

MPM489W

Operation Manual



MICROSENSOR



Contents

1 Introduction	1
2 Specifications	2
3 Construction and Outline Dimension.....	3
4 Operation Principle.....	4
5 Unpacking, Storage and Shipment Enclosed	6
6 Installation.....	7
7 Operation, Maintenance and Fault Diagnosis.....	15
8 Responsibility.....	16

Our company reserves the modification right for this operation manual due to renovation of production technology and craftwork. If some information is changed, no more notice will be edited.

Please pay attention to the latest version.

Our company also reserves the right of final explanation for this manual.

Version: V1.0

Thank you very much for selecting Micro Sensor's product, please take some time to read this operation manual very carefully before using the product.

1 Introduction

MPM489W level transmitter is full-sealed submersible level measurement instrument. A high stable and dependable sensor is mounted with the transmitter special PCB in a stainless steel housing. The integration construction and the standard output signal support worksite operation and automatic controlling facilities. The stainless steel cap on the top of the transmitter protects the steel diaphragm of the transducer, yet allows the water free access to it. The waterproof cable sealed tightly to the housing. The reference tube is in the cable. The housing protection is IP68, and the transmitter is available for long-term submersible operation.

MPM489W level transmitter has advantages of small size, light weight and long-term stability; it can be applied to measure and control in field of petroleum, chemi-industry, medicine, metallurgy, power station, mine, city water supply, drainage and hydrology survey, etc.

To be convenient for worksite local installation and observation, the connection box and indicator could be assembled according to customers' option.

2 Specifications

Range: 0mH₂O~1mH₂O...200mH₂O

Over pressure: ≤2 times FS

Pressure Type: gauge, absolute

Accuracy: ≤±0.25%FS ≤±0.5%FS ≤±1%FS

Note: The precision of products is related to the range of measurement, and the precision of products in different range is different.

Stability Error: Range >10mH₂O ≤ ±0.2%FS/year

Range ≤10mH₂O ≤ ±20mmH₂O/year

Temperature Drift:	Zero Drift	FS Drift
Range >10mH ₂ O	≤±0.02%FS/°C	≤±0.05%FS/°C
Range ≤10mH ₂ O	≤±0.05%FS/°C	≤±0.05%FS/°C

Operation Temperature:

-10°C~60°C (Intrinsic safety)

-20°C~70°C (cable material: PE, PVC)

-20°C~80°C (cable material: PUR)

Storage Temperature: - 20°C~85°C

Power Supply Voltage: 11V~28V DC 3.3V/5V DC

Signal Output:

4mA~20mA DC (2-wire 11V~28V DC Power Supply)

0/1V~5V/10V DC (3-wire 11V~28V DC Power Supply)

0.5V~2.5/4.5VDC (3-wire 3.3V/5V DC Power Supply)

Load(Ω): $RL \leq (U-11)/0.02$ (2-wire) ; $\geq 10k\Omega$ (3-wire)

Intrinsic safe version mark: ExiallCT6Ga;

ExiallCT4Ga(ATEX)

EC-Type Examination Certificate Number: Presafe 17 ATEX 11284X

Intrinsically safe coefficient:

$U_i=28VDC$ $I_i=93mA$ $P_i=0.65W$ $C_i=0.044\mu F$ $L_i=0mH$

ATEX:

$U_i=28VDC$ $I_i=115mADC$ $L_i=0mH$ $C_i=0.055\mu F$ $P_i=0.66W$ (2-wire)

$U_i=26VDC$ $I_i=140mADC$ $L_i=0mH$ $C_i=0.055\mu F$ $P_i=0.66W$ (3-wire)

$U_i=15VDC$ $I_i=200mADC$ $L_i=0mH$ $C_i=0.0451\mu F$ $P_i=0.75W$ (3-wire)

Protection Rating :IP68

3 Construction and Outline Dimension

3.1 Construction

3.1.1 The transmitter construction to see Fig. 1:

Unit:mm

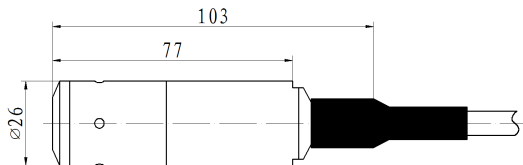


Fig. 1

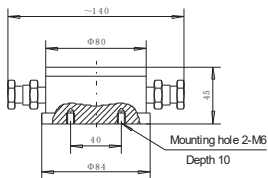
3.1.2 Outline and Dimension

The transmitter outline dimension is to see Fig. 2.

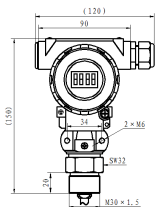
Cable Length: assembled according to customers' options and the longest cable could be 300 meters.

Connection Box: Please specify a connection box is to be connected to MPM489W when ordering.

