3 Handling & Transportation

- Please avoid dropping, colliding, or applying excessive impact, as this may cause electric shock and damage.
- Do not place the product in the same space as strong magnetic objects.

4. Product Introduction

4.1 Product Features

- One sensor with flow speed and temperature measurement.
- Supports Modbus digital communication.
- IP68/IP69K Protection Level.
- Built-in anti-surge protection.
- No moving mechanical structures, and no wear and tear.
- Liquids with impurities can also be detected because there is no mechanical structure.
- The length of the sensing rod can be designed and manufactured to match the size of the pipe diameter on-site.

4.2 Working Principles

This thermal mass flow meter is installed on fluid pipeline with a sensing probe that is heated. When the fluid comes into contact with the heated probe, it carries away the heat. The temperature change caused by the heat carried away is measured and converted to 4~20mA current output for simultaneously determining both temperature and flow speed.

The thermal mass flow meter needs to be assembled with a threaded adapter assembly which is secured onto the pipeline, and a sensing probe is inserted into the pipeline to measure the flow speed and temperature of the fluid.

4.3 Product Applications

Thermal mass flow meters are specially designed to measure liquids in small pipelines with limited space, and are mainly used in the following fields:

- Cooling systems: Such as liquid cooling pipelines in the AI servo cooling system
- Vacuum systems: Such as vacuum pump cooling pipeline
- Air conditioning systems: Such as large air conditioning hot and cold-water pipelines

5. Product Specifications

5.1 Product Specifications

Supply power	12~32VDC
Current draw	<100mA @24V
Medium Temperature	0~125°C (Note 1)
Temperature Measurement Range	-25~150°C
Ambient Temperature	-25~80°C
Medium	Water
Measurement Range	10~400cm/s
Measurement Error	<2% @Standard measuring conditions (Note 2)
Response Time for Temperature Sudden Change	10s
Pressure	100bar
Analog Output	4~20mA First set for measuring flow speed (cm/s) Second set for measuring temperature (°C) (Optional)
Comm Interface	RS-485 (Note 3) Flow speed (cm/s), temperature (°C)
Response Time	2~5s
Short Circuit Protection	Yes
Reverse Power Protection	Yes
Electrical Connection	M12*1 (6pin)
Housing Material	316L
Ingress Protection	IP68/IP69K

(Note 1)

The sensor has been calibrated and specified for water as the medium.

Technically, the sensor is suitable for medium temperatures of up to -25°C.

In order to measure temperatures below 0°C, different media must be added to the water.

The measurement results will be affected by the medium, so measurements

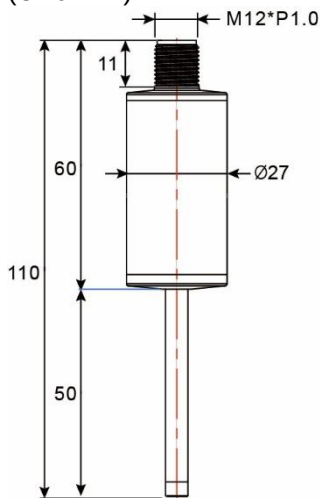
below 0°C must be tested individually for the specific mixture used.

(Note 2) Water fluid temperature: $26 \pm 1^\circ\text{C}$, pressure: 1 ± 0.2 bar, vertical installation of the sensor in the pipe with the sensing probe located in the center of the pipeline, the inner diameter of the pipe: 25mm (D); for the length of the straight pipe section, 12D or more on the upstream side and 12D or more on the downstream side.

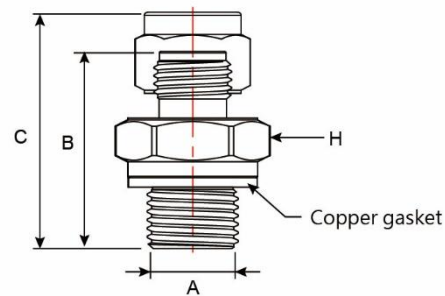
(Note 3) RS-485 communication connections up to 20 units.

5.2 Appearance and Dimension

(Unit: mm)



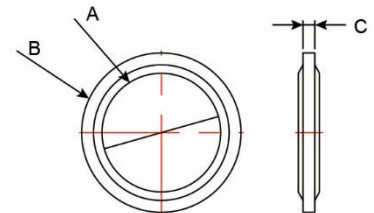
Quick connector (optional)



A	B	C	H(Hex)
1/2" PF	37.1	44.7	27
1/4" PF	30.1	37.5	19

Oil sealing gasket (optional)

Matching clamp size	A	B	C
1/2" PF	24.3	33.3	2.3
1/4" PF	14.9	22.3	2



5.3 Ordering Instructions

EPT 1 0 0 0 0 - A 1 0 0 0 0 0 0 17 18 19 20 21

⑰ Output / input

A : 12~32VDC, 4~20mA, With RS-485

C : 12~32VDC, 4~20mA*2, With RS-485

D : 12~32VDC, With RS-485

⑱⑲⑳㉑ Total length

Code	Probe length
0032	32mm
0050	50mm
0075	75mm
0100	100mm
0200	200mm

Optional



M12 Cable

Part number	Specifications
PC312-22316B2M01	Single head M12, General type 180, PVC, Without lamp, 6C, 2M
PC312-22316B5M01	Single head M12, General type 180, PVC, Without lamp, 6C, 5M



