米朗 MIRAN®

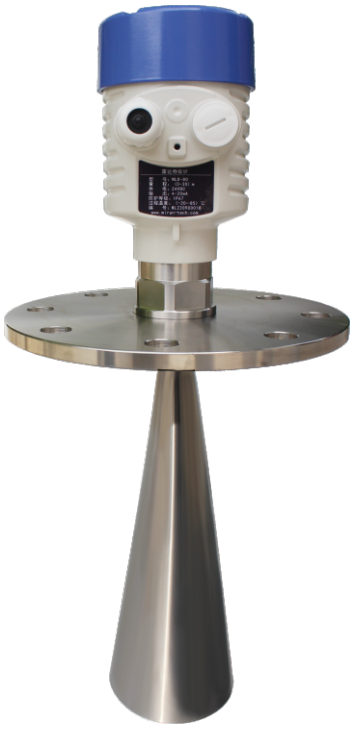
中国工信部高精度传感器一条龙应用计划示范项目

国家级专精特新“小巨人”企业，国家级高新技术企业

中国工业强基重点产品，中国工信部传感器一条龙应用计划示范企业

高频雷达式物位计

High frequency radar level meter



26GHZ雷达物位计
26GHZ radar level meter



26GHZ雷达物位计
26GHZ radar level meter





80GHZ雷达物位计
80GHZ radar level meter

MLD系列高频雷达式物位计

MLD Series High Frequency Tilt Angle Sensor

- Demonstration project of one-stop application plan for high-precision sensors of Ministry of Industry and Information Technology of China
- National level specialized and special new "little giant" enterprise, national level high-tech enterprise
- Key products of strong industrial base in China, demonstration enterprise of sensor one-stop application plan of Ministry of Industry and Information Technology of China

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MLD系列高频雷达式物位计
MLD Series High-frequency Radar Level Meter

产品实物图Product Physical Drawing

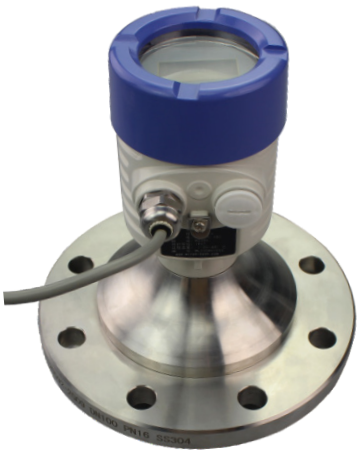
MLD-30M 80GHZ雷达物位计
MLD-30M 80GHZ radar level meter





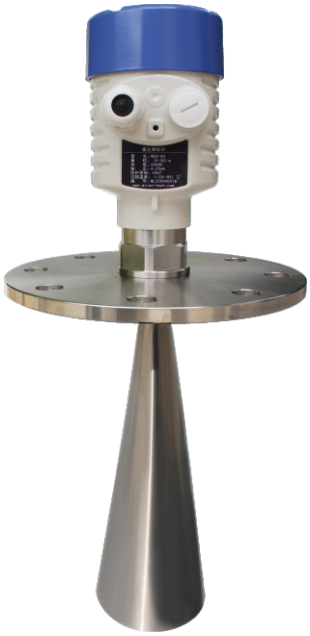
MLD-40M 80GHZ雷达物位计
MLD-40M 80GHZ radar level meter







MLD-30M 26GHZ雷达物位计
MLD-30M 26GHZ radar level meter





产品概述Product Overview

MLD-30M系列传感器是26GHz高频雷达式物位测量计，测量距离可达30米。MLD-40M系列传感器则是80GHz高频雷达式物位测量计，测量距离可达40米。如需更长的测量距离，可以联系我们定制。雷达物位计的天线被进一步优化处理，新型快速的微处理器可以进行更高速率的信号分析处理，雷达物位计可用于河道、湖泊、浅滩、固体料、过程容器或强粉尘、易结晶/露场合反应釜等一些复杂的测量条件。

The MLD-30M series sensor is a 26GHz high-frequency radar level measuring instrument with a measuring distance of up to 30 meters. The MLD-40M series sensors are 80GHz high-frequency radar level measuring instruments with a measuring distance of up to 40 meters. If you need a longer measuring distance, you can contact us for customization. The antenna of the radar level sensor is further optimized, the new fast microprocessor can carry out higher rate signal analysis and processing, and the radar level sensor can be used for some complex measurement conditions such as rivers, lakes, shoals, solid materials, process vessels or strong dust, easy to crystallize/dew reactors, etc.

雷达物位天线发射较窄的微波脉冲，经天线向下传输。微波接触到被测介质表面后被反射回来再次被天线系统接收，将信号传输给电子线路部分自动转换成物位信号（因为微波传播速度极快，电磁波到达目标并经反射返回接收器这一来回所用的时间几乎是瞬间的）。采用先进的微处理器和独特的回波处理技术，雷达物位计可以应用于各种复杂工况；采用脉冲工作方式，雷达物位计发射功率极低，可安装于各种金属、非金属容器内，对人体及环境均无伤害。

The radar level antenna transmits narrow microwave pulses, which are transmitted downward through the antenna. After contacting the surface of the measured medium, the microwaves are reflected back to the antenna system, which transmits the signals to the electronic circuitry for automatic conversion into level signals (since microwaves propagate very fast, the time taken for the electromagnetic waves to reach the target and to be reflected back to the receiver is essentially instantaneous). Using advanced microprocessor and unique echo processing technology, the radar level meter can be applied to various complex conditions. Using pulse operation mode, the radar level meter emits very low power, and can be installed in various metallic and non-metallic containers, which is harmless to human body and the environment.

产品型号选型Product Model Selection

MLD - □ / □m - □ - □ - □

MLD	□	□m	□	□	□
米朗科技雷达物位计 miran technology radar level meter	频率:26GHz frequency:26GHz	行程:0-30m stroke:0-30m	R:RS485 R:RS485	H:数显表头 H:Digital Panel Meter	L:L型支架安装 L:L-bracket mounting
	频率:80GHz frequency:80GHz	行程:0-80m(限80GHz) stroke:0-80m(limit 80GHz)	A:4-20mA输出 A:4-20mA output	W:无线数显表头 W:Wireless Digital Panel Meter	F:法兰式安装 F:Flange Mounting
		行程:0-100m(限80GHz) stroke:0-80m(limit 80GHz)			
		(所有行程均可任意定制) (All travels can be customized arbitrarily)			

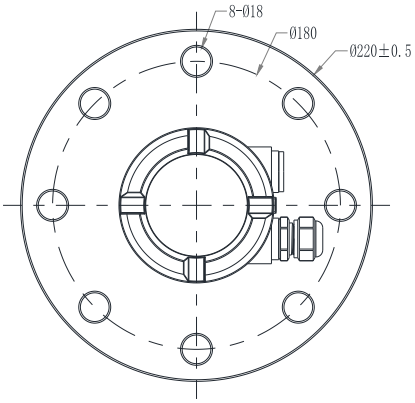
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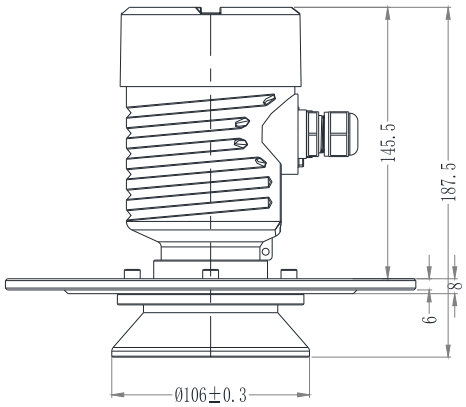
MLD-26/30M-R-H-L：米朗科技雷达物位计，行程为30M，发射频率为26GHZ，RS485信号输出,数显表头及L型支架安装。

MLD-26/30M-R-H-L: Miran technology radar level gauge, with a range of 30M, a transmitting frequency of 26 GHz, and an RS485 signal output , with digital panel meter and L-bracket mounting.

产品尺寸图Product Dimension Drawing

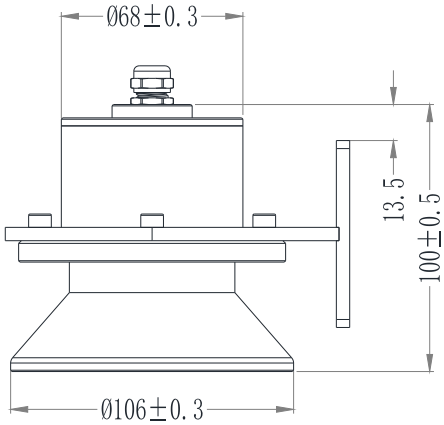
MLD-30M 80GHZ雷达物位计radar level meter
法兰盘安装(默认) flange mounting (default)



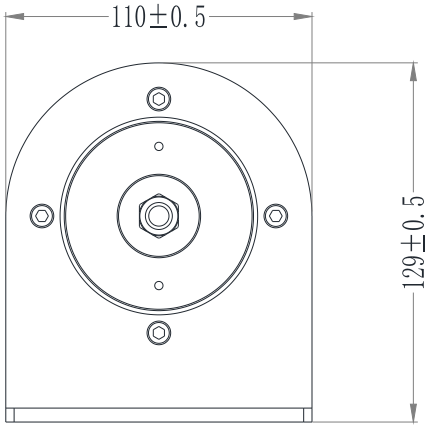


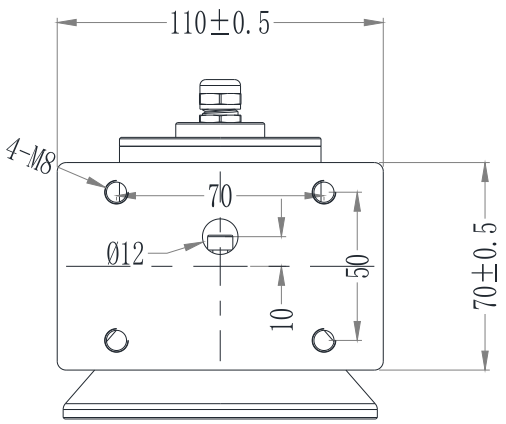


MLD-30M 80GHZ雷达物位计液位计radar level meter
支架安装(可选) bracket mounting (optional)

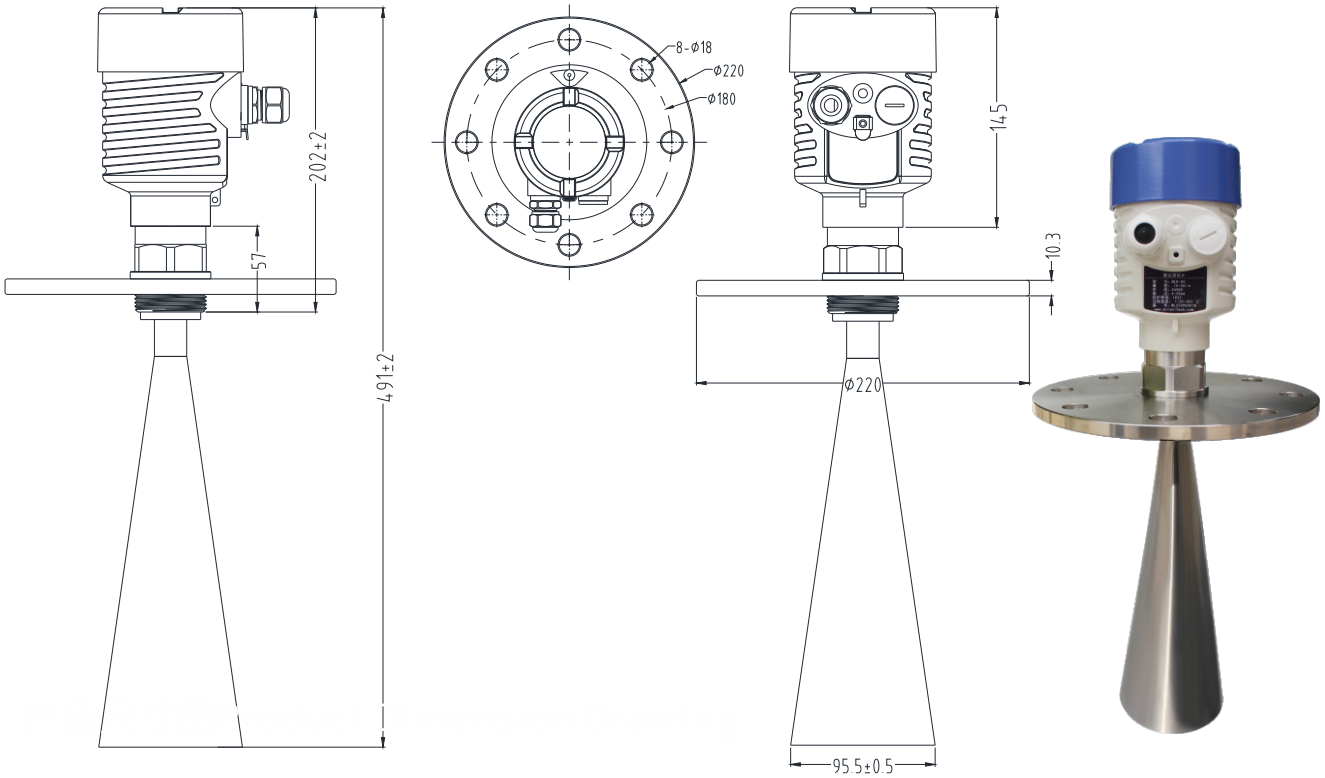




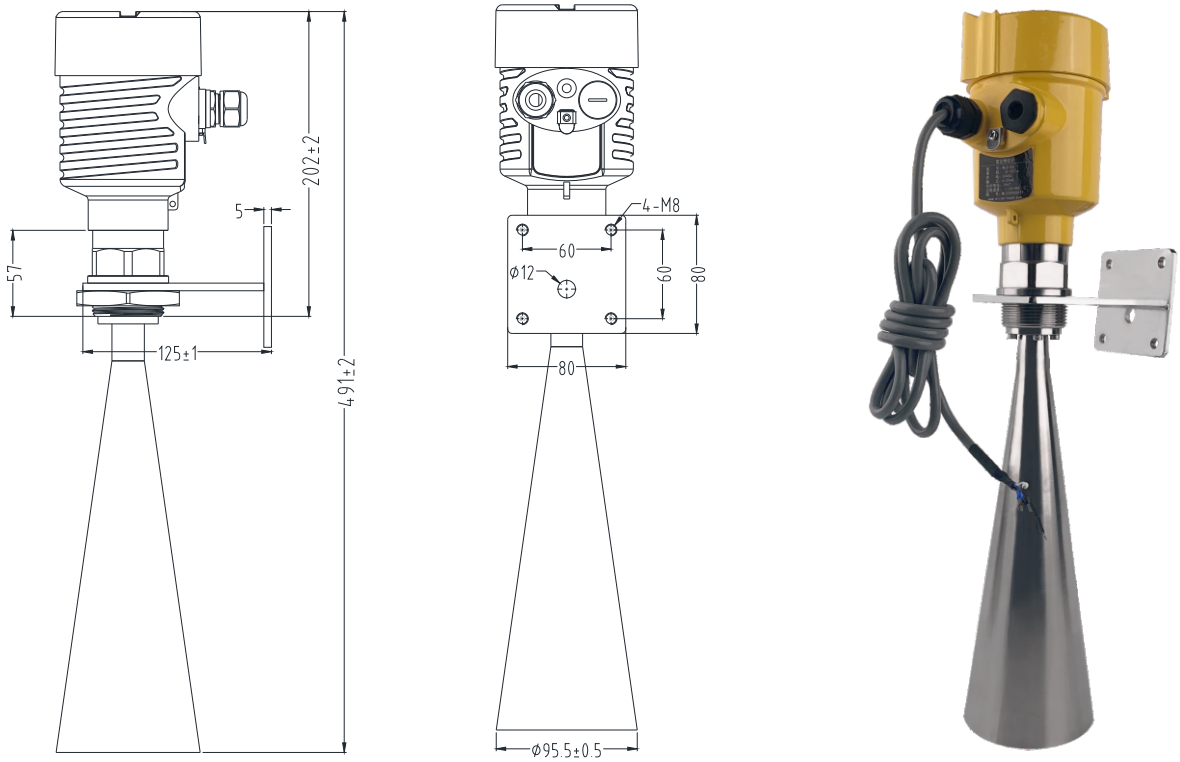




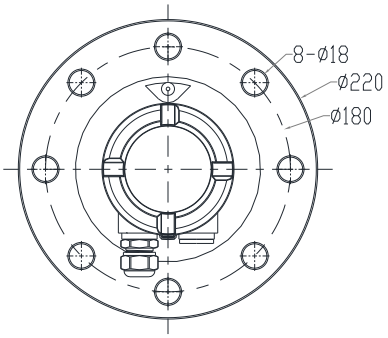
MLD-30M 26GHZ雷达物位计radar level meter
法兰盘安装（默认）flange mounting (default)

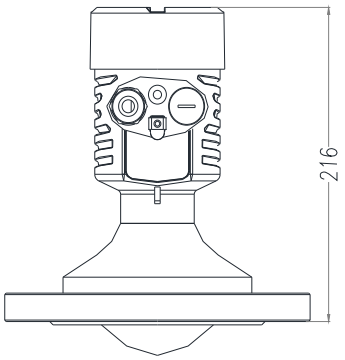


MLD-30M 26GHZ雷达物位计radar level meter
支架安装（可选）bracket mounting (optional)



MLD-40M 80GHZ雷达物位计radar level meter







产品特点Product Features

1、天线尺寸小，便于安装；非接触雷达，无磨损，无污染。

1、Small antenna size, easy to install; non-contact radar, no wear and tear, no pollution.

2、几乎不受腐蚀、泡沫影响；几乎不受大气中水蒸气、温度和压力变化影响。

2、Virtually unaffected by corrosion and foam; Virtually unaffected by water vapor, temperature. and pressure changes in the atmosphere.

3、严重粉尘环境对高频物位计工作影响不大。

3、Severe dusty environment has little effect on the work of high frequency level meter.

4、波长更短，对在倾斜的固体表面有更好的反射。

4、Shorter wavelength, better reflection on solid surfaces at an incline.

5、波束角小，能量集中，增强了回波能力的同时又有利于避开干扰物。

5、The beam angle is small, the energy is concentrated, which enhances the echo capability and at the same time is conducive to avoiding interfering objects.

6、测量盲区更小，对于小罐测量也会取得良好的效果。

6、The measurement of the blind spot is smaller, for small tank measurement will also achieve good results.

7、高信噪比，即使在波动的情况下也能获得更优的性能。

7、High signal-to-noise ratio, even in the case of fluctuations can also obtain better performance.

8、高频率，是测量固体和低介电常数介质的首要选择。

8、High frequency, is the primary choice for measuring solids and low dielectric constant media.