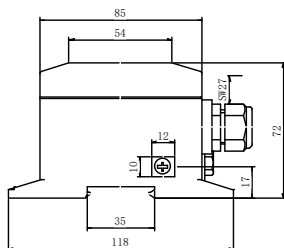
Indicator: only for transmitter with 2-wire, 4mA~20mADC output and connection box Ye, indicator could be provided according to the options.



Connection box Yb



Connection box Ye



Connection box Yc/Yd

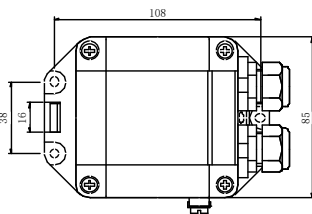


Fig. 2

4 Operation Principle

The measuring element of transmitter is a sensor, which transfers the pressure into electric signal by semiconductor silicon material's piezo-resistive effect. The measured pressure acts on stainless steel diaphragm, and then be transferred onto sensitive chip by silicon oil which is filled between the stainless steel diaphragm and sensitive chip (see Fig. 3). The sensitive chip is connected with transmitter special amplifying circuit by wires (see Fig. 4). Due to the good linearity relationship between the electric signal of Wheatstone bridge on the sensitive chip and the measured pressure, the pressure could be measured accurately.

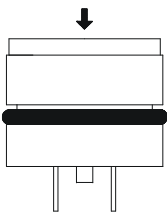


Fig. 3

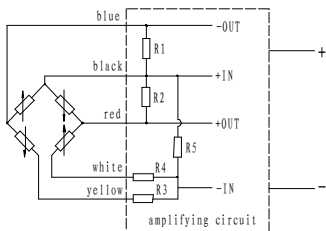


Fig. 4

The basic principle of level measurement is that the liquid static pressure which proportioned with the liquid depth is transferred into current (or voltage) signal output, and establishing the linearity corresponding relationship between electric signal output and the liquid depth to

measure level or the liquid depth.

The level measurement principle of transmitter to see Fig. 5:

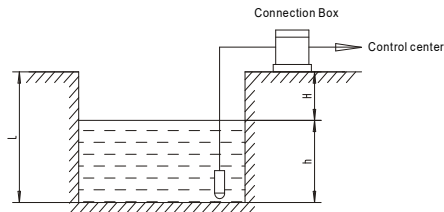


Fig. 5

$$P = \gamma \cdot h \dots \dots \dots \textcircled{1}$$

P is the liquid static pressure at the measuring point;

γ is the liquid specific gravity;

h is the depth from the measuring point to the liquid surface, or level.

5 Unpacking, Storage and Shipment Enclosed

5.1 Unpacking

Attention:

- Check the package completed or not firstly, and the box should be put as the sign "up".
- Avoid knocking violently when opening, and prevent injuring instruments or accessory. Please be carefully to prevent the housing and rubber casing of transmitter cable from damage.

5.2 Enclosed

When out-factory, the transmitter includes:

MPM489W level transmitter	1
Polyethylene Special Cable (connected with transmitter)	the ordered length
Connection Box (connected with cable)	due to the order
Indicator (in connection box Ye)	due to the order
Product Operation Manual	1
Product Quality Certificate	1

5.3 Storage

The transmitter should be stored in dry and ventilative room with ambient temperature $-20^{\circ}\text{C}\sim 85^{\circ}\text{C}$, relative humidity no more than 85% and the air in the room without corrosive gas.

6 Installation

6.1 Check before Installation

Attention before transmitter installation:

- The static pressure produced by the liquid at installation place exceeds the transmitter FS or not.
- The measuring liquid is compatible with the transmitter construction material or not.
- The measuring liquid may stop up the holes on the protection cap or not.

6.2 Installation Methods

The transmitter should be installed vertically down.

In the flowing water, the acted surface should be parallel with the water flowing direction.

6.2.1 Installation in the Static Water

The installation method in the static water see Fig. 6.

To prevent shaking or destroying the transmitter when pumping, the transmitter should be put away from the liquid resource. Otherwise it should be installed as Fig. 7, protected by steel tube.

The installation method in the deep well see Fig. 7.

Steel tube inserted method is usually used. The steel tube cannot be bent; the diameter of steel tube must be more than 30mm. Several holes should be made at different heights on the tube so as to easily raising and make water flow smoothly. If necessary, wrap steel wire around transmitter to prevent breaking the cable by lifting with the steel wire.