Quick Connector

Part number	Specifications
HP411-AIR001A503	1/2"PF*ID6,SUS316
HP411-AIR001A212	1/4"PF*ID6,SUS316

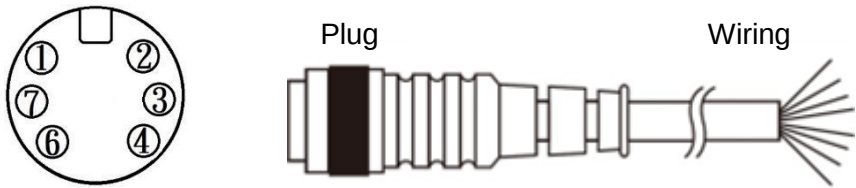


Oil Sealing Gasket

Part number	Specifications
HP403-C030352803	OD33.3*ID24.3*2.3t,1/2"PF,VITON(FKM)
HP403-C020252802	OD22.3*ID14.9*2t,1/4"PF,VITON(FKM)

5.4 Wiring Instructions

M12 connector socket



The definitions of wire colors of the cable and pin configuration of the M12 connector socket are shown in the table

Pin number of M12 connector socket	Function	Wire color
1	Analog output for flow speed, 4-20mA +	Black
2	Communication output, RS-485 D-	Red
3	Communication output, RS-485 D+	White
4	Power input, DC12~32Vdc+	Brown
5		N/A
6	Power input, DC 0V -, Analog output, 4-20mA -	Blue
7	Analog output for temperature, 4-20mA +	Green
8		N/A

Wiring Diagram

Flow speed, 4~20mA Output	Temperature, 4~20mA Output	Communication, RS-485 Output
The diagram shows the M12 connector socket with a circuit connected to pins 1, 6, and 4. Pin 1 (Black) is connected to the positive terminal of an ammeter (A). Pin 6 (Blue) is connected to the negative terminal of the ammeter. Pin 4 (Brown) is connected to the positive terminal of a DC power source (12~32Vdc). Pin 6 (Blue) is also connected to the negative terminal of the power source. A load resistor is connected between the ammeter and the power source, with the label $R_{LOAD} < 450\Omega$.	The diagram shows the M12 connector socket with a circuit connected to pins 7, 6, and 4. Pin 7 (Green) is connected to the positive terminal of an ammeter (A). Pin 6 (Blue) is connected to the negative terminal of the ammeter. Pin 4 (Brown) is connected to the positive terminal of a DC power source (12~32Vdc). Pin 6 (Blue) is also connected to the negative terminal of the power source. A load resistor is connected between the ammeter and the power source, with the label $R_{LOAD} < 450\Omega$.	The diagram shows the M12 connector socket with a circuit connected to pins 2, 3, 6, and 4. Pin 2 (Red) is connected to the negative terminal of an RS-485 module. Pin 3 (White) is connected to the positive terminal of the RS-485 module. Pin 6 (Blue) is connected to the negative terminal of a DC power source (12~32Vdc). Pin 4 (Brown) is connected to the positive terminal of the power source.

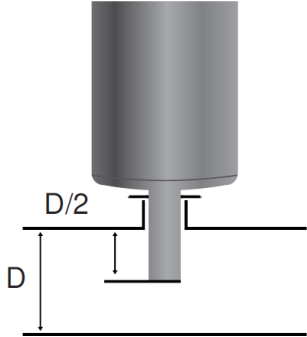
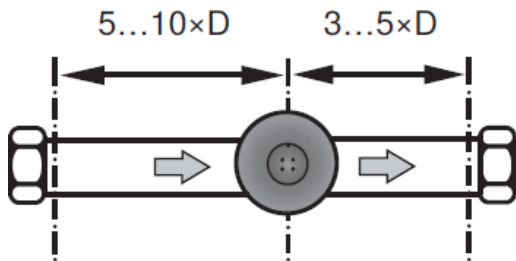
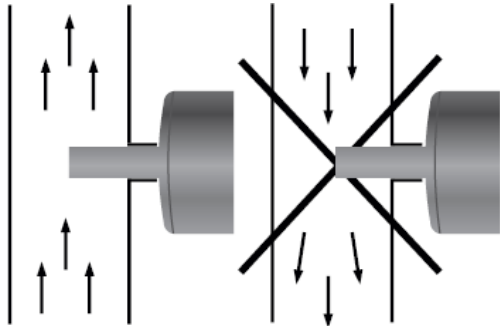
6. Installation Descriptions

6.1 Environmental Safety

- Storage temperature: $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$ ($-40^{\circ}\text{F} \sim 185^{\circ}\text{F}$)
- Ambient temperature: $-40^{\circ}\text{C} \sim 80^{\circ}\text{C}$ ($-40^{\circ}\text{F} \sim 176^{\circ}\text{F}$)
- Medium temperature: $-40^{\circ}\text{C} \sim 100^{\circ}\text{C}$ ($-40^{\circ}\text{F} \sim 212^{\circ}\text{F}$)
- Power supply: 12 VDC $\sim$ 32 VDC.