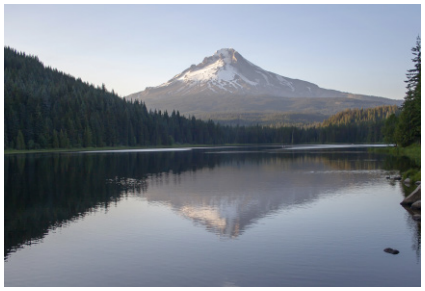
9、温度补偿，实时监测电子仓内温度，自动补偿温飘系数。

9、Temperature compensation, real-time monitoring of the temperature in the electronic. compartment, automatic compensation for temperature fluctuation coefficient.

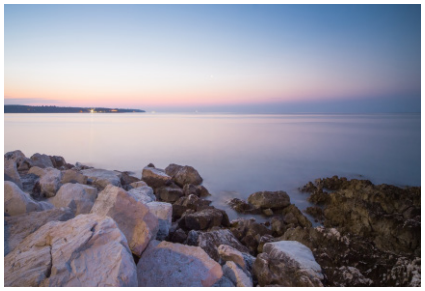
应用领域Application Areas



• 河道
course of a river



• 湖泊
lochs



• 浅滩
Shallows



• 固体料
Solids



• 过程容器
process container



• 强粉尘
Heavy dust



• 易结晶场合
Easy to crystallize



• 露场合
Reveal one's position

• • •

雷达物位计可以应用于各种复杂工况，采用先进的微处理器和独特的回波处理技术；采用脉冲工作方式，雷达物位计发射功率极低，可安装于各种金属、非金属容器内，对人体及环境均无伤害。

Radar level meter can be applied in various complex working conditions, using advanced microprocessor and unique echo processing technology;Adopting pulse working mode, the radar level meter transmits very low power, which can be installed in all kinds of metal and non-metal containers, and is harmless to human body and environment.

性能参数Performance Parameters

性能指标Performance indicators

80GHz雷达物位计液位计 80GHZ Radar Level Meter			
发射频率 Frequency Of Emission	60-80GHz	扫描频率 Scanning Frequency	
测量范围 Measurement range	30m，(100m)	近端盲区 Near-end Blind Spot	50mm
分辨率 Resolution	0.5mm	精度 Accurate	±5mm
天线波束 Antennae Beam	3°	过程压力 Process Pressure	
电缆接口 Cable connector	M20×1.5	防爆等级 Explosion-proofGrade	
天线类型 Antenna Type	聚四氟乙烯材料 透镜天线 PTFE materiallens antenna		
信号输出 Signal Output	Rs485 4-20mA		
过程温度 Process Temperature	-40-85°C(适用于法兰盘发射雷达波的工作面) -40~85"C(for working surfaces where flanges emit radar waves		
环境温度 Environmental Temperature	-40-85°C,<95%RH		
现场操作 On-site Operation	PC端软件/4按键面板配置/手机app和微信小程序/罐旁表 PC-basedsoftware/4-button panel configuration /mobile app and WeChat applet/lankside meter		
通讯协议 Communication Protocols	MODBUS		
故障输出 Fault Output	22mA或4mA/20.5mA(可设置) 22mA or 4mA/20.5mA(settable)		
现场显示 On-site Display	160x80点阵式黑白LCD显示器/带背光显示 160x80 dot-mal k and white LCD display/wih backlighting		

性能参数Performance Parameters

性能指标Performance indicators

80GHZ雷达物位计 80GHZ Radar Level Meter			
发射频率 Frequency Of Emission	76.2 - 80.2GHz	扫描频率 Scanning Frequency	4GHz
测量范围 Measurement range	0.1m-40m	近端盲区 Near-end Blind Spot	50mm
分辨率 Resolution	0.5mm	精度 Accurate	±5mm
天线波束 Antennae Beam	3°	过程压力 Process Pressure	-1 ~ 3MPa
电缆接口 Cable Connector	M20x1.5	防爆等级 Explosion-proof Grade	CNEX: Ex ia llC T6 Ga
天线类型 Antenna Type	PEEK材料 透镜天线 PEEK material lens antenna		
信号输出 Signal Output	4-20mA, HART5(标准配置) /或 HART7 4-20mA, HART5 (standard) /or HART7		
过程连接 Process Connection	DN100		
过程温度 Process Temperature	-40~150°C (适用于法兰盘发射雷达波的工作面) -40~150°C (for working surfaces where flanges emit radar waves)		
环境温度 Environmental Temperature	-40~85°C, ≤95%RH		
现场操作 On-site Operation	PC端软件/4按键面板配置/手机app和微信小程序/罐旁表 PC-based software / 4-button panel configuration / mobile app and WeChat applet / tankside meter		
通讯协议 Communication Protocols	HART/MODBUS /PROFIBUS (可选selectable)		
故障输出 Fault Output	22mA 或 4mA/20.5mA (可设置) 22mA or 4mA/20.5mA (settable)		
现场显示 On-site Display	160x80 点阵式黑白LCD显示器/带背光显示 160x80 dot-matrix black and white LCD display/with backlighting		
外壳材质 Shell Material	铝合金单腔或双腔 Aluminum single or double cavity		
天线类型 Antenna type	PEEK材料 透镜天线 PEEK material lens antenna		

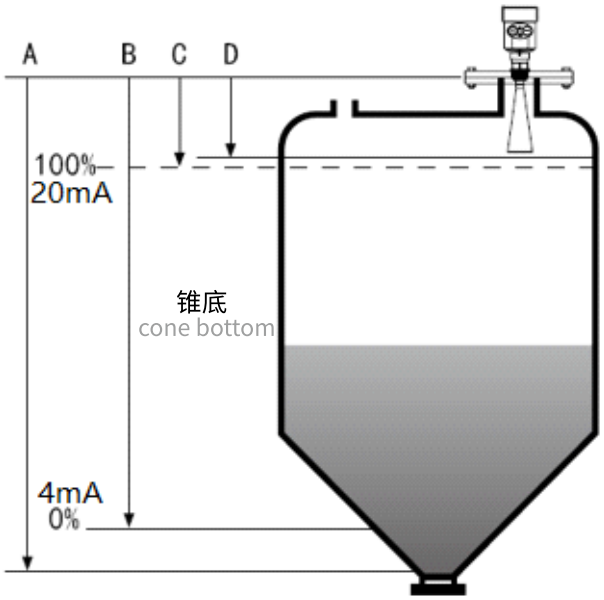
性能参数Performance Parameters

性能指标Performance indicators

26GHZ雷达物位计 26GHZ Radar Level Meter			
测量范围 Measuring Range	0.6m-30m 0.6m-30m	过程连接 Process Connection	螺纹/支架/法兰 threaded/bracket/flange
过程温度 Process Temperature	-40~85°C	过程压力 Process Pressure	常压 atmospheric
防护等级 Protection Class	IP67	频率范围 Frequency Range	26GHZ
近端盲区 Near-end Blind Spot	600mm	现场显示 On-site Display	可选(显示器) optional (monitor)
外壳 Housings	铝/304不锈钢 aluminum/304 stainless steel		
精度 Accurate	±5mm(量程10m);±10mm(量程30m) ±5mm (range 10m); ±10mm (range 30m)		
供电电源 Power Supply	DC(12-24V)四线制/DC 24V二线制 DC (12-24V) 4-wire / DC 24V 2-wire		
信号输出 Signal Output	Modbus RTU协议(12~24V DC)或4-20mA/Hart两线(24V DC) Modbus RTU protocol (12~24V DC) or 4-20mA/Hart 2-wire (24V DC)		

安装要求Installation Requirements

参数图示说明Parameter illustration

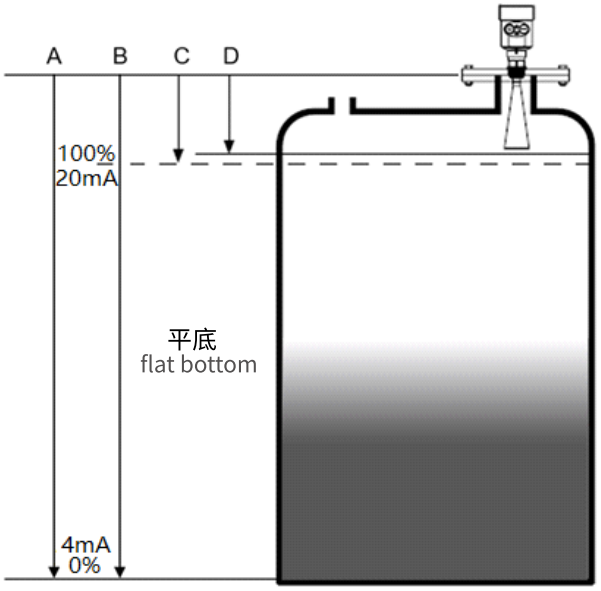


A 量程设定 Scale Setting

B 低位调整 Low Level Adjustment

C 高位调整 Highs Adjust

D 盲区范围 Blind Spot Range



A 量程设定 Scale Setting

B 低位调整 Low Level Adjustment

C 高位调整 Highs Adjust

D 盲区范围 Blind Spot Range

注：测量的基准面是：螺纹底面或法兰的密封面。

Note: The reference surface for measurement is: the bottom surface of the thread or the sealing surface of the flange.

使用雷达物位计时，务必保证最高料位不能进入测量盲区（图中D所示区域）。

When using a radar level meter, make sure that the highest level does not enter the measurement blind zone (area shown in D in the diagram).

量程参数设置时，务必包括现场罐体锥形部分高度（参考图中A所示）。

When setting the range parameter, be sure to include the height of the conical part of the tank on site (refer to A in the diagram).

安装位置Mounting position

安装在直径的1/4处或1/6处。

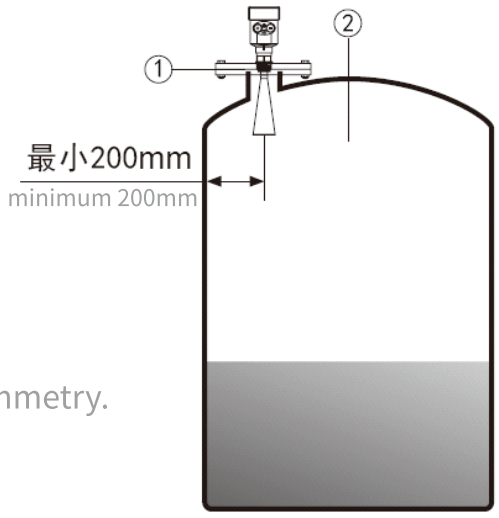
Install at 1/4 or 1/6 of the diameter.

注：距离罐壁最小距离应为200mm。

Note: The minimum distance from the tank wall should be 200mm.

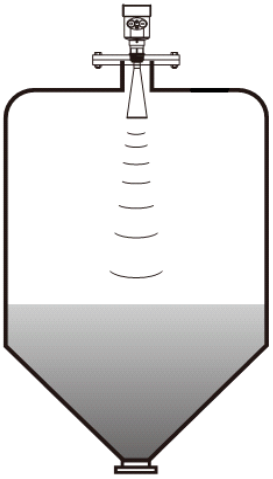
注：①基准面　②容器中央或对称轴。

Note: ①datum plane ②center of container or axis of symmetry.



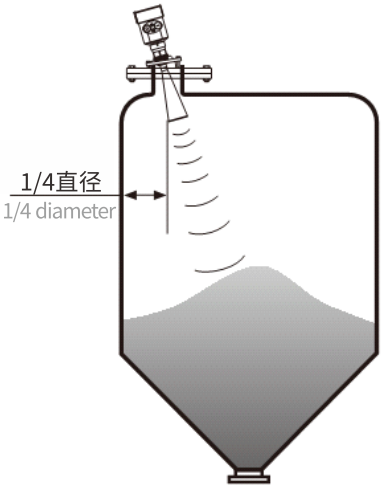
1.锥形罐顶部平面，可装在罐顶正中间，可保证测量到锥形底部。

1. Flat top of conical tank, fits right in the middle ofthe tank top and measurement to the bottom of the cone is guaranteed.



2.有料堆时天线要垂直对准料面。若料面不平，堆角大必须使用万向法兰来调整喇叭角度使喇叭尽量对准料面。(由于倾斜的固体表面会造成回波衰减，甚至丢失信号的问题)。

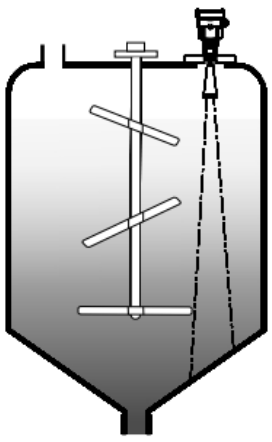
2. When there is a pile of material, the antenna should be aligned vertically with the material surface. If the material surface is not flat and the pile angle is large, you must use a universal flange to adjust the horn angle so that the horn is aligned with the material surface as much as possible. (due to the inclined solid surface will cause echo attenuation, or even loss of signal problem).



3.搅 拌mix:

当罐中有搅拌，必要时仪表尽量远离搅拌器。安装后要在搅拌状态下进行“虚假回波学习”，以消除搅拌叶片所产生的虚假回波影响。若由于搅拌产生泡沫或翻起波浪，则应使用导波管安装方式。

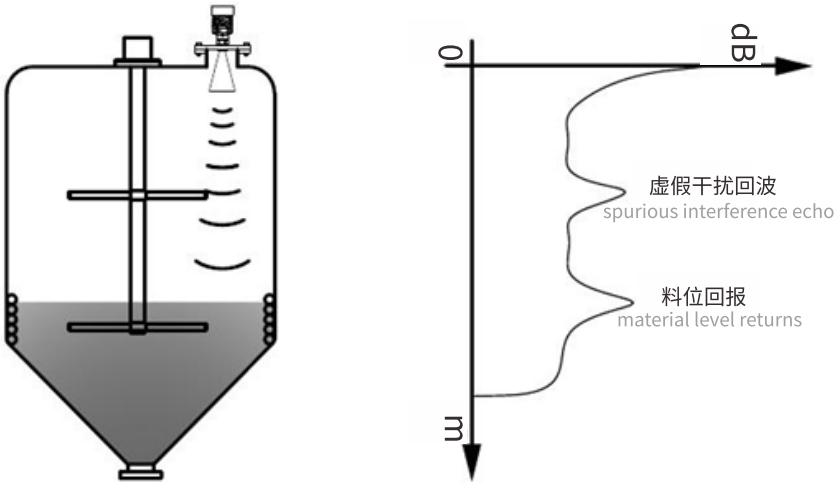
When there is agitation in the tank, keep the meter as far away from the agitator as possible if necessary. After installation, perform a “false echo study” under agitation to eliminate the effects of false echoes generated by the agitation blades. If foam or waves are generated by the agitation, the waveguide installation should be used.



4.虚假回波存储spurious echo storage:

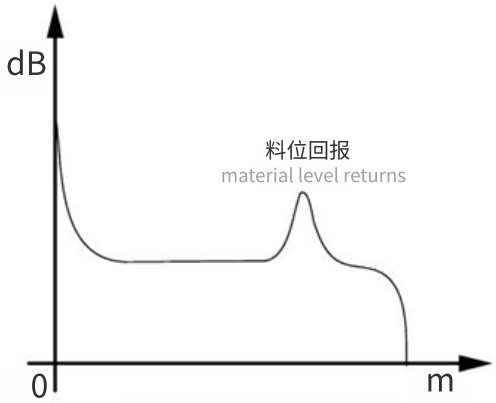
当罐内有搅拌桨对雷达测量造成干扰，如果不能避开搅拌桨，则需要进行虚假回波存储消除假波产生的干扰信号。

When there are agitator paddles in the tank that interfere with the radar measurement, false echo storage is required if the agitator paddles cannot be avoided.storage is required to eliminate the interference signal generated by the false wave.

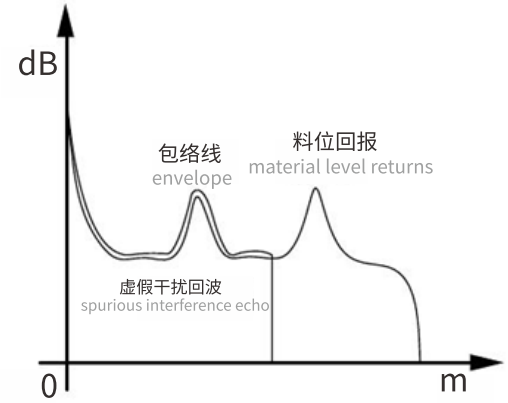


5.若想得到正常的物位回波，虚假回波存储可以把下图中包络线之间的回波信号存储起来定义为虚假信号，从而得到正常的物位回波信号。

If you want to get the normal level echo, the false echo storage can store the echo signal between the envelopes in the following figureThe false echo storage can store the echo signals between the envelopes in the figure below and define them as false signals, so as to get the normal level echo signals.



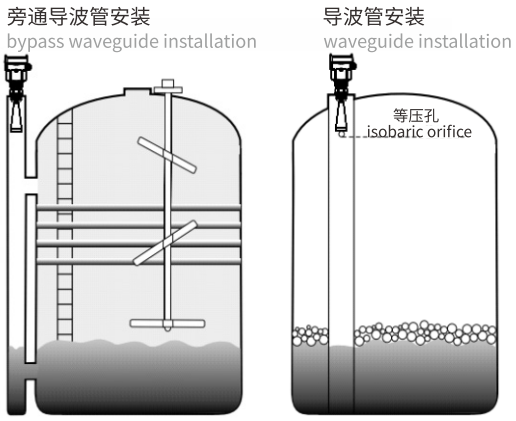
正常的物料回波曲线图
normal material echo curve



虚假回波存储功能可消除障碍产生的干扰
false echo storage function eliminates interference from obstacles

6.导波管安装waveguide installation:

使用导波管安装(导波管或旁通管),可以避免容器内障碍物、泡沫对测量的影响。由于入料、搅拌或容器内其他过程处理,会在某些液体介质表面形成泡沫,衰减信号。如果泡沫造成测量误差,您应该将传感器安装在导波管内,或使用导波达物位计。在导波管内进行测量,导波管的直径最小50mm。在连接导波管的时候,防止大的裂缝和焊缝。另外,必要时进行“虚假回波学习”。



The use of a waveguide installation (waveguide or bypass tube) avoids the influence of obstacles and foam in the vessel on the measurement. Foam can form on the surface of some liquid media due to feeding, stirring or other process handling in the vessel, attenuating the signal. If foam causes measurement errors, you should mount the sensor inside a waveguide tube or use a waveguide level meter. For measurements inside the waveguide, the minimum diameter of the waveguide is 50 mm. when connecting the waveguide, prevent large cracks and welds. Also, perform “false echo learning” if necessary.

注: 测量粘附性介质的时候,不能使用导波管安装。

Note: When measuring adhesive media, waveguide installation is not possible.