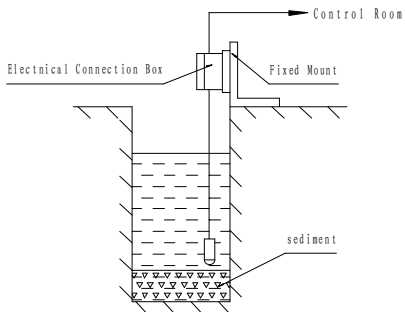


Fig. 6

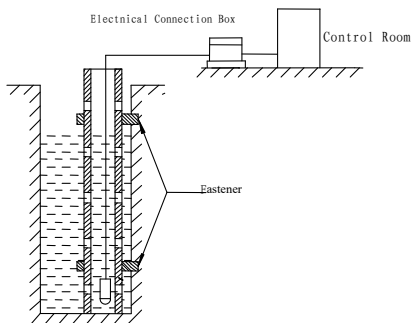


Fig. 7

6.2.2 Installation in Flowing Water (e.g. river channel, reservoir area, etc.)

The water-calming equipments are required.

Method one: Insert a steel tube in the water channel (see Fig. 8).

The steel tube wall should be thicker, and several holes should be made at different heights on the tube to damp waves and clear the water pressure influence.

Method two: Superficial burying is better in the sand and stone channel. (see Fig.9).

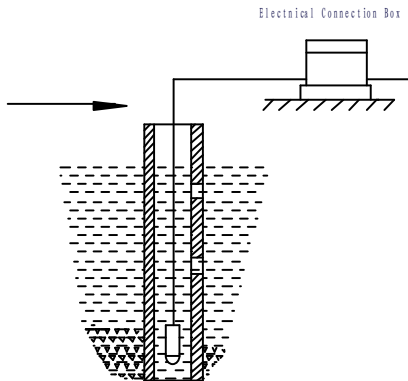


Fig. 8

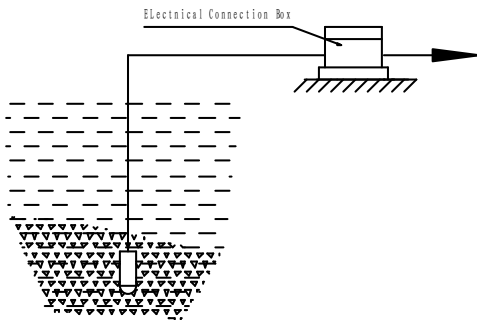


Fig. 9

Method three: see Fig. 10.

This method can not only clear water flowing pressure and wave influence, but also filter the sand and mud.

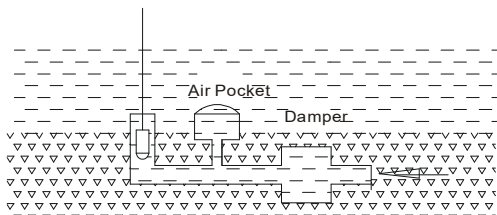


Fig. 10

6.3 Electrical Connection

Wires could be connected based on terminal definitions on production quality certificate. The specific method is to see following steps.

6.3.1 Electrical connection method

Electrical connection method of transmitter with Two-wire 4mA~20mA

DC output, to see Fig. 11. (Cable connection) Three-wire

0~5VDC/1~5VDC/0.5~4.5VDC output, to see Fig.12.(Cable connection)

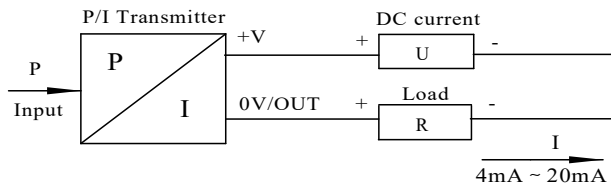


Fig. 11

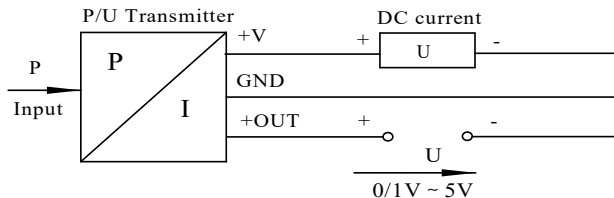


Fig. 12

The electric definitions of cable are as follow:

Cable	2-wire	3-wire
Red	+V	+V
Black	+OUT	+OUT
White	Null	GND

6.3.2 The Electrical Connection Method of Explosion Proof Version Transmitter

Intrinsically safe version explosion proof transmitters conform Standard GB3836.1 and GB3836.4, used for explosive condition. When electric is connecting, the transmitter and safe barrier should set up intrinsically safe explosion proof system.

The diffused inductance and capacity between the transmitter and safe barrier should be no more than 0mH and 0.044uF respectively. The safe barrier and excitation should be installed in safe area, and intrinsically

safe version transmitter and connection box should be put in dangerous area, besides the transmitter connected to the earth safely.