6.2 Installation

To ensure accurspeed flow detection, please adhere to the installation precautions below:

The ideal location of the sensor tip is in the middle of the pipe.	
The sensor should be installed at a sufficient distance from the bends and cross-sectional points of the pipe to maintain accurspeed flow detection. The recommended upstream straight pipe section is at least 5~10D; the downstream straight pipe section is 3~5D (D: outer diameter of the pipe)	
In a closed system, it is necessary to ensure that the pipe is filled with liquid. When installing the sensor in the vertical pipe, the direction of water flow should be from bottom to top, not top to bottom.	

6.3 Quick Coupling Disassembly Sequence Diagram



7. Operating Descriptions

7.1 Electrification Instructions

EPT1 flow and temperature sensor is powered by 12~32Vdc with an external power supply of 12~32Vdc / 200 mA or higher. Please pay attention to the voltage polarity during carrying out wiring, noting the following: brown wire is for positive power; the blue wire is for 0V reference; no power should be supplied on the RS-485 communication lines.

7.2 Information on Communication Commands

EPT1 flow and temperature sensor supports industrial Modbus communication protocols; MODBUS uses RTU Mode transmission mode, and the communication method is half-duplex. Preset transmission speeds (Baudspeed) available include: 9600 (bps), 1 Start Bit, 8 Data Bits, No Parity, 1 Stop Bit

	Address	Data Type	Parameter	Directions	R/W	Reading Range	Unit
1	4139	FLOAT32	TEMP_VALUE	Temperature	R	-20.0~125.0	°C
2	4145	FLOAT32	FLOW_VALUE	Flow speed	R	0~500	cm/s
3	4147	FLOAT32	PFC_CURRENT_OUT_A	The first set of output current (Preset as corresponding flow)	R	4~20	mA
4	4149	FLOAT32	PFC_CURRENT_OUT_B	The second set of output current (Preset as corresponding temperature)	R	4~20	mA
5	4228	UINT8	PFC_PRODUCT_NAME[36]	Product model	R/W	--	--
6	4246	UINT8	PFC_PRODUCT_SERIAL[20]	Product serial number	R/W	--	--
7	4256	UINT8	PFC_FIRMWARE_VERSION[12]	Firmware version	R/W	--	--
8	4262	UINT8	PFC_HARDWARE_VERSION[22]	Hardware version	R/W	--	--
9	4273	UINT8	PFC_PRODUCT_DATE[12]	Product production date	R/W	--	--
10	4280	UINT16	PFC_LOAD_FIRMWARE_SETTING	Load factory default values and save to FACTORY DATA and USER DATA	R/W	0: No action 1: default	--
11	4281	UINT16	PFC_SAVE_SYSTEM_VAR_TO_EEPROM	Save parameters to USER DATA FLAG	R/W	0: No action 1: Save	--
12	4282	UINT16	PFC_MODBUS_ID	Set Modbus ID	R/W	1~255	--
13	4284	UINT16	PFC_FILTER_LEVEL	Set filter levels	R/W	0~100	--
14	4297	FLOAT32	PFC_VELOCITY_ZERO	Flow speed range [low point]	R/W	0	cm/s
15	4299	FLOAT32	PFC_VELOCITY_SPAN	Flow speed range [high point]	R/W	400	cm/s
16	4301	FLOAT32	PFC_TEMPERATURE_ZERO	Temperature range [low point]	R/W	0	°C
17	4303	FLOAT32	PFC_TEMPERATURE_SPAN	Temperature range [high point]	R/W	100	°C

8. Storage and Transport Requirements

8.1 Environmental Requirements

- Execute the necessary precautions to prevent rain and moisture.
- Reduce vibration and prevent collisions during transport.
- Temperature range -25~70°C
- Humidity less than 80%
- The performance of the water meter may be impacted from open storage

8.2 Transport Requirements

- To protect the water meter from damages during transportation, please keep it in the same package condition as when it was shipped from the factory before it arrives at the installation site.

9. Maintenance

9.1 Daily Care

- Periodically check the pressure sensing port to see if it is clogged by foreign matters or damaged; if it is seriously clogged, clean it. If it is damaged, replace the equipment.
- When equipment is removed and before it is re-installed, confirm carefully if pressure is released from pressurized pipes to avoid leakage of liquids from the pipes.
- The disposal of equipment shall be based on local national regulations in an environmentally friendly way.
- In the case of return, please make sure that the product is not contaminated, particularly by hazardous or poisonous substances. For the transport, suitable packaging is required to avoid damaging the equipment.

10. Error Message and Troubleshooting

Failure Status	Cause	Solution
No current output	Check whether the power supply facility is normal and whether the positive and negative polarities are correct	Clear errors so that the sensor can receive power correctly.
Unable to communicate	Ensure RS-485 cable polarity and communication port settings are both correct.	1. Verify whether the RS-485 converter can operate normally. 2. Contact the original manufacturer