



KYDM Series
Magnetostrictive Liquid-Level Sensors
ModBus

Installation Manual

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1. Introduction

The **magnetostrictive flexible probe** use the magnetostrictive measurement technology to **report inventory levels in storage tanks**. The **flexible probe** satisfy the demand for a digital communication interface that offers the liquid level market unsurpassed flexibility to meet most process application conditions.

The magnetostrictive liquid level probe provide 3-in-1 measurement for liquid level, interface level and temperature measurements. And there is no scheduled maintenance or recalibration needed once the sensor is installed and calibrated.

The output of magnetostrictive flexible probe is through ModBus, which is communicated via a 4 wire multi-drop power and data bus (EIA485). Utilizing the Bus network eliminates the requirements for individual cable runs from each tank and this data format provides a direct interface to most types of computers and digital communication equipment.



Picture 01 Flexible probe

1.1 Features

- Non-contact sensing technology
- High accuracy, stability and reliability
- Linear, absolute measurement
- Good capability on anti-interference
- 1 to 3 levels, 1 to 5 temperatures measurement

1.2 Specification

Parameter type	Parameter																
Range	4000~20000mm (customized ranges available) Temperature: 1 to 5																
Output signal	ModBus RTU																
Accuracy	<table> <tr> <td>System Resolution</td> <td><4μm</td> </tr> <tr> <td>Non-Linearity</td> <td><\pm0.05%F.S. or \pm80μm</td> </tr> <tr> <td>Resolution</td> <td>< 4μm</td> </tr> <tr> <td>Repeatability</td> <td><\pm0.002%F.S. or \pm2.5μm min.</td> </tr> <tr> <td>Temperature coefficient</td> <td><0.007%F.S./ °C</td> </tr> <tr> <td>Hysteresis</td> <td>< 4μm</td> </tr> <tr> <td>Zero adjustment</td> <td>100%F.S.</td> </tr> <tr> <td>Temperature Accuracy</td> <td>\pm0.5 °C</td> </tr> </table>	System Resolution	<4 μ m	Non-Linearity	< \pm 0.05%F.S. or \pm 80 μ m	Resolution	< 4 μ m	Repeatability	< \pm 0.002%F.S. or \pm 2.5 μ m min.	Temperature coefficient	<0.007%F.S./ °C	Hysteresis	< 4 μ m	Zero adjustment	100%F.S.	Temperature Accuracy	\pm 0.5 °C
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Working conditions	<table> <tr> <td>Working temperature:</td> <td>-40 °C ~+85 °C</td> </tr> <tr> <td>Shock rating:</td> <td>100g, Single hit</td> </tr> <tr> <td>Vibration rating:</td> <td>15g/100~2000Hz</td> </tr> <tr> <td>EMC</td> <td></td> </tr> </table>	Working temperature:	-40 °C ~+85 °C	Shock rating:	100g, Single hit	Vibration rating:	15g/100~2000Hz	EMC									
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House material	<table> <tr> <td>Sensor head:</td> <td>Aluminum / 304SS</td> </tr> <tr> <td>Rod:</td> <td>304SS/316SS /perfluoroethylene-propylene (PTFE)</td> </tr> <tr> <td>Tube Pressure:</td> <td>depend on the float chose</td> </tr> </table>	Sensor head:	Aluminum / 304SS	Rod:	304SS/316SS /perfluoroethylene-propylene (PTFE)	Tube Pressure:	depend on the float chose										
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Electrical connection	<table> <tr> <td>Connection type:</td> <td>Integral cable / Connector (PLT-167P+R)</td> </tr> <tr> <td>Input voltage:</td> <td>+24VDC \pm 10%</td> </tr> <tr> <td>Current drain:</td> <td><40mA</td> </tr> <tr> <td>Electric strength:</td> <td>500V (DC ground to machine ground)</td> </tr> </table>	Connection type:	Integral cable / Connector (PLT-167P+R)	Input voltage:	+24VDC \pm 10%	Current drain:	<40mA	Electric strength:	500V (DC ground to machine ground)								
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Input voltage:	+24VDC \pm 10%																
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Storage Temperature	-40 °C ~ +100 °C																
Electronic Head Structure	Type A Electronic Head Type B Electronic Head																
Cable Connection Mode	Direct Cable Connection Connection Port Cable Connection (Side outlet) Aviation Plug Cable Connection																
Mounting Interface	Threaded Flange Connecting or special order																
Safety Approval	ExdIIBT5 / ExiaIIBT5																
Sealing	IP65 (IP67, IP68 if needed)																