对波导管的设计要求
Design requirements for waveguide

1.金属材质,管内侧光滑;

1.Made of metal, the inside of the tube is smooth;

2.优选拉伸的或有纵向焊缝的不锈钢管;

2.Preferably stretched or stainless steel tubes with longitudinal welds;

3.焊缝必须尽可能平整,且与孔同轴;

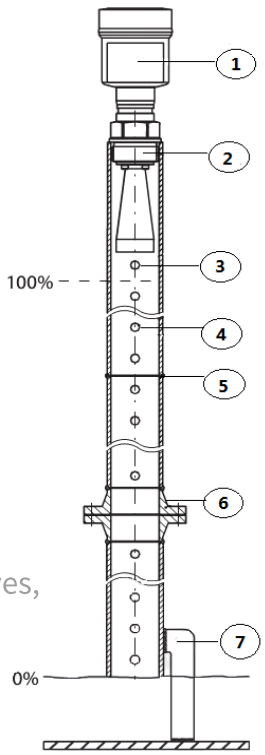
3.The weld must be as flat as possible and coaxial to the hole;

4.在用预焊接的法兰或套管进行延长以及在使用球阀时,必须将过渡管在内侧对齐并在精确匹配后加以固定;

4.When extending with pre-welded flanges or sleeves and when using ball valves, thetransition pipe aligned on the inside and secured after exact matching;

5.过渡管上的缝隙≤0.1mm;

5.The gap on the transition pipe is ≤ 0.1mm;



6.不得沿着管壁焊接。波导管的内壁必须保持平滑。如果不小心焊到内侧，应除净由此产生的不平整处和焊道，否则会带来严重的干扰回波，从而给介质的附着带来方便；

6. Must not be welded along the pipe wall. The inner wall of the waveguide must be kept smooth. If accidentally welded to the inside, the resulting unevenness and weld channel should be removed, otherwise severe interference echoes will be introduced, thus facilitating the attachment of the medium;

7.波导管必须至少到达所希望的最低充填高度，因为测量只能在管内进行；

7. The waveguide must reach at least the desired minimum filling height, as measurements can only be made inside the tube;

8.孔径≤5mm，数量任意，单面或全通；

8.Hole diameter ≤ 5mm, any number, single-sided or full-pass;

9.传感器的天线直径应尽可能与管子内径一致；

9.The antenna diameter of the sensor should be as close as possible to the inside diameter of the pipe;

10.在整个长度上，直径应保持一致；

10.The diameter should be consistent throughout the length;

①雷达传感器 ②仪表上的螺纹或法兰 ③排气孔 ④等压孔 ⑤焊缝 ⑥带颈对焊法兰 ⑦波峰管的固定

①radar sensor ②thread or flange on the instrument ③exhaust hole ④equal pressure hole ⑤weld seam ⑥butt-welding flange with neck ⑦fixing of wave pipe

典型的错误安装
Typical incorrect installation

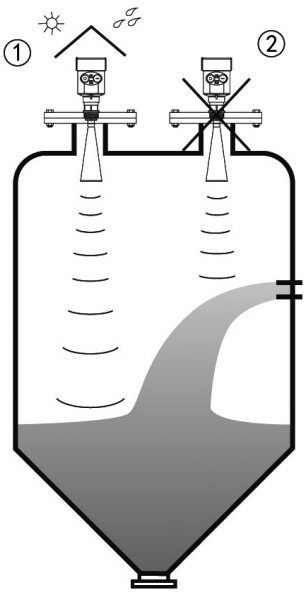
1.锥形罐不能安装在入料口的上方。

1.The conical tank cannot be installed above the inlet.

同时注意：室外安装时应采取遮阳、防雨措施。

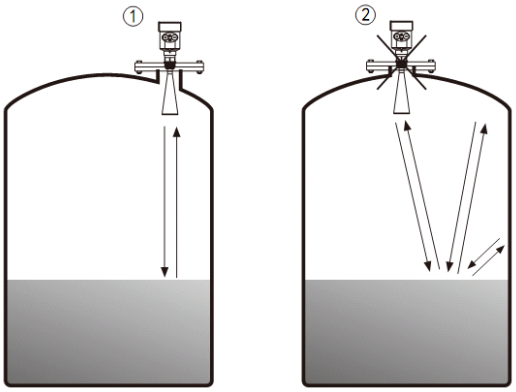
Also note: shading and rain protection measures should be taken for outdoor installation.

①正确correct ②错误incorrect



2.仪表不能安装在拱形或圆形罐顶中间。除了会产生间接回波还会受到多次回波的影响。多次回波可能比真正回波的信号阀值还大，因为通过顶部可集中多个回波。所以不能安装在中心位置。

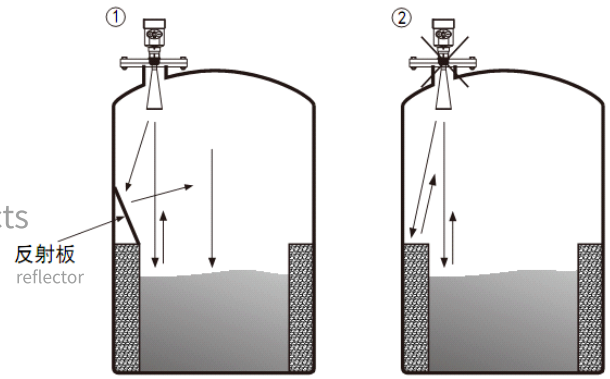
2. The meter cannot be installed in the middle of an arched or rounded tank roof. In addition to generating indirect echoes, they are also affected by multiple echoes. Multiple echoes may have a larger signal threshold than true echoes because multiple echoes can be focused through the top. Therefore, it cannot be installed in the center.



①正确correct　　②错误incorrect

3.当罐中有障碍物影响测量时，要加装反射板才能正常测量。

3.When there is an obstacle in the tank that affects the measurement, a reflective plate has to be added for normal measurement.



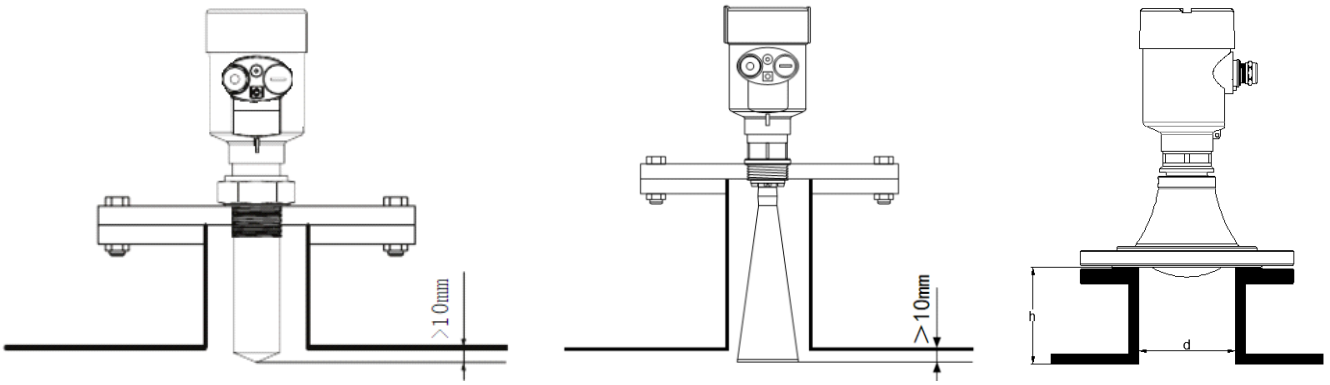
①正确correct　　②错误incorrect

把障碍信号折射走
refracts obstruction signals away

接管高度要求
Typical incorrect installation

必须保证天线伸入到罐里至少10mm的距离。
It must be ensured that the antenna extends at least 10 mm into the tank.

d	h
80mm (3″)	150mm
100mm (4″)	300mm
150mm (6″)	500mm



电气连接Electrical Connection

4-20mA (2线制)电流输出 (2-wire) current output	棕色 BROWN	红色 RED		黑色 BLACK		屏蔽线 SHIELDED WIRE			
	电源正 power positive DC12~24V			输出 exports		GND			

RS485 数字信号输出 digital signal output	棕色 BROWN	红色 RED		黑色 BLACK		蓝色 BLUE	绿色 GREEN	白色 WHITE	屏蔽线 SHIELDED WIRE
	电源正 power positive DC12~24V			电源负 power negative		RS485 A		RS485-	GND

以上仅为参考，具体接线定义以产品实物标签上的标注为准
The above is for reference only, the specific wiring definition of the product physical labeling shall prevail

供电电压supply voltage

1.电缆要求cable requirements：

供电电缆可使用普通两芯电缆，电缆外径应为(8～12)mm，以确保电缆口的密封。如果存在电磁干扰，建议使用屏蔽电缆。

The supply cable can be an ordinary two-core cable, and the outer diameter of the cable should be (8 to 12) mm to ensure the sealing of the cable entrance. If electromagnetic interference exists, it is recommended to use shielded cables.

2.(4～20) mA/HART（两线制two-wire）：

供电电源和输出电流信号共用一根两芯屏蔽电缆线。具体供电电压范围参见技术数据。对于本安型须在供电电源与仪表之间加一个安全栅。

The power supply and the output current signal share a common two-core shielded cable. See the technical data for the specific voltage range of the power supply. For intrinsically safe models, a safety barrier must be added between the power supply and the instrument.

3.(4～20) mA/HART（四线制four-wire）：

供电电源和电流信号分开，各自分别使用一根两芯屏蔽电缆线。具体供电电压范围参见技术数据。

The power supply and the current signal are separated by a two-core shielded cable. The specific voltage range of the power supply is described in the technical data.

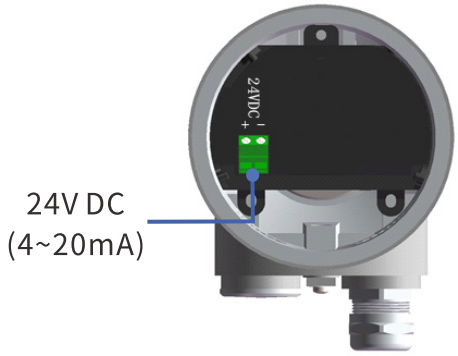
4.RS485/Modbus：

供电电源和485信号线分开各自分别使用一根两芯屏蔽电缆线，具体供电电压范围参见技术数据。

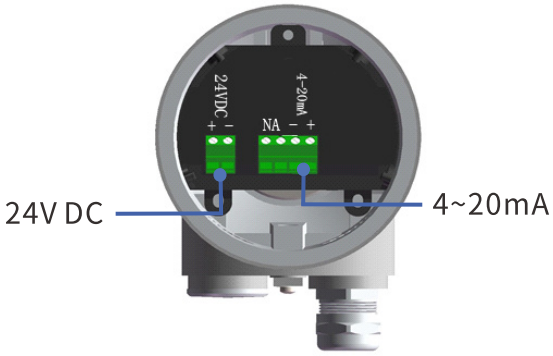
The power supply and the 485 signal line are separated by a two-core shielded cable, see the technical data for the specific power supply voltage range.

连接方式Connection type

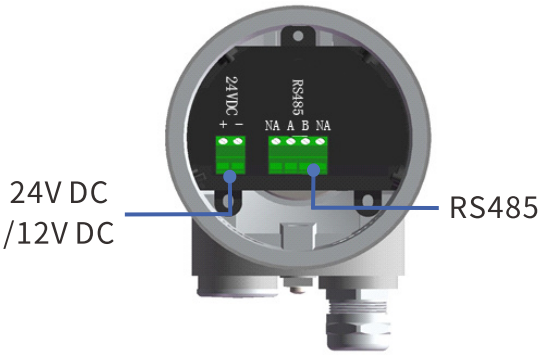
24V 两线制接线图如下the 2-wire wiring diagram is as follows:



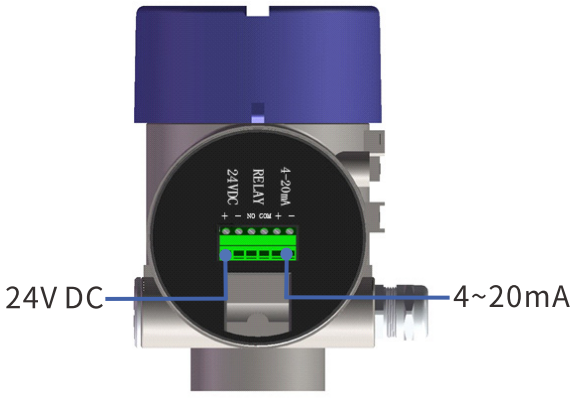
24V 四线制接线图如下the 4-wire wiring diagram is as follows:



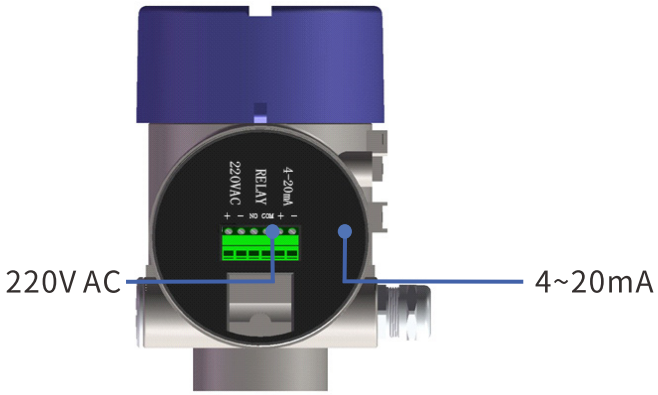
24V/12V RS485/Modbus 接线图如下the wiring diagram is as follows:



24V 双腔四线制接线如右图
dual-chamber, 4-wire wiring is shown at rig



220V 双腔四线制接线如下图dual-chamber, 4-wire wiring is shown below：



安全指导Security guidance

1.请遵守当地电气安装规程的要求！

1.Observe the requirements of local electrical installation regulations!

2.请遵守当地对人员健康和安全的规程要求。所有对仪表电气部件的操作必须由经过正规培训的专业人员完成。

2.Please observe local regulations for the health and safety of personnel. All operations on the electrical components of the instrument must be performed by properly trained professionals.

3.请检查仪表的铭牌确保产品规格符合您的要求。请确保供电电压与仪表铭牌上的要求一致。

3.Please check the nameplate of the meter to ensure that the product specifications meet your requirements. Make sure the supply voltage matches the requirements on the meter nameplate.

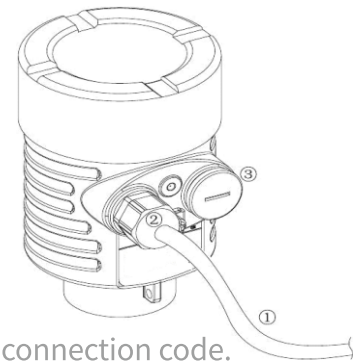
防护等级Protection rating

本仪表完全满足防护等级IP66/67的要求，请确保电缆密封头的防水性，如下图：

This instrument fully meets the requirements of protection class IP66/67, please make sure the cable sealing head is waterproof, as shown below:

如何确保安装满足IP67的要求：

How to ensure the installation meets IP67 requirements:



1.请确保密封头未受损。

1.Make sure the sealing head is not damaged.

2.请确保电缆未受损。

2.Make sure the cable is not damaged.

3.请确保所使用的电缆符合电气连接规范的要求。

3.Make sure that the cable used meets the requirements of the electrical connection code.

4.在进入电气接口前，将电缆向下弯曲，以确保水不会流入壳体，见①

4.Before accessing the electrical connections, bend the cables downwards to ensure that water does not flow into the housing, see ①

5.请拧紧电缆密封头，见②

5.Tighten the cable sealing head, see ②

6.请将未使用的电气接口用盲堵堵紧，见③

6.Plug unused electrical connections tightly with blind plugs, see ③

仪表调试Instrumentation Commissioning

三种调试方法
three debugging methods

①显示/按键display/keypad

②上位机调试upper computer debugging

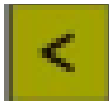
③HART手持编程器HART handheld programmer

显示/按键
display/keypad

通过显示屏幕上的4个按键对仪表进行调试。调试菜单的语言可选。调试后，一般就只用于显示，透过玻璃视窗可以非常清楚地读出测量值。

The instrument is commissioned via 4 keys on the display screen. The language of the commissioning menu is selectable. After commissioning, the instrument is generally used for display only. After commissioning, the instrument is generally only used for display, and the measured values can be read out very clearly through the glass window.

显示/按键
display/keypad

	退出编程状态 exit programming status 退至上一级菜单 exit to the previous menu [快捷键]显示回波曲线 [shortcut key] display echo curve

^	修改参数值 modify parameter values
↻	选择编程项 selecting programming items 选择编辑参数位 selecting the edit parameter bit 参数项内容显示 parameter item content display
OK	进入编程状态 entering programming status 确认编程项 confirm programming items 确认参数修改 confirmation of parameter modification

上位机调试
Upper debugging

通过HART与上位机相连

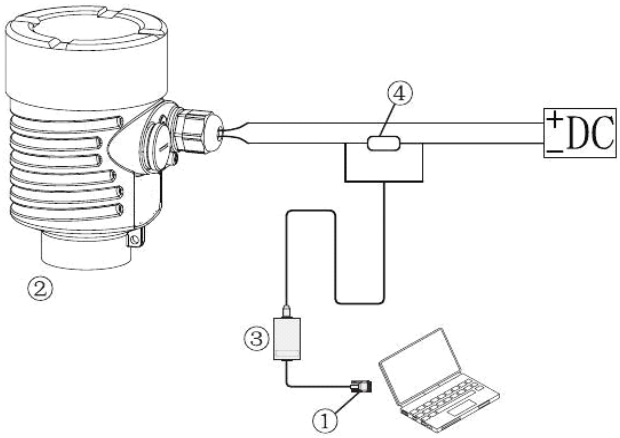
connected to the host computer via HART

① USB接口USB interface

② 雷达物位计radar level meter

③ HART适配器HART adapter

④ 250Ω电阻250Ω resistor

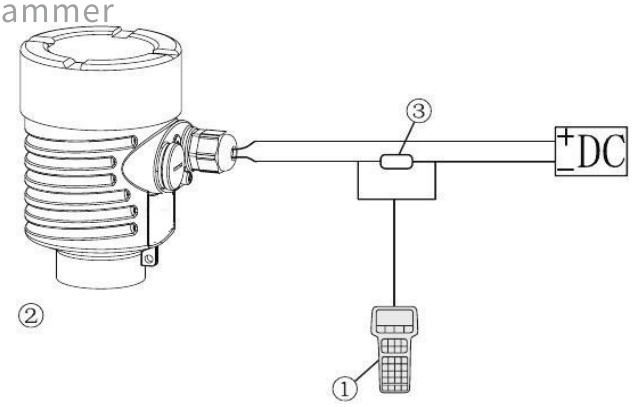


HART 手持编程器编程
HART handheld programmer programming

① HART手持编程器HART handheld programmer

② 雷达物位计radar level meter

③ 250Ω电阻250Ω resistor



界面操作说明Interface operation instructions


退出设置，返回上级菜单exit setup and return to higher menu


选择参数，修改数字select parameter, modify number


移动光标，浏览菜单move the cursor to navigate the menu



进入菜单，确认设置enter the menu and confirm settings

1. 基本设置Basic settings



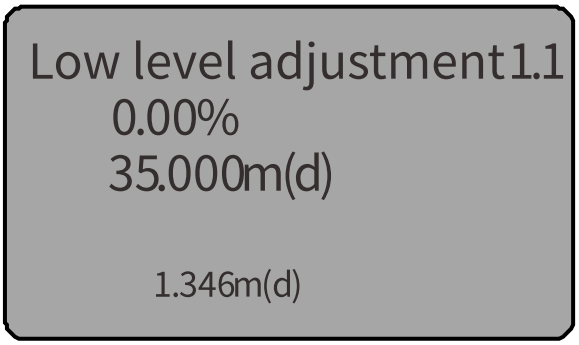


1.1 低位调整low-level adjustment

低位调整用于量程设置，它与高位调整一起决定了电流输出线性对应关系的比例；在主菜单中，当菜单号为1时，按OK键，进入基本设置子菜单，液晶显示。

The low adjustment is used for range setting, which together with the high adjustment determines the proportion of the linear correspondence of the current output; in the main menu, when the menu number is 1, press OK to enter the basic setting submenu, LCD display.





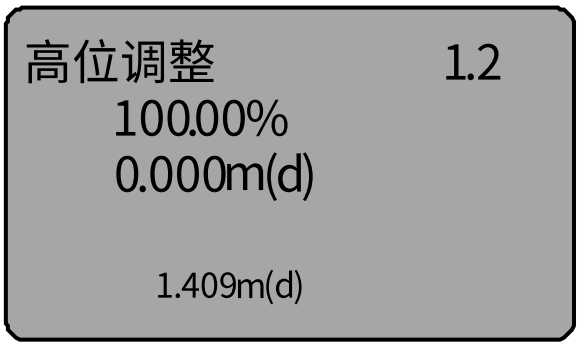
按OK键，进入编程低位百分比，参见前述参数编辑方法中字符/数字参数编程方法编辑百分比值及距离值。编辑完成后，按OK键确认，按 ← 键放弃编程。

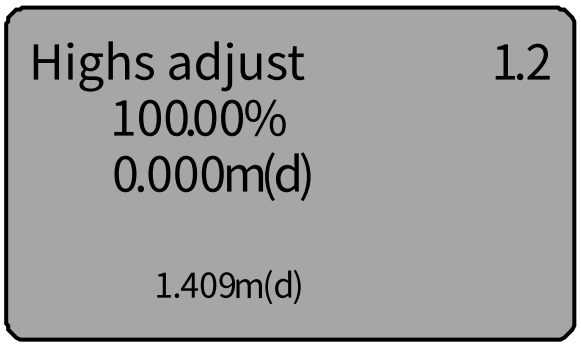
Press the OK key to enter programming the low percentage, see the character/digital parameter programming method in the previous parameter editing method to edit the percentage value and distance value. When editing is complete, press OK to confirm and ← to abort programming.

1.2 高位调整high-level adjustment

高位调整用于量程设置。它与低位调整一起决定了电流输出线性对应关系的比例。当液晶显示菜单号为1.1时，按键进入高位调整，液晶显示。

The high adjustment is used for range setting. Together with the low level adjustment, it determines the ratio of the linear correspondence of the current output. When the LCD display menu number is 1.1, press to enter the high level adjustment and the LCD display.





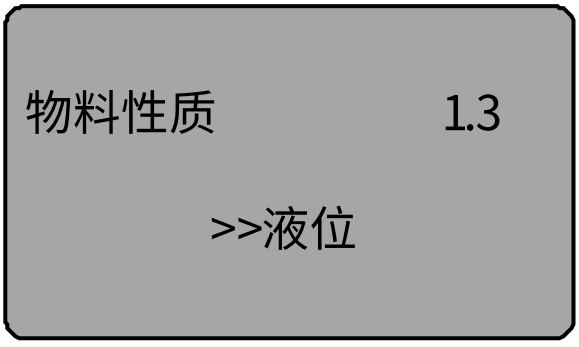
此时，按OK键即可对高位调整进行编辑。

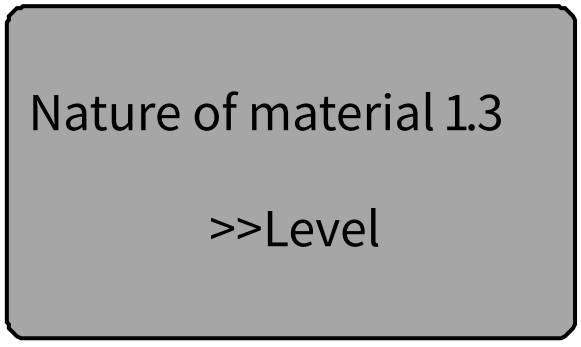
At this point, press OK to edit the high adjustment.

1.3 物料性质nature of material

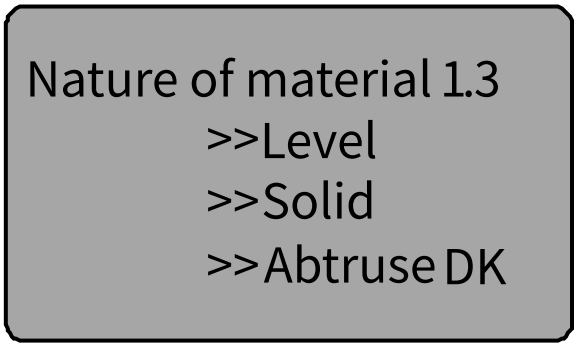
当液晶显示菜单号为1.3号，按OK键进入物料性质编程，液晶显示。

When the LCD display menu number is No. 1.3, press the OK key to enter the material property programming and the LCD display.









物料性质菜单用于选择固体、液体或微DK，从面进一步确定物料的其他一些影响测量的性质。

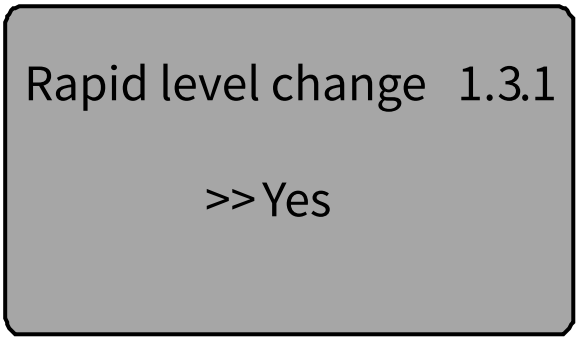
The material properties menu is used to select solids, liquids or micro DK from the facets to further identify some of the other properties of the material that affect the measurement.

1.3.1 物位快速变化rapid level change

当物料性质选择液体或固体时，按OK键进入快速变化菜单，液晶显示。

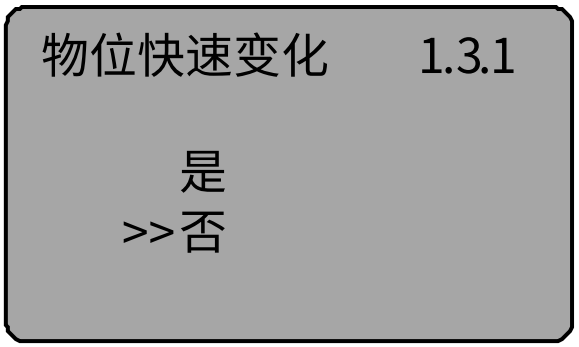
When the material property selects liquid or solid, press OK button to enter the quick change menu, LCD display.

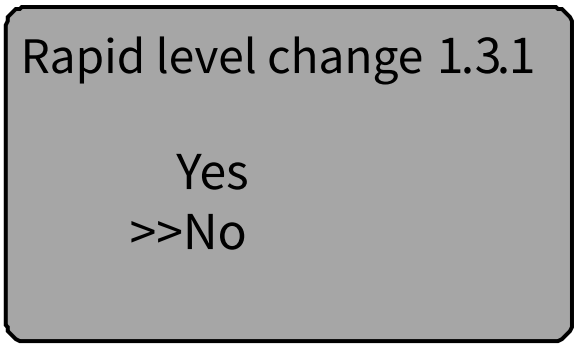




再按OK键进入快速变化菜单，液晶显示。

Press OK again to enter the quick change menu with LCD display.



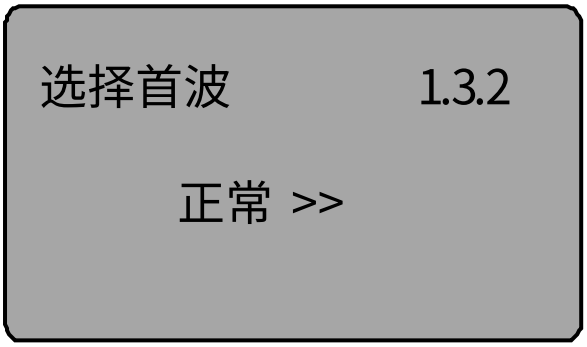


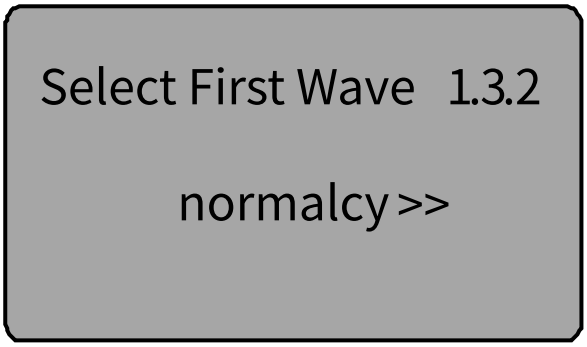
1.3.2 首波选择first-wave choice

当物料性质选择液体或固体时，液晶显示菜单为1.3.1时用键选择下一个菜单进入首波选择

菜单，液晶显示。

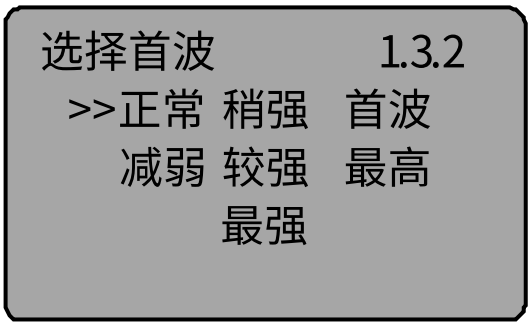
When the material property selects liquid or solid, the LCD display menu is 1.3.1, use the key to select the next menu. menu to enter the first wave of the selection menu, LCD display.





再按OK键进入首波选择菜单，液晶显示。

Press OK again to enter the first wave selection menu, LCD display.

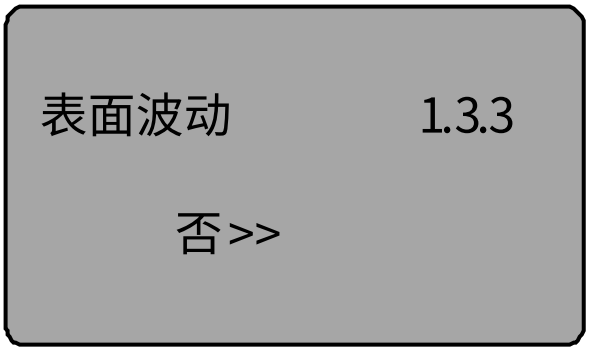


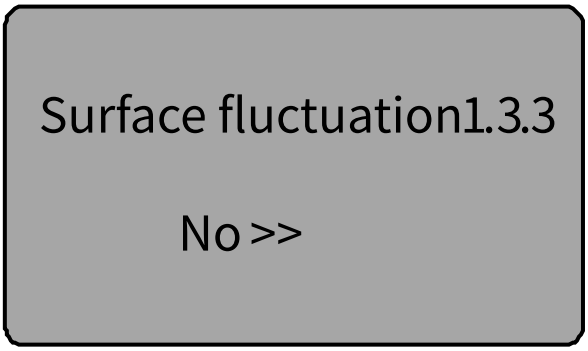


1.3.3 (液体) 表面波动(liquid) surface fluctuations

当物料性质为液体时，液晶显示菜单为1.3.2时，用键选择下一个菜单进入表面波动菜单，液晶显示。

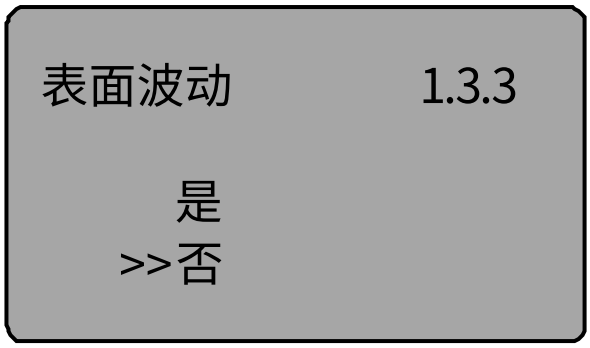
When the nature of the material is liquid, the liquid crystal display menu is 1.3.2, use the key to select the next menu to enter the surface fluctuation menu, liquid crystal display.

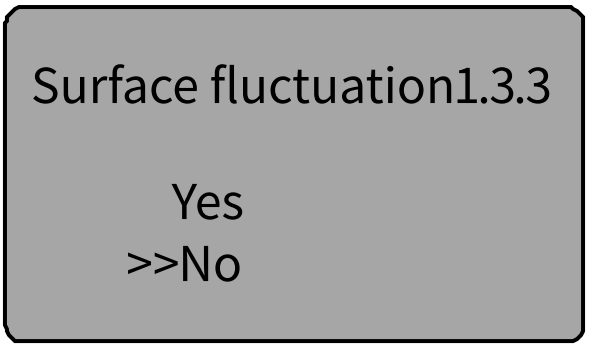




再按OK键进入表面波动选择菜单，液晶显示。

Press OK again to enter the Surface Fluctuation Selection Menu, the LCD displays.



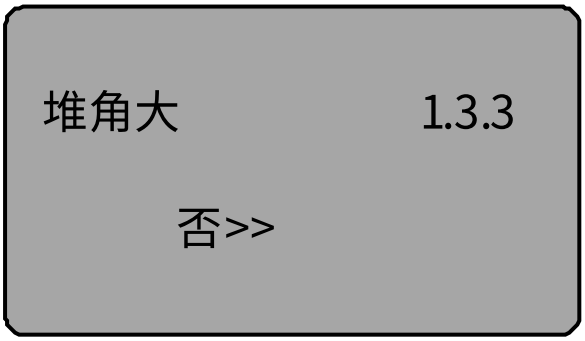


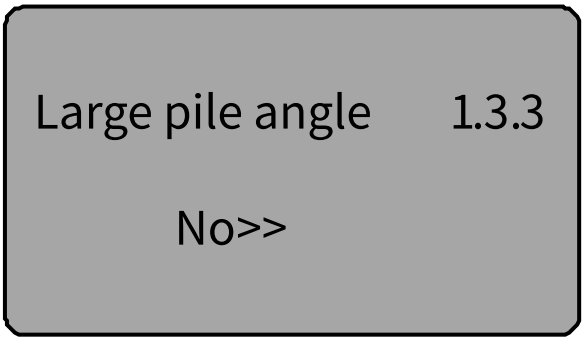
1.3.3 (固体) 堆角大

1.3.3 (solid)large pile angle

当物料性质为固体时，当液晶显示菜单为1.3.2时，用键选择下一个菜单进入堆角大菜单，液晶显示。

When the nature of the material is solid, when the LCD display menu is 1.3.2, use the key to select the next menu to enter the big menu of stacked corners, theLiquid crystal display.



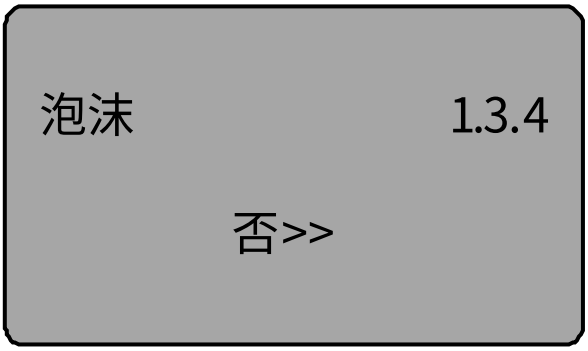


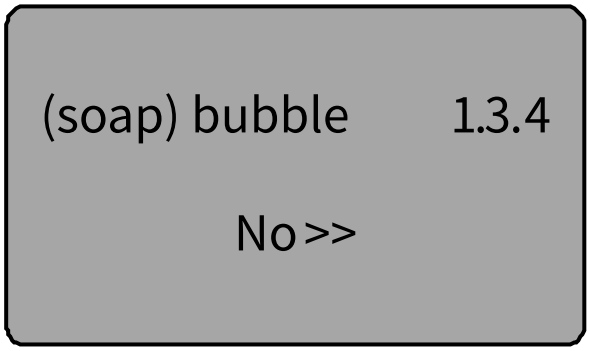
1.3.4 (液体) 泡沫

1.3.4 (liquid) foam

当液晶显示菜单为1.3.3时用键选择下一个菜单进入液位泡沫菜单，液晶显示。

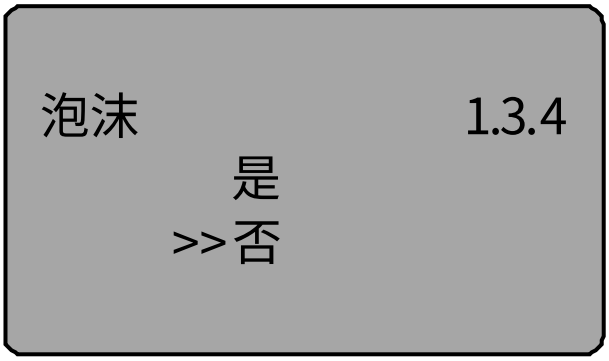
When the liquid crystal display menu is 1.3.3 use the key to select the next menu to enter the level foam menu, the liquid crystal display.

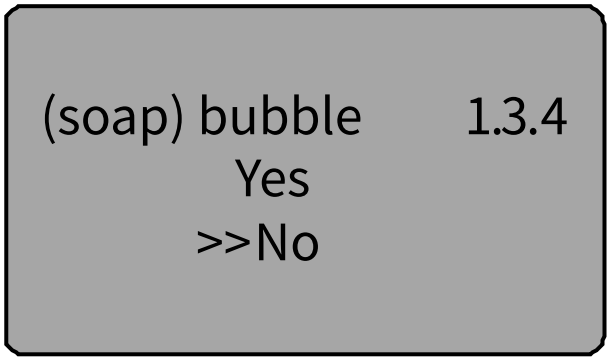




再按OK键进入液体泡沫选择菜单，液晶显示。

Press OK again to enter the liquid foam selection menu, LCD display.

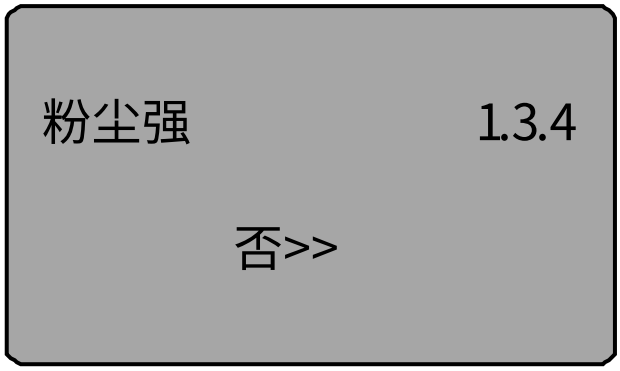


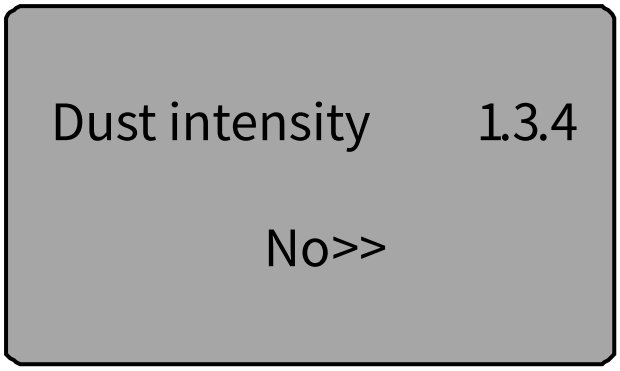


1.3.4 (固体) 粉尘强(solid) dust strong

当液晶显示菜单为1.3.3时用键选择下一个菜单进入粉尘强选择菜单，液晶显示。

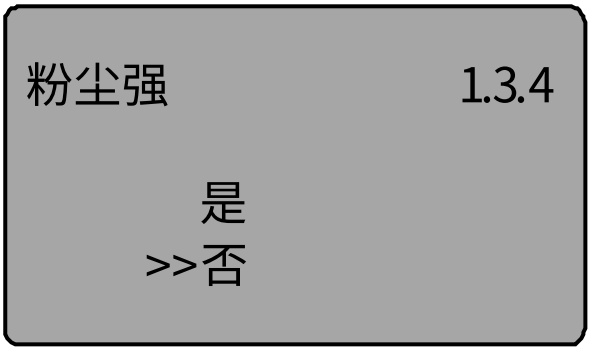
When the LCD display menu is 1.3.3 use the key to select the next menu to enter the dust strong selection menu, LCD display.

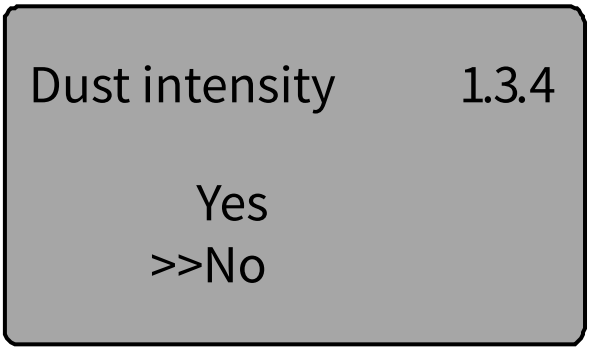




再按OK键进入粉尘强选择菜单，液晶显示。

Press OK again to enter the dust strong selection menu, LCD display.

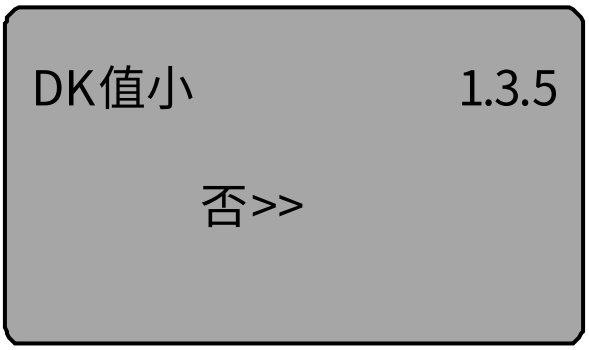


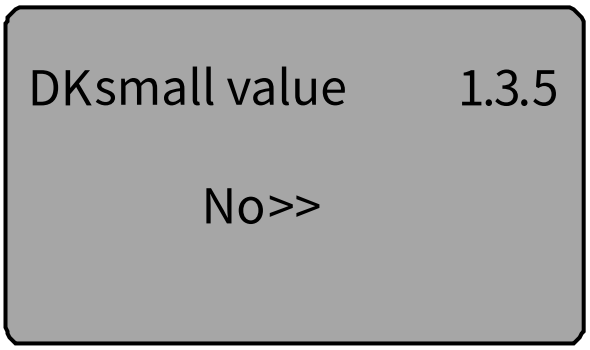


1.3.5 DK值小small DK values

当液晶显示1.3.5时，按OK键进入DK值调整设置菜单，液晶显示。

When the LCD displays 1.3.5, press OK to enter the DK value adjustment setting menu, and the LCD displays.

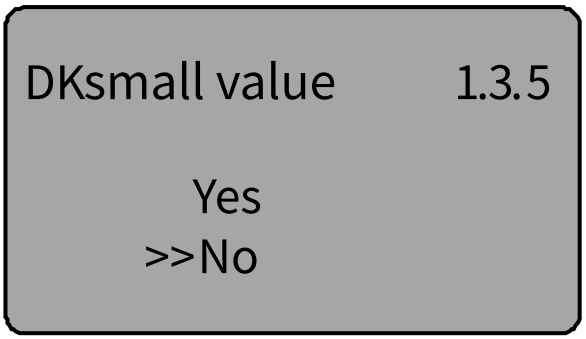




再按OK键进入DK值调整菜单，液晶显示。

Press OK again to enter the DK value adjustment menu, and the LCD displays.

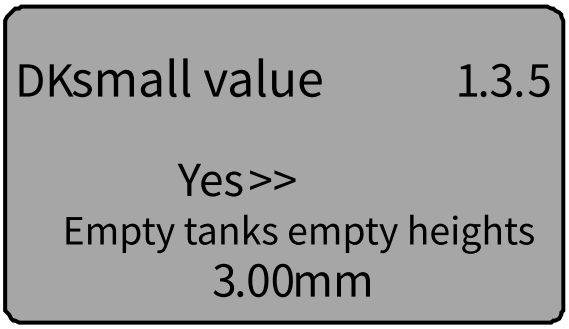




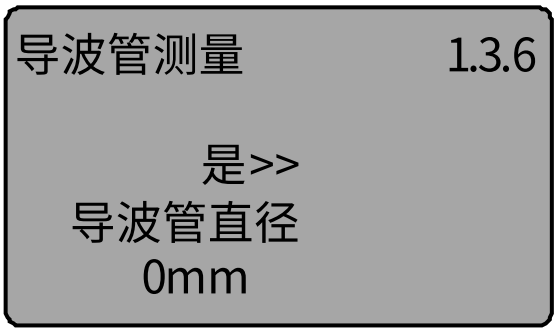
按键选择“是”，用于DK值小时的测量设定，液晶显示如下，这时需要人工输入一个准确的空罐空高值，该值用于判断罐底的位置，以减少罐底的反射。

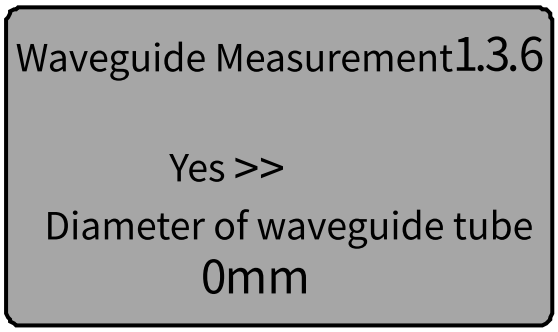
Press the key to select "Yes" for the measurement setting when the DK value is small, the LCD display is as follows, then you need to manually enter an accurate value of the empty height of the empty tank, which is used for judging the position of the tank bottom in order to minimize the reflection of the bottom of the tank.





1.3.6 (液体)导波管设定(liquid) waveguide setting

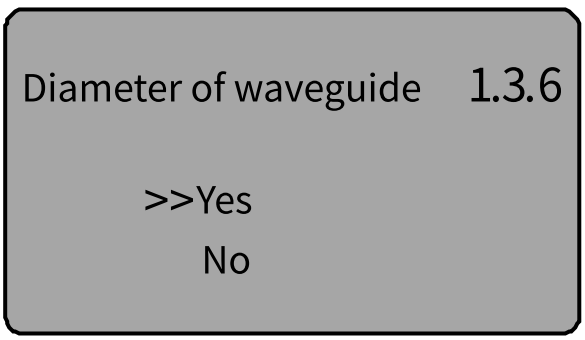




再按OK键进入导波管测量选择菜单,液晶显示。

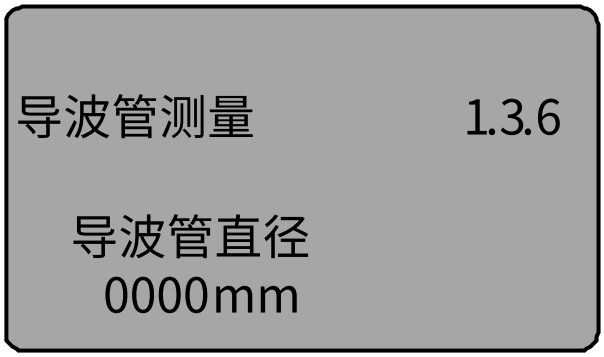
Press OK again to enter the waveguide measurement selection menu, LCD display.

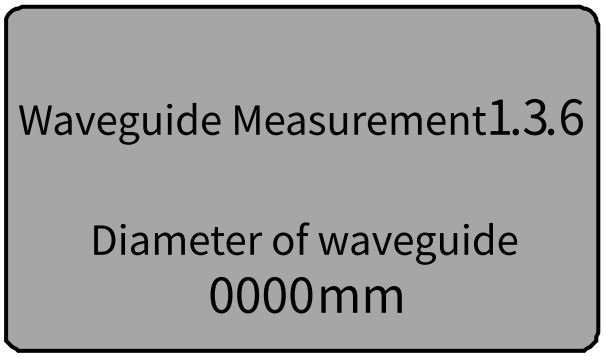




按键选择“是” 按OK键进入直入导波管直径设置菜单,液晶显示。

Press the key to select "Yes" Press OK key to enter the direct wave guide tube diameter setting menu, LCD display.

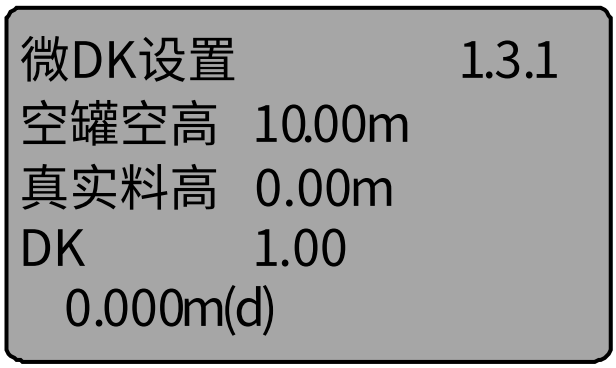


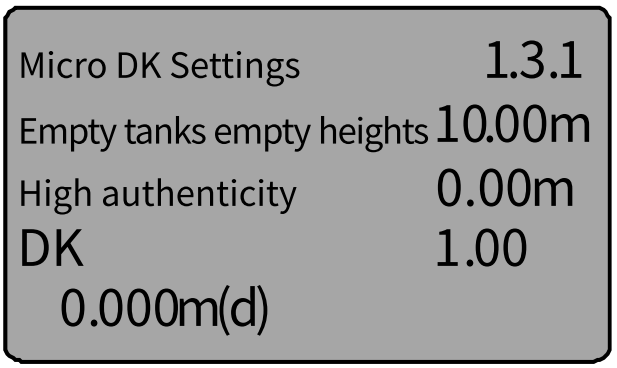


1.3.1 微DKmicro DK

选择物料性质为微DK，按OK键进入微DK设置的液晶显示。

Select the material nature as micro DK, press OK to enter the LCD of micro DK setting.





选择物料性质为微DK时，一般用于介电常数小于1.4，这时介质表面的直接回波很弱，或不能测量，而通过罐底反射的方法可以测得料位高度，这时需要输入以下参数中的两个：

1.空罐空高，空罐或空容器的空高值。

2.直实料高或待测物质的介电常数，这两个参数关联，输入其中之一即可。以上参数的精度直接影响测量结果的精度值注："微DK"的选择要慎重，大多测量是不合适的，当"微DK"选择后，系统根据回波情况，判断采用直接回波法或底部反射法来得到测量结果。

Select the nature of the material for the micro DK, generally used for dielectric constant less than 1.4, when the surface of the media direct echo is very weak, or can not be measured, and through the bottom of the tank reflection method can be measured height of the material level, then you need to enter the following parameters in the two:

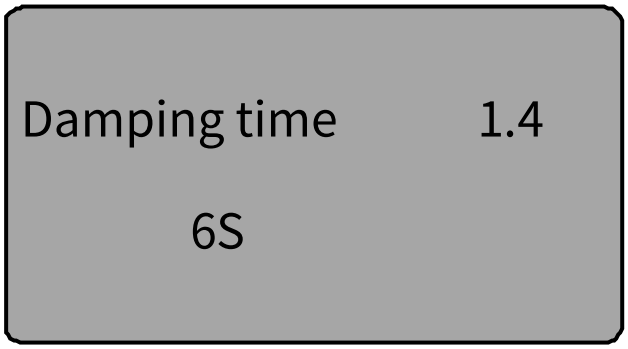
1. Empty tanks empty height, empty tanks or empty containers of the value of the empty height.
2. Straight real material height or the dielectric constant of the material to be measured, the two parameters are related to, enter one of them! The accuracy of the above parameters directly affects the measurement results. The accuracy of the above parameters directly affects the accuracy of the measurement results of the value Note: "micro DK" selection should be careful, most of the measurement is not appropriate, when the "micro DK" selection, the system according to the echo situation, judgment using direct echo method or bottom reflection method to get the measurement results. The result.

1.4 阻尼时间damping time

当液晶显示菜单号为1.3时，按键，进入阻尼时间设置菜单，液晶显示。

When the LCD display menu number is 1.3, press the ⊡ key to enter the damping time setting menu and the LCD display.





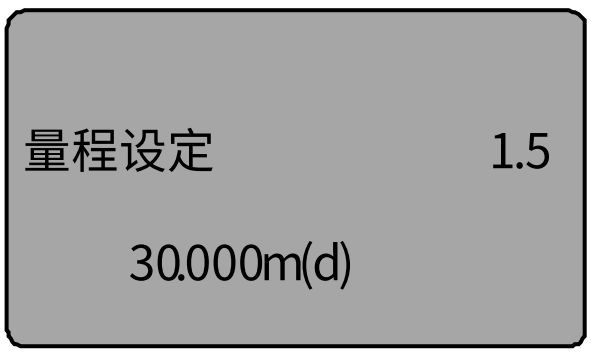
按OK键进入参数编辑状态，用 ↑ 键设置数字，用⊡键选择编辑数字位，编辑完成后按OK键确认。

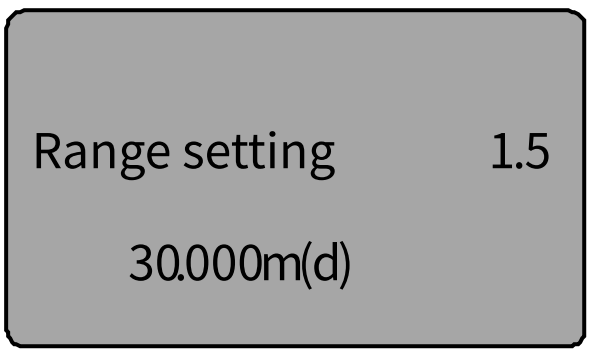
Press OK to enter the parameter editing status, use ↑ to set the digit, use ⊡ to select the editing digit, and press OK to confirm when editing is completed.

1.5 量程设定range setting

为了得到正确的测量结果，需设置仪表的量程范围，当菜单号显示为1.4时按⊡键进入量程设定菜单，液晶显示。

In order to get the correct measurement results, you need to set the range of the instrument, when the menu number shows 1.4, press ⊡ key to enter the rangeSetting menu, LCD display.





按OK键，对应参数，用 ↑ 键及⊡键设置参数，按OK键确认。

Press OK, corresponding to the parameter, set the parameter with the ↑ key and ⊡ key, and press OK to confirm.

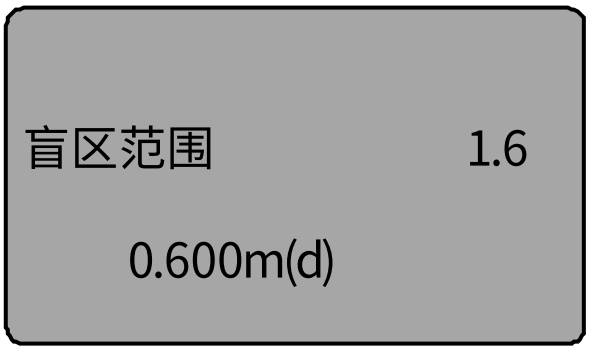
1.6 盲区范围blind spot range

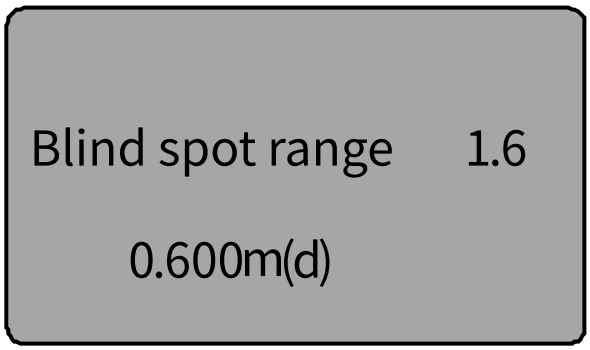
当在距离传感器表面较近处有固定障碍物干扰测量，且最大料高不会到达障碍物时，可用盲区范围的设置功能来避免测量错误。

When there is a fixed obstacle close to the sensor surface that interferes with the measurement, and the maximum material height will not reach the obstacle, the blind range setting function can be used to avoid measurement errors.

当液晶显示菜单号为1.5时，按键进入盲区范围设置菜单，液晶显示。

When the LCD display menu number is 1.5, press to enter the blind range setting menu and the LCD display.