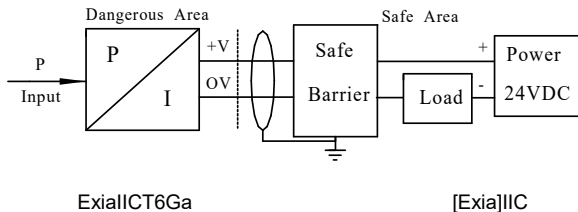


Fig. 13

Transmitter ex-proof parameter:

Safe barrier ex-proof parameter:

$U_i=28\text{VDC}$ $I_i=93/115\text{mADC(ATEX)mADC}$

$U_o=28\text{VDC}$

$L_i=0\text{mH}$ $C_i=0.0440/055\mu\text{F(ATEX)}$

$I_o=93/115\text{mA DC (ATEX)}$

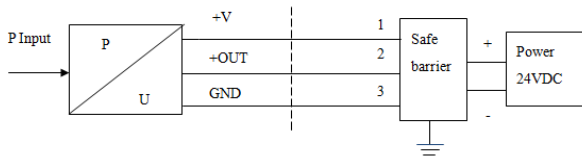
$P_i=0.65/0.66\text{W(ATEX)}$

$P_o=0.65/0.66\text{W(ATEX)}$

ATEX(3-wire):

Dangerous Area

Safe Area



Transmitter ex-proof parameter:

Safe barrier ex-proof parameter:

$U_i=26\text{VDC}$ $I_i=140\text{mADC}$

$U_o=26\text{VDC}$ $I_o=140\text{mADC}$

$L_i=0\text{mH}$ $C_i=0.055\mu\text{F}$ $P_i=0.66\text{W}$

$P_o=0.66\text{W}$

$U_i=15\text{VDC}$ $I_i=200\text{mA DC}$ $U_o=15\text{VDC}$ $I_o=200\text{mA DC}$
 $L_i=0\text{mH}$ $C_i=0.0451\mu\text{F}$ $P_i=0.75\text{W}$ $P_o=0.75\text{W}$

Fig. 14

The maximum diffused capacities of cable between the transmitter and safe barrier is $C_p = C_o - C_i$, and diffused inductance is $L_p = L_o - L_i$.

6.3.3 The electrical connection method of transmitter with junction box.

There is terminal block inside of the junction box. Please refer the definition of the electrical wiring connection as indicated .

6.4 The Reference Tube Installation

There is a plastic tube in the transmitter special cable; the back pressure cavity of gauge sensor is connected to atmosphere by this tube. In the process of installation and operation, be sure to keep the reference tube be well connected with the atmosphere. Mud or sand should not be jammed into the reference tube. Prevent water or other liquid going through the reference tube to destroy the transmitter.

6.5 Attentions

- a) Transmitter should be installed vertically downwards. When used in moving water, it must be noted that parallel to direction of the flow of water.
- b) There is a plastic tube (the reference tube) in the special transmitter cables to connect the atmosphere. In installation and operation, connect the reference tube with the atmosphere

unobstructed and prevent mud and sand stopping up the reference tube, especially water or other liquid. Otherwise, the transmitter would be destroyed.

- c) If the transmitter is mounted under thunder-lightning situation, we suggest having an additional lightning-arrester in the cables.

7 Operation, Maintenance and Fault Diagnosis

7.1 Operation

The customer could operate the transmitter without adjustment.

Please be sure that the installation and electrical connection are correct or not before operation.

Connect the excitation and operate.

The transmitter could work at once as soon as it is connected with excitation, but the output signal could be more reliable after 30 minutes.

7.2 Maintenance

MPM489W level transmitter does not need to be maintained regularly, but please pay attention to items as follow for better operating effect and reliability.

- a) Check wire connection is reliable or not, and the cable is broken and old or not.
- b) Clean the protection cap and diaphragm cavity periodically.
(take care!)
- c) Don't violently pull cables or poke the diaphragm with metal or

other hard objects.

7.3 Fault Diagnosis

MPM489W level transmitter is integrative full-sealed construction without movable parts inside, owning advantage of long-term stability and reliability.

If some failure occur, such as no output, output too big or too small and unreliable, please turn off the excitation firstly, then check the installation and wire connection conform with the operation manual or not, the excitation is correct or not and the reference tube is unobstructed or not.

If unsuccessful, the transmitter may be destroyed, please contact our company.

8 Responsibility

Within one year from the delivery date, we shall repair or replace the instrument with any quality fault caused by material parts or our manufacturing technique free of charge. For non-quality malfunction during user's operation, we are in charge of repair. The material cost and the shuttle transportation fees should be borne by users.

www.microsensorcorp.com



MICRO SENSOR CO.,LTD.

ADD:No. 18 Ying Da Road, Baoji City, Shaanxi Province
Tel: +86-(0)917-3600739/909
Fax:+86-(0)917-3609977
E-mail:sales@microsensor.cn