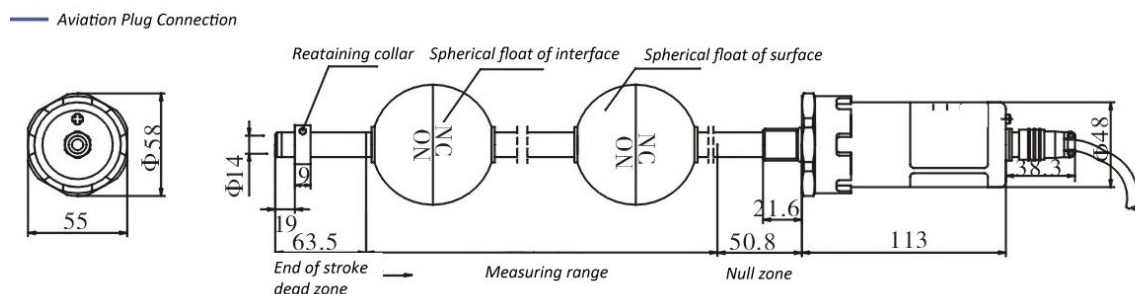
2. Installation

2.1 Notices Before Installation

It is strongly recommended reading this user manual and following the installation guidelines before installing sensor:

- Ensure the sensor mounting is kept away from noise of strong magnetic and electrical fields.
- The sensor can be operated in any position. Normally, the sensor is installed on the stationary part, while the float is mounted on the moving machine part. Ensure the moving direction of float is along the tube of sensor.
- Keep the minimum clearance between the float and the flange. Use non-magnetic screws to fix float onto the moving machine part. Sensor with over 1000 mm measuring stroke may require mechanical supports. Refer to the figures below.
- To avoid scratching the sensor tube by the moving float, the float and the sensor tube should be carefully mounted in parallel.
- The maximum pressure inside of the sensor tube permitted is 340bar.
- The bore size in the piston rod and type of sealing depend on the cylinder structure with respect to different hydraulic pressure and piston velocity. The Min.13 mm bore diameter and O-rings or copper gaskets are recommended for sealing.

2.2 Structure Dimension



Picture 02

Notes:

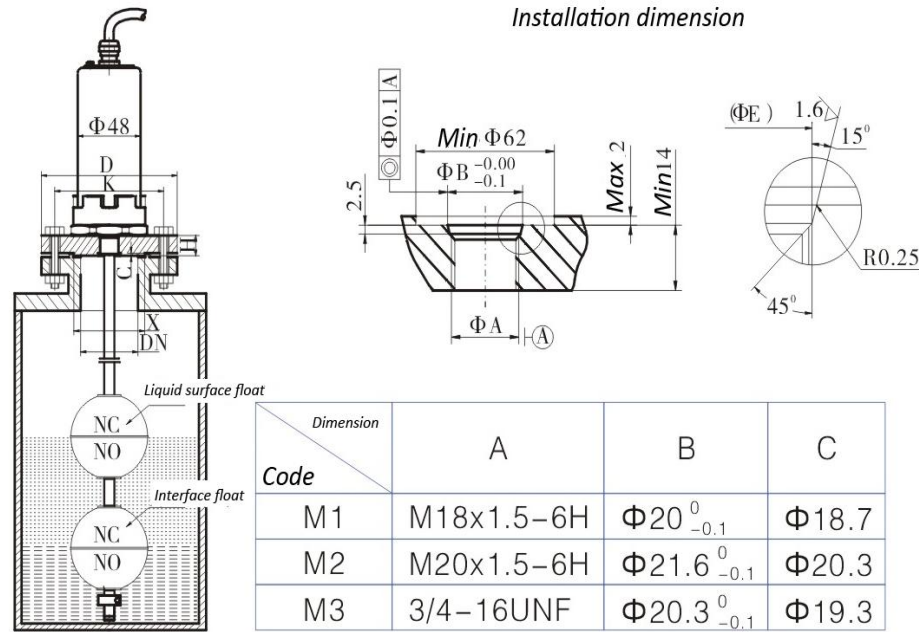
1. The material of sensor heads is aluminum for Cable connection and Aviation

plug connection product, and stainless steel for Terminal connection and flameproof product, respectively.