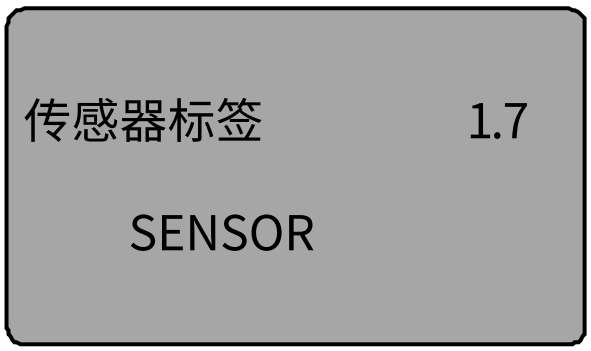
按OK键进入参数编辑状态，编辑完成后按OK键确认。

Press OK to enter the parameter editing state, and press OK to confirm after editing is completed.

1.7 传感器标签sensor labeling

当液晶显示菜单号为1.6时，按键将菜单移至传感标签显示项，液晶显示。

When the LCD display menu number is 1.6, press the key to move the menu to the sensing tag display item, the LCD display.





按OK键进入参数编辑状态，编辑完成后按OK键确认。

Press OK to enter the parameter editing state, and press OK to confirm after editing is completed.

基本设置菜单包括的内容到此结束!

This is the end of what the Basic Settings menu consists of !

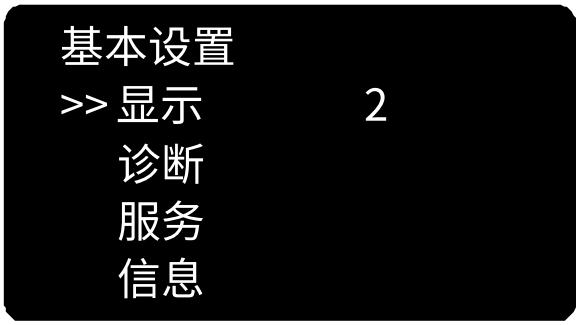
2. 显示Demonstrate:

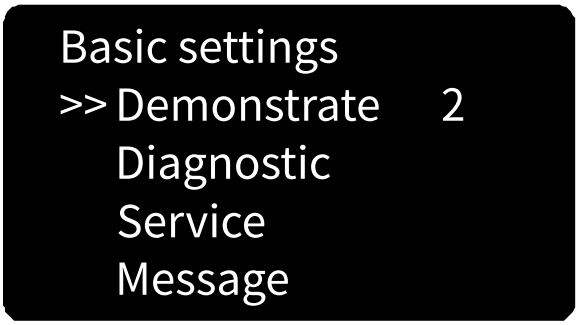
此项功能用于显示方式编程。

This function is used to program the display mode.

当液晶显示主菜单时，按键将箭头移至显示项，液晶显示。

When the LCD displays the main menu, press to move the arrow to the display item and the LCD displays.





按OK键，进入显示方式编程。

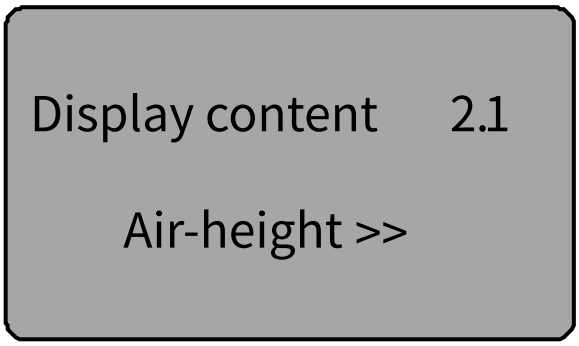
Press OK to enter display mode programming.

2.1 显示内容display content

进入显示方式编程，液晶显示。

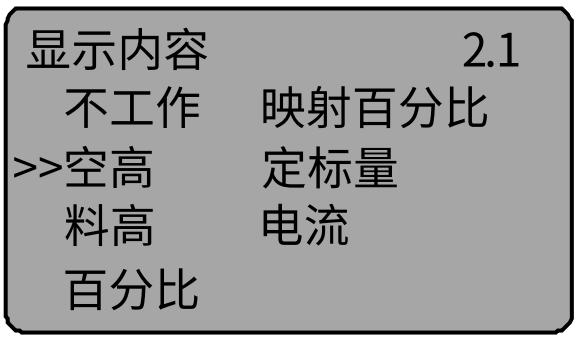
Enter display mode programming, LCD.

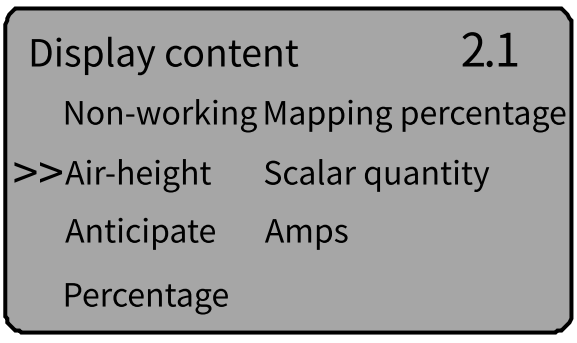




表示当前显示内容的参数是空高，即仪表显示测量的空高值。按OK键，进入 编辑状态，液晶显示。

The parameter indicating the current display content is null height, i.e. the meter displays the measured null height value. Press OK to enter the editing state, the LCD will display.





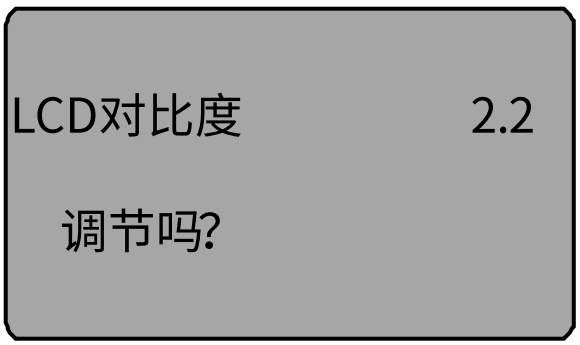
用键将箭头移动至所需参数项，按OK键确认。编辑完成后，按 ← 键退出显示编程，返回上一级菜单。

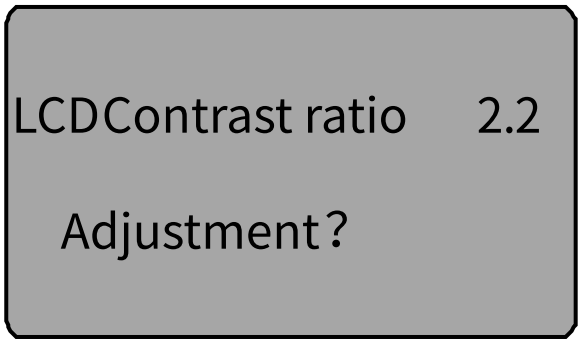
Use the key to move the arrow to the desired parameter item and press the OK key to confirm. When editing is complete, press the ← key to exit display programming and return to the previous level menu.

2.2 LCD对比度调节
2.2 LCD contrast adjustment

当液晶显示菜单号2.1时,按键，进入LCD对比度调节菜单，显示:

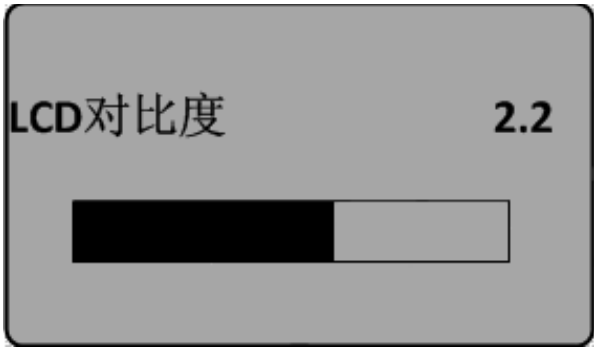
When the LCD displays the menu number 2.1, press the key to enter the LCD contrast adjustment menu, the display shows:

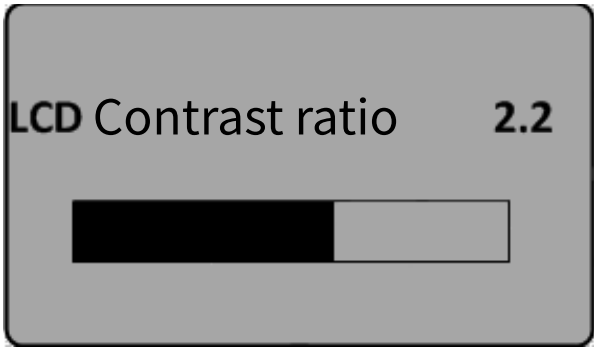




按OK键进入调节状态。

Press OK to enter the adjustment status.



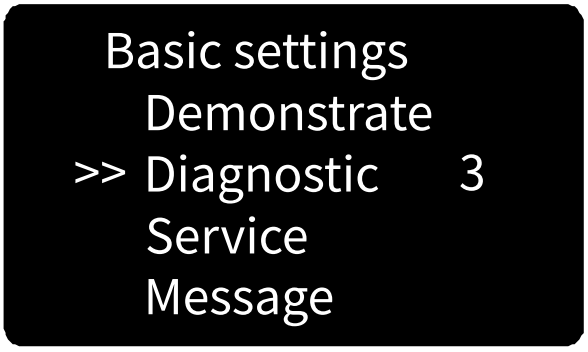


用 ↑ 键及键来增大或减小对比度，之后用OK键确认调节并保存结果。

Use the ↑ and keys to increase or decrease the contrast, then confirm the adjustment with the OK key and save the result.

3. 诊断diagnostic





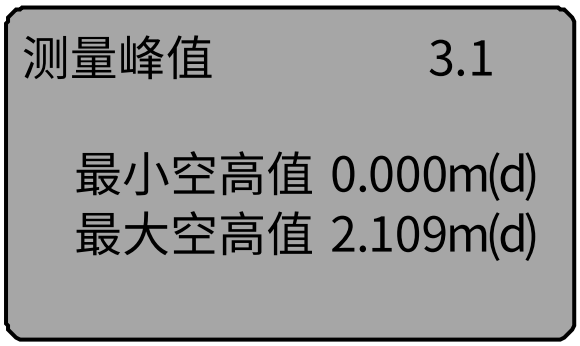
诊断功能用于仪表及其各部件工作状态的测试及系统调节。

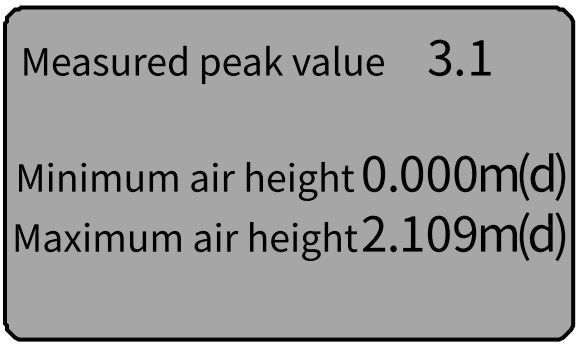
The diagnostic function is used to test the working status of the instrument and its components and to adjust the system.

按OK键进入诊断功能，液晶显示。

Press OK to enter the diagnostic function, LCD display.

3.1 测量峰值measurin g peaks





峰值显示的是测量过程中的空高峰值，此项参数可用服务菜单中的4.4复位项清除。当液晶显示主菜单时，按键，将箭头移至诊断项，液晶显示。

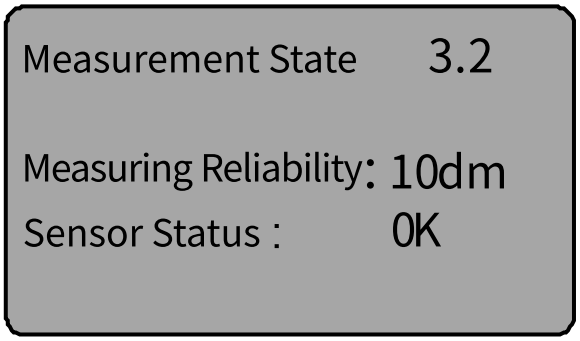
Peak shows the peak value of the empty peak during the measurement, this parameter can be cleared with item 4.4 Reset in the service menu. When the LCD displays the main menu, press the key and move the arrow to the diagnostic item, the LCD displays.

3.2 测量状态measurement status

当液晶显示菜单号3.1时，按键，进入下一个诊断测量状态，显示传感器工作状态。

When the LCD displays menu number 3.1, press the key to enter the next diagnostic measurement state, which displays the sensor working status.

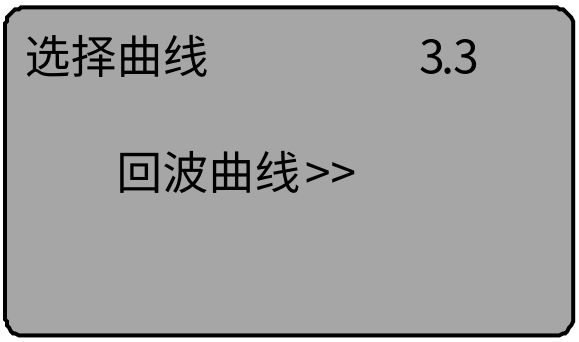


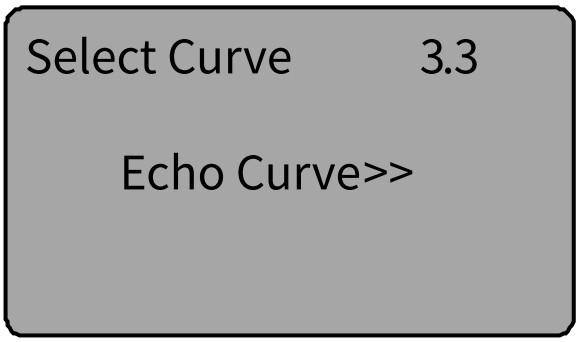


3.3 选择曲线selection curves

当液晶显示菜单号3.2时，按键，进入波形曲线显示功能，液晶显示。

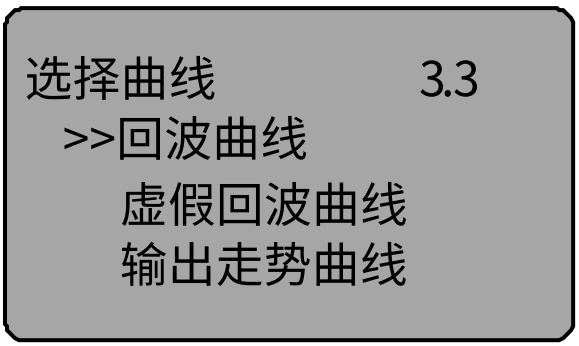
When the LCD displays Menu No. 3.2, press key to enter the waveform curve display function, and the LCD displays.

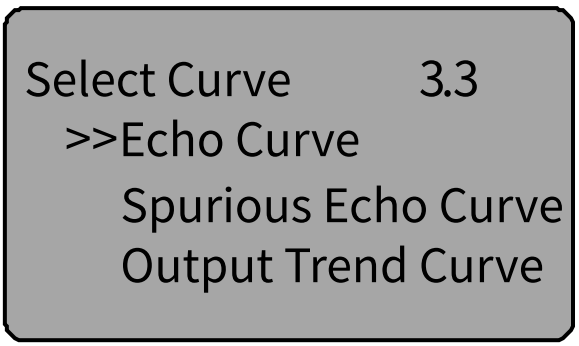




若需要选择其它曲线，按OK键，进入选择曲线菜单，液晶显示。

If you need to select other curves, press OK to enter the select curve menu, LCD display.





用键将箭头移动到所要显示的曲线处，按OK键确认选择。

Use the key to move the arrow to the curve to be displayed and press OK to confirm the selection.

3.4 输出走势曲线output trend curve

当液晶显示菜单号3.3时，按键，液晶显示所选择的曲线。曲线缩放功能。

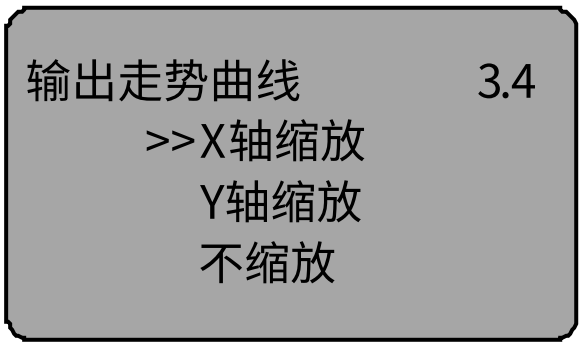
When the LCD displays menu number 3.3, press the key and the LCD displays the selected curve. Curve scaling function.

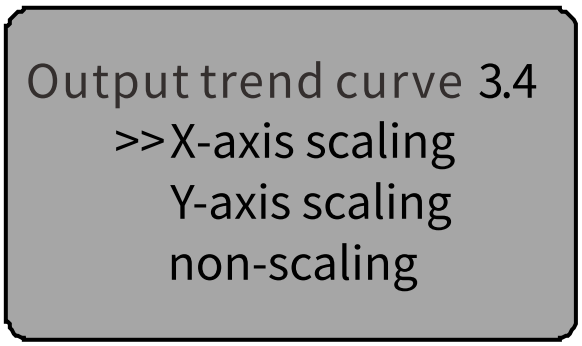
曲线缩放用于在时间轴和幅度上放大曲线，以便于更清楚地观察。

Curve Zoom is used to zoom in on the curve on the timeline and magnitude for a clearer view.

在液晶显示曲线时，按OK键，进入曲线缩放编辑菜单。显示。

While the LCD is displaying the curve, press OK to enter the curve scaling edit menu. Display.





用键将箭头，选择缩放方向或不缩放，按OK键确认，液晶曲线显示。

Use key to put the arrow, select the zoom direction or no zoom, press OK to confirm, the LCD curve display.

当选择X轴缩放，按OK键确认：再按 ↑ 键移动终止点至所需位置，按OK键确认，此时所选区域曲线被放大至全屏。按 ← 键，退出曲线显示。

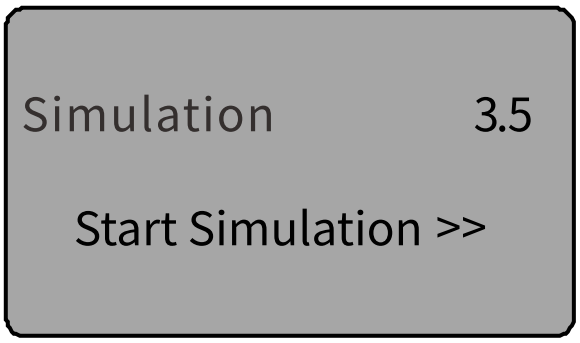
When X-axis zoom is selected, press OK to confirm: then press ↑ to move the termination point to the desired position and press OK to confirm, at this point the selected area of the curve is zoomed to full screen. Press ← key to exit curve display.

3.5 仿真simulation

仿真功能是4…20mA电流的仿真输出。用于检验仪表电流输出功能是否正常。同时，也可用于系统调试。当液晶显示菜单号3.4时，按键，进入仿真状态，液晶显示。

The simulation function is the simulation output of 4...20mA current. It is used to check whether the current output function of the meter is normal. At the same time, it can also be used for system debugging. When the LCD displays the menu number 3.4, press the key to enter the simulation state, and the LCD displays.

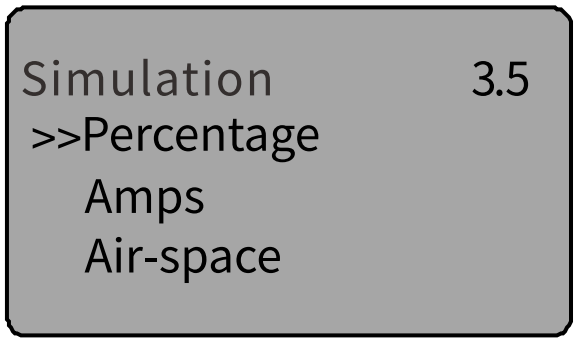




按OK键确认仿真功能，液晶显示。

Press OK button to confirm the emulation function, LCD display.





用键选择电流输出映射方式，按OK键确认，进入相应的设置菜单，完成数值设置后，按OK键确认，此时，相应的电流输出设置值所对应的电流值。

Use the key to select the current output mapping method, press OK to confirm, enter the corresponding setting menu, complete the value setting, press OK to confirm, at this time, the current value corresponding to the corresponding current output setting value.

注：三个备选菜单项说明:

Note: description of the three alternative menu items:

1.百分比：按给定的百分比值输出电流。如100%对应输出20mA,0%对应输出4mA。

1.Percentage: Output current according to the given percentage value. For example, 100% corresponds to 20mA output, 0% corresponds to 4mA output.

2.电流：按给定的电流值输出电流。如16.6mA对应输出16.6mA。

2.Current: Output current according to the given current value. For example, 16.6mA corresponds to the output of 16.6mA.

3.空高：按给定的空高值输出电流。(该值与电流值的对应关系由1.1低位调整、1.2高位调整)

3.Null Height: Outputs current at the given null height value. (this value corresponds to the current value by 1.1 low adjustment, 1.2 high adjustment)

4. 服务service





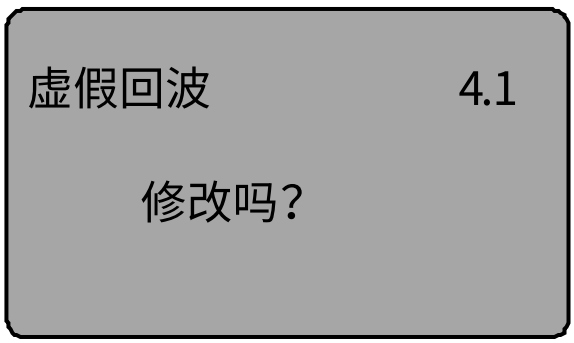
服务菜单中包括更专业化的功能，供经过培训的人员使用。主要有虚假回波学习、复位及仪表参数保存等。当液晶显示主菜单时，按键，将箭头移至服务项，显示。

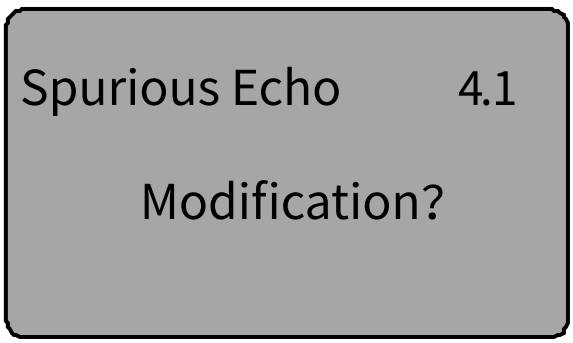
The service menu includes more specialized functions for trained personnel. The main ones are false echo learning, reset and meter parameter saving. When the LCD displays the main menu, press the key and move the arrow to the service item to display.

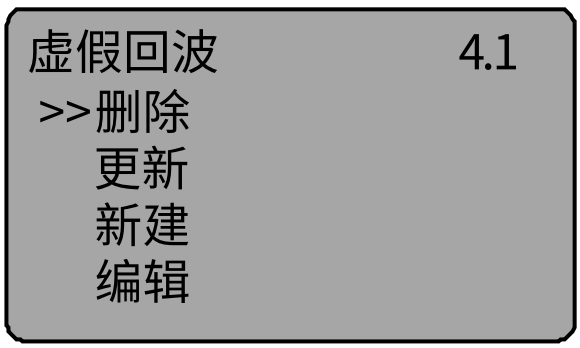
4.1 虚假回波spurious echo

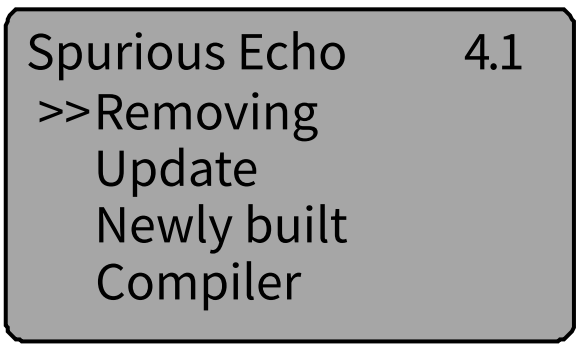
当测量范围内有固定障碍物干扰测量时，可用虚假回波学习的功能来克服其影响（参考安装位置图解）。当液晶显示主菜单号为4.1时，按OK键，进入服务子菜单，显示。

When there is a fixed obstacle within the measuring range interfering with the measurement, the function of false echo learning can be used to overcome its influence (refer to the illustration of the installation position). When the LCD display shows the main menu number as 4.1, press the OK button to enter the service submenu, which displays.



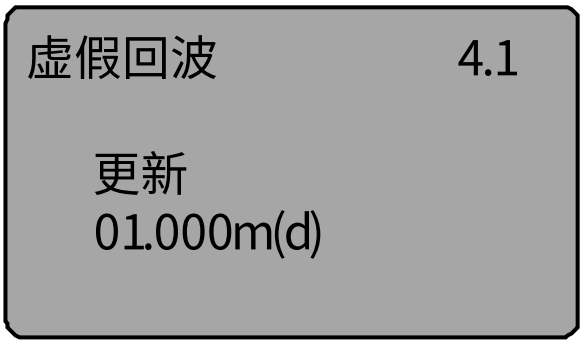


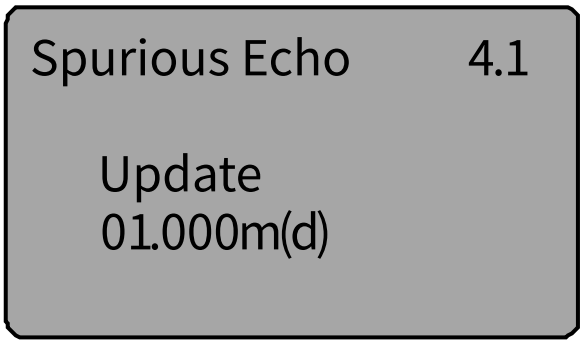




若要更新/新建虚假回波曲线，按键，将箭头移动到所需条目前，按OK键确认，显示。

To update/create a new spurious echo curve, press the key, move the arrow to the desired bar, press OK to confirm, and display.





提示输入真实回波距离值，输入距离值后，按OK键确认，液晶显示请等待，仪表进行虚假回波的学习，完成后退到虚假回波学习菜单。

Prompt to input the real echo distance value, after inputting the distance value, press OK to confirm, the LCD display please wait, the instrument carries on the learning of false echo, after finishing, it retreats to the false echo learning menu.

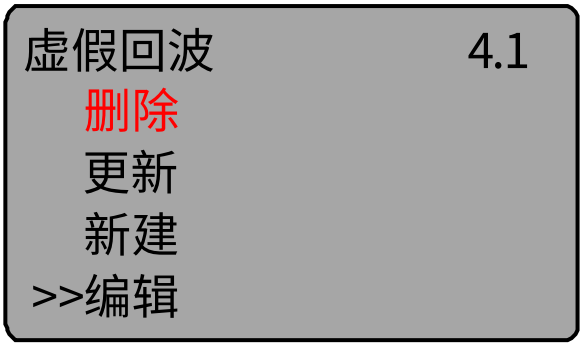
注：更新虚假回波曲线和新建虚假回波曲线的区别：新建虚假回波曲线在真实回波之后的虚假回波曲线清零，而更新虚假回波曲线在真实回波之后的虚假回波曲线保持不变。

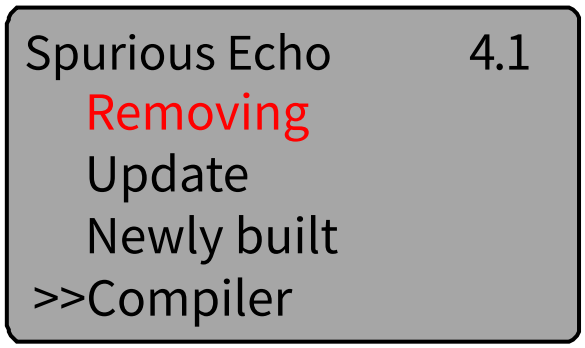
Note: The difference between updating a false echo curve and creating a new false echo curve: the new false echo curve zeroes out the false echo curve after the true echo, while the update false echo curve keeps the false echo curve unchanged after the true echo.

若要编辑虚假回波曲线，按键，将箭头移动到所需条目前，按OK键确认，该功能可对已建立的虚假回波进行编辑或改动以适应特殊工况的要求，进入虚假回波编辑后的界面如下：

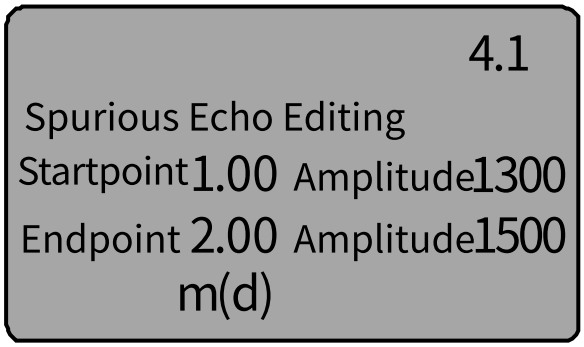
（注：本菜单需要专业人员操作）

If you want to edit the false echo curve, press the key, move the arrow to the front of the desired bar, press the OK key to confirm, this function can be edited or changed to adapt to the requirements of the special working conditions of the false echo has been established, into the false echo editing interface is as follows: (Note: This menu requires professional operation)



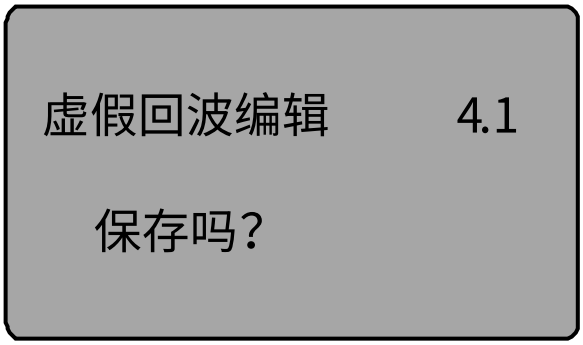


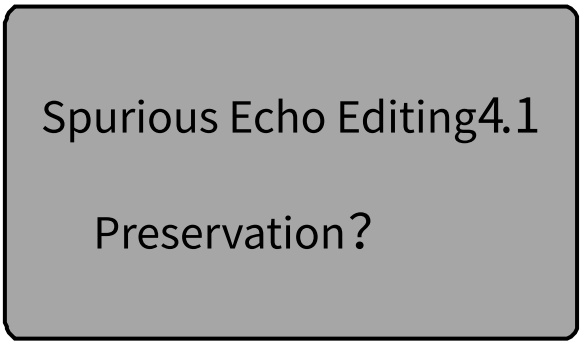




曲线编辑每次两点，始点和终点为欲编辑曲线位置坐标，其后对应的幅度数值就是要修改的数值（注：当距离坐标输入或修改后，其后对应的幅度会自动根据当前保存的数据更新，用以作为幅度修改的参考）；两对坐标修改完成后，按OK键确认此次修改；仪表将根据输入的两个点自动连成直线生成新的虚假回波曲线，替代原曲线；按OK键确认后，界面会显示经本次修改的虚假回波曲线，以供参考，这时按←可返回以上编辑界面继续编辑，当确认虚假回波编辑已达到工况要求，可再按←键退出虚假回波编辑菜单，这时界面显示如下：

Curve editing two points at a time, the start point and end point are the coordinates of the position of the curve to be edited, and the corresponding amplitude value is the value to be modified. The corresponding amplitude value is the value to be modified (Note: when the distance coordinates are input or modified, the corresponding amplitude will be automatically updated according to the currently saved data, which is used as a reference for amplitude modification); after the two pairs of coordinates are modified, press OK to confirm the modification; the instrument will automatically connect the two input points to form a straight line to generate a new false echo curve, which replaces the original curve; press OK to confirm the curve; the interface will display the modified false echo curve for reference; at this time, press ← to return to the above editing interface to continue editing, and when it confirms the false echo curve, press ← to continue editing. Press OK to confirm, the interface will display the modified false echo curve for reference, then press ← to return to the above editing interface to continue editing, when it is confirmed that the false echo editing has reached the requirements of the working conditions, then press ← to exit the false echo editing menu, then the interface will display as follows:





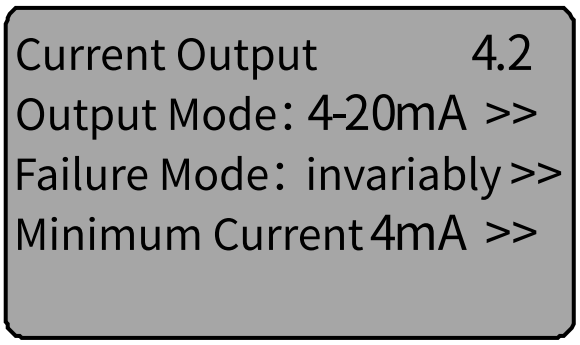
按OK键保存上面修改，按BK键放弃当前的修改。
Press OK to save the above changes and BK to discard the current changes.

4.2 电流输出current output

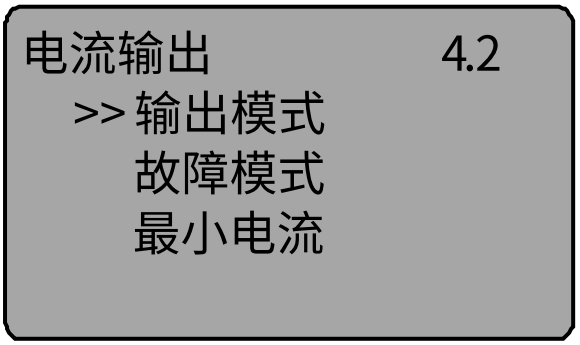
此项设置用于设置电流输出方式。
This setting is used to set the current output method.

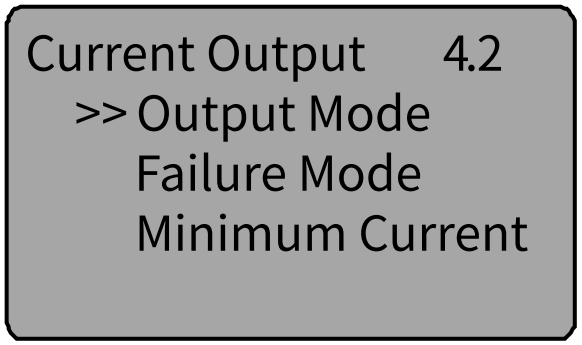
当液晶显示主菜单号为4.1时，按键，液晶显示。
When the LCD displays the main menu number 4.1, press the key and the LCD displays.





按OK键
Press the OK button.

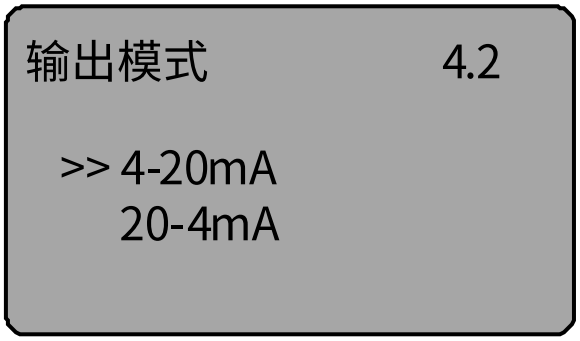


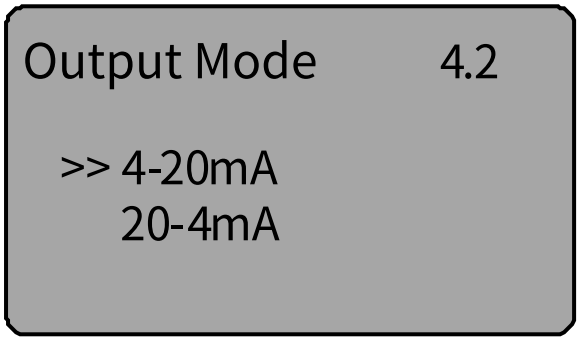


输出模式output mode

输出模式用于选择4-20mA或20-4mA输出方式。4-20mA表示低料位对应4mA，高料位对应20mA；20-4mA表示低料位对应20mA，高料位对应4mA。在液晶显示电流输出选择菜单4.2时，按键，将箭头移动到输出模式处，按OK键确认，显示。

Output mode is used to select 4-20mA or 20-4mA output mode. 4-20mA means 4mA for low level and 20mA for high level; 20-4mA means 20mA for low level and 4mA for high level. when the LCD display shows the current output selection menu 4.2, press the key, move the arrow to output mode, and then confirm by pressing the OK key.





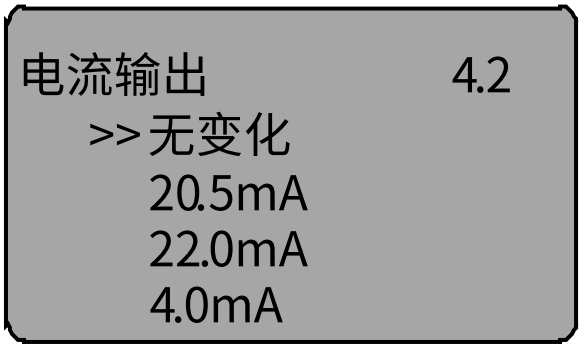
故障模式failure mode

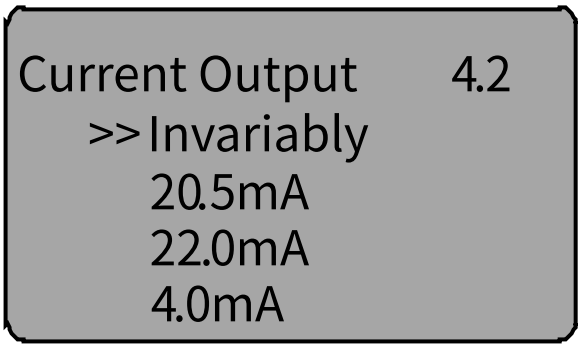
按键，选择所需设置，按OK键确认选择。

Press to select the desired setting and press OK to confirm the selection.

故障模式用于选择当有故障报警时，输出电流可不改变、输出20.5mA、22 mA或4.0 mA。在液晶显示电流输出选择菜单4.2时，按键，将箭头移动到故障模式处，按OK键确认，液晶显示。

Fault mode is used to select whether the output current can be unchanged, 20.5 mA, 22 mA or 4.0 mA when there is a fault alarm. When the LCD displays the current output selection menu 4.2, press the key, move the arrow to fault mode, and then press the OK key to confirm, and the LCD will display the current output selection menu 4.2.The LCD will show.





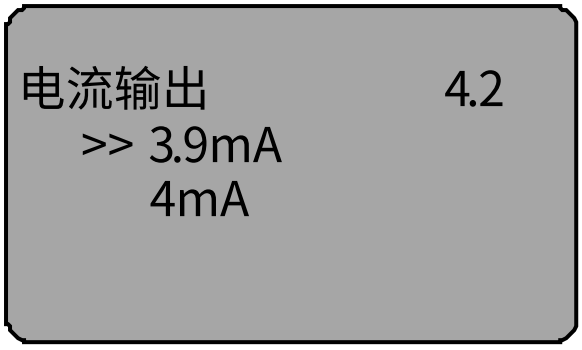
按键，选择所需设置，按OK键确认选择。

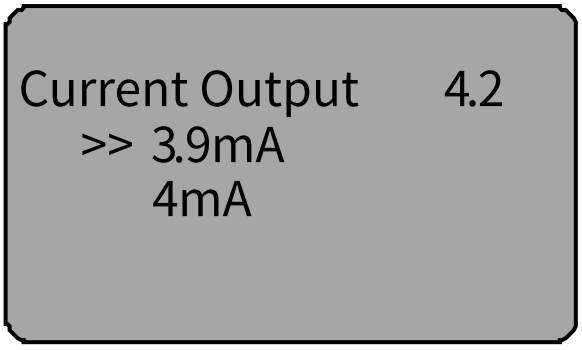
Press to select the desired setting and press OK to confirm the selection.

最小电流minimum current

最小电流用于选择输出最小电注为4mA或3.9 mA。在液晶显示电流输出选择菜单4.2时，按键，将箭头移动到最小电流处，按OK键确认，液晶显示。

Minimum current is used to select the output minimum electric injection as 4mA or 3.9 mA. When the LCD displays the current output selection menu 4.2, press , move the arrow to minimum current, press OK to confirm, and the LCD displays.





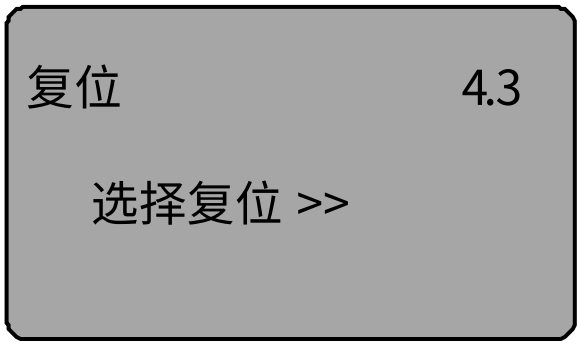
按键，选择所需设置，按OK键确认选择。

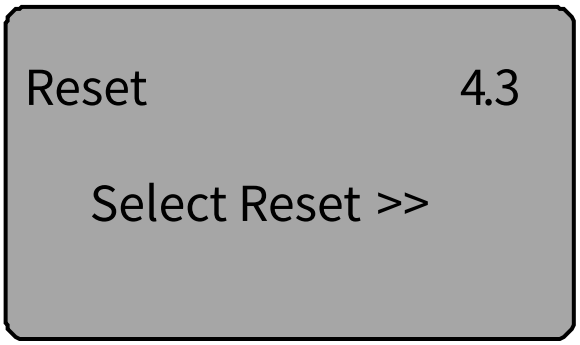
Press the key to select the desired setting and press OK to confirm the selection.

4.3 复位reset

复位功能仪表参数的复位。共有四个复位功能：基本设置、工厂设置、测量峰值。基本设置是将仪表基本设置项中的各参数恢复为工厂的缺省设置；工厂设置将仪表全部参数恢复为工厂的缺省设置；测量峰值复位是将诊断中的测量峰值清零；累计流量复位是当仪表用于明渠流量计时，清零累计流量。当显示电流输出（菜单号4.2）时，按键，进入复位功能，显示。

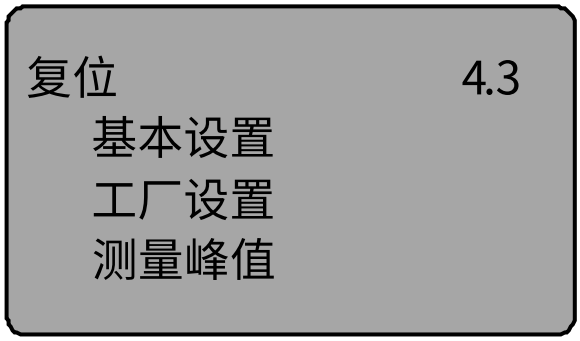
Reset Function Reset of instrument parameters. There are four reset functions: basic setting, factory setting, and peak measurement. Basic setting is to restore each parameter in the basic setting item of the meter to the factory default setting; factory setting restores all parameters of the meter to the factory default setting; measurement peak reset is to clear the measurement peak in the diagnosis; cumulative flow reset is to clear the cumulative flow when the meter is used for nullah flowmeter. When the current output (menu number 4.2) is displayed, press to enter the reset function and display.

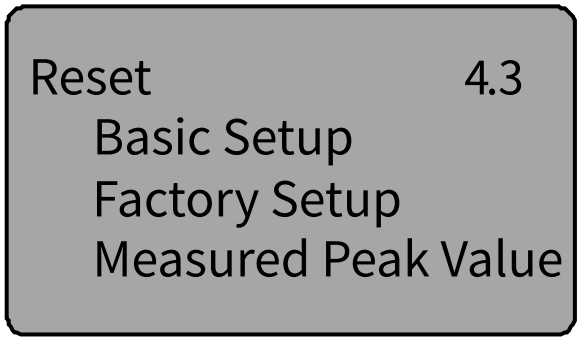




按OK键，进入复位选择菜单，可根据需要选择相应的复位功能项复位。

Press OK to enter the reset selection menu, you can select the corresponding reset function item reset as needed.

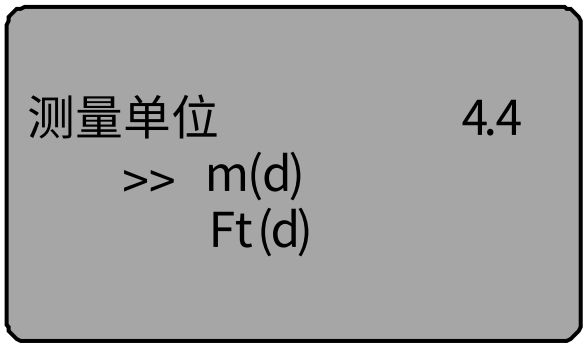


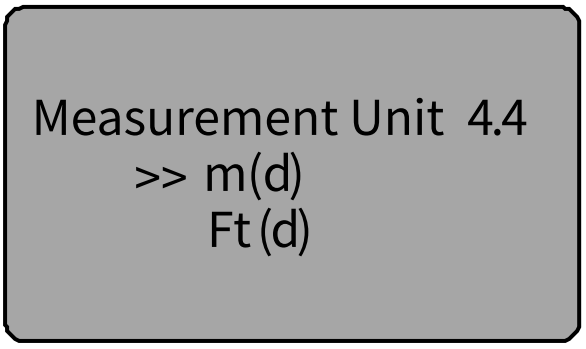


4.4 测量单位measurement units

测量单位提供给用户使用公制或英制计量的选择。当液晶显示复位菜单（菜单号4.3）时，按键，进入测量单位设置菜单，显示。

The unit of measurement provides the user with the option of using metric or imperial measurements. When the LCD displays the reset menu (menu number 4.3), press the key to enter the measurement unit setting menu, which displays.





按OK键，进入测量单位选择菜单，可根据需要选择相应的测量单位。

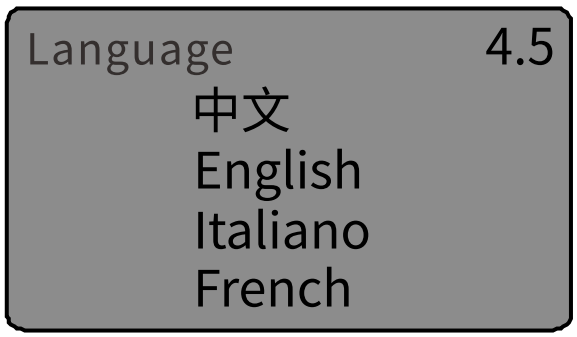
Press OK to enter the measurement unit selection menu.

4.5 语言language

语言提供给用户中文、英文、意大利文、法语等多种语言方式选择功能。当液晶显示测量单位（菜单号4.4）时，按键，进入语言设置功能，显示。

Language provides the user with a variety of language mode selection function in Chinese, English, Italian, French and so on. When the LCD displays the measurement unit When the LCD displays the measurement unit (menu No. 4.4), press key to enter the language setting function, which displays.





按OK键，进入语言选择菜单，选择所需的语言。

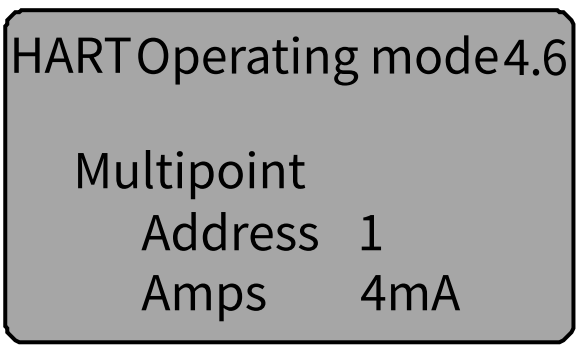
Press OK to enter the language selection menu and select the desired language.

4.6 HART工作模式HART operating mode

当两个或两个以上的仪表使用HART通信接口连接到上位机时，需用此功能将仪表设置为多点工作模式。当液晶显示测量单位（菜单号4.5）时，按键，进入HART工作模式菜单，显示。

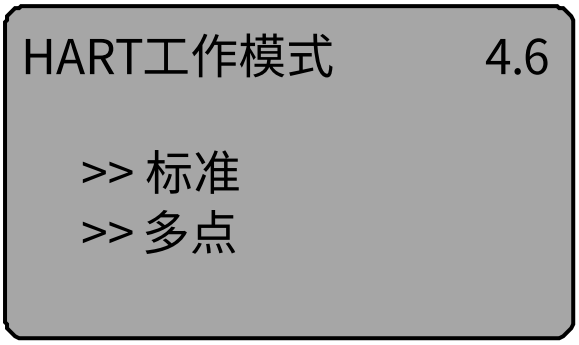
When two or more instruments are connected to the upper computer using HART communication interface, this function is needed to set the instrument to multi-point working mode. When the LCD displays the measurement unit (menu No. 4.5), press key to enter the HART working mode menu, which displays.

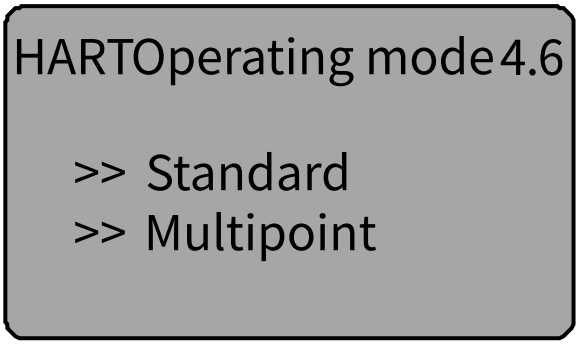




按OK键，进入HART工作模式设置界面，液晶显示。

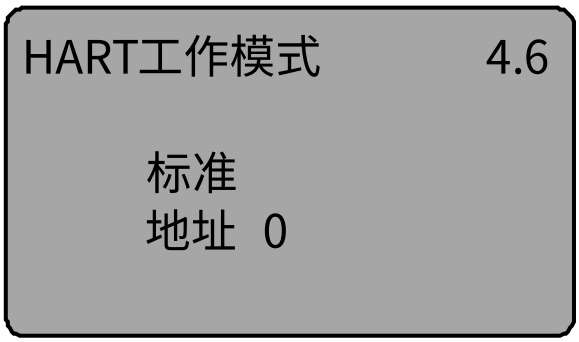
Press OK to enter HART working mode setting interface, LCD display.

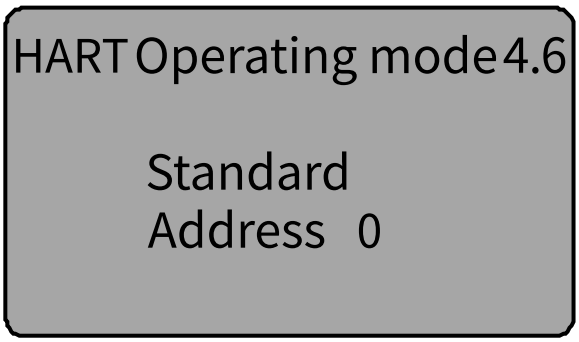




按键选择标准或多点工作模式。选择标准工作模式时，本机地址被指定为0.当选定HART工作模式为多点的显示如下：按OK键，进入标准设置。

Press key to select standard or multipoint operating mode. When the standard working mode is selected, the unit address is specified as 0. The display for selecting the HART working mode as multipoint is as follows: press the OK key to enter the standard setting.

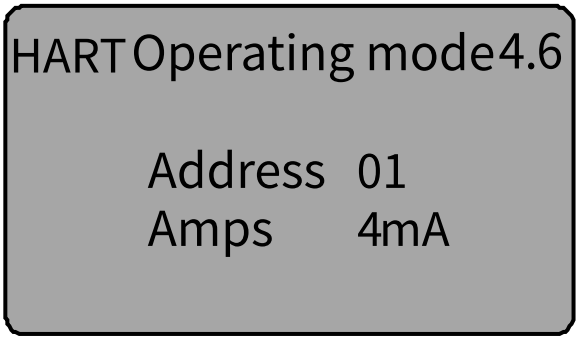




按OK键，进入多点设置。

Press OK to enter multi-point setup.





地址可改变为1~15；工作电流4mA和8mA可选择，按OK键确认。

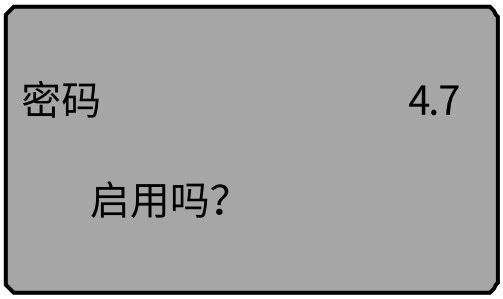
Address can be changed to 1~15; operating current 4mA and 8mA can be selected, press OK to confirm.

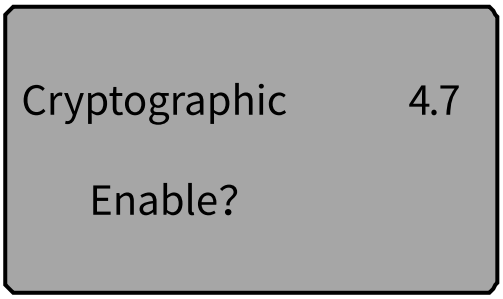
4.7 密码password

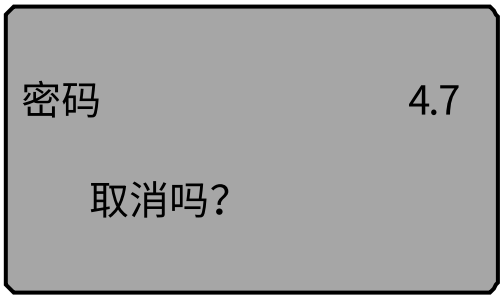
密码用于对仪表参数的保护，密码功能启用后，在更改任何一个仪表参数时都需要输入密码，

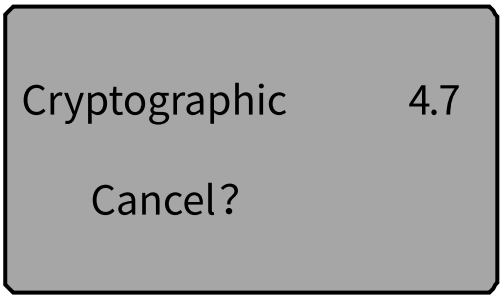
一旦输入正确的密码，密码防护功能限时取消，可对仪表参数进行修改。当液晶显示HART工作模式时，按键，进入密码功能，显示。

Password is used to protect the instrument parameters, after the password function is enabled, you need to input the password when changing any instrument parameter, once the correct password is input, the password protection function will be canceled for a limited time, and the instrument parameters can be modified. When the LCD shows HART working mode, press key to enter the password function, and the display shows.









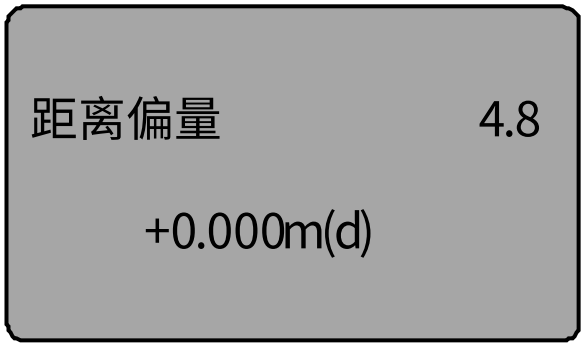
按OK键启用密码功能并设置密码或禁止密码功能。

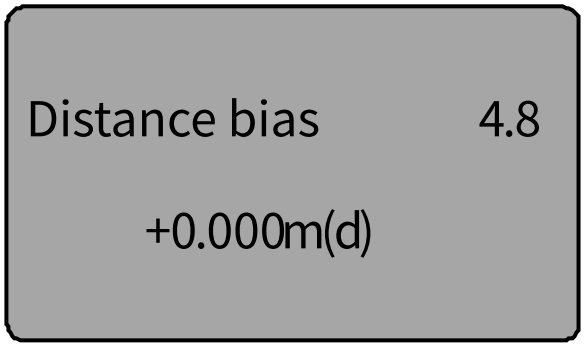
Press OK to enable the password function and set the password or disable the password function.

4.8 距离偏量distance bias

距离偏量设置用于，修改仪表测量误差值 为实际空高值与显示值之差，当液晶显示号码菜单号4.7时，按键，进入距离偏量菜单设置，显示。

The distance deviation setting is used to modify the measurement error value of the instrument to be the difference between the actual air height value and the display value. When the LCD shows the number menu No. 4.7, press key to enter the distance deviation menu setting, and it displays.