2. Type A Electronic Head structure is suitable for the range over 3000mm.

2.3 Mounting Method

Suitable for measure all tanks with flange or special flange (customer supplies).



Picture 03

Mounting Kit List			
NAME	Qty.		
	FK-1	FK-2	FK-3
Locknut	1		
Sensor bracket	1		
Turnbuckle		1	1
Union Joint			1
Taper Bush			1
Housing Screw			1

Accessory Kit List	
NAME	Qty.
Float	1 [*]
Locking Collar	1
Hexagon Screw	1
Hexagon Wrench	1
Screwdriver	1

Note: ^{*} number of float depends on the order.

3. Connection & Adjustment Method

3.1 Wiring Guide

Recommend to read the operation manual of Interface Card or Display Controller (PLC) in detail before connecting the system.

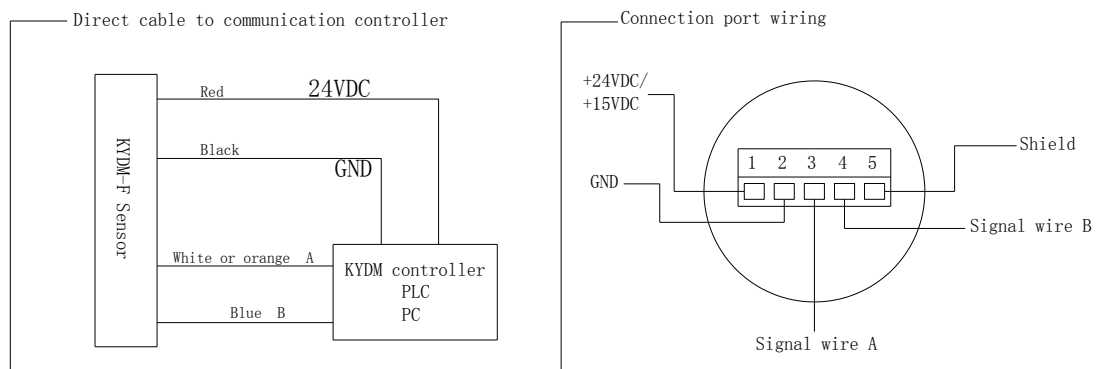
CAUTION: Device must be power off before wiring.

ATTENTION:

1. It is recommended that each sensor should be supplied by single power (at least 150mA loading current) that complies with the requirements of the product.
2. Avoid running the sensor shield cable near high voltage power cables (e.g. drive cables), RF signal source, any capacitive or inductive noise source such as motors, relays and switching devices or other noise transmission cables.
3. Shield cables must remain integrity all the time, and connect with the Ground of follow-up equipment.

Table 1.

Wire Color	Function
Red	+24VDC
Black	GND
White/Orange	Signal A
Blue	Signal B
	SHIELD



Picture 04

3.2 Adjustment

Adjustment is necessary before sensor gets to work. The connection and adjustment methods are different due to variant output receiver devices customer supplied. Carefully reading the followings before adjustment:

1. Confirm that the DC voltage provided is the same as the required working voltage of the sensor before turning on;
2. Make sure correct wiring ;
3. During adjustment, ensure power off all devices in dangerous area.

Recommend to read the operation manual of Interface Card or Display Controller in detail before adjusting, to ensure complying with the sensor output mode.

4. Q & A

Symptom	Possible Cause	Action
Unstable output	Mismatched system components	Change to the latest components
	Ground loops/improper grounding	Route ground again reference grounding
	Incorrect receiver device or software	Confirm and change device or update the software to the latest version
	Improper power supply/power connection	Check and change power
	Improper wiring	Refer to wiring guide
	Improper magnet mounting	Refer to assembling method
	EMI noise, affecting sensor or sensor cable	Confirm and keep away from the EMI sources
	Circuit fault within sensor	Return for repairing
No communication with sensor	No power	Check voltage at sensor
	Wiring incorrect	Refer to wiring guide
Missing magnet error	Float is not recognized	Confirm that the float is attached
	Float is in the dead zone	Raise float to see if the error stops
	Wrong number of floats selected	Confirm that the number of floats on the sensor and the number of floats the sensor is attempting to verify are the same.

Service:

- Detailed product information can be downloaded from our website. Our skilled technicians and engineers can provide support if necessary.
- We warrant title to the product sold hereunder and that within 1 year from delivery which conforms to the specifications and is free from defects in quality.

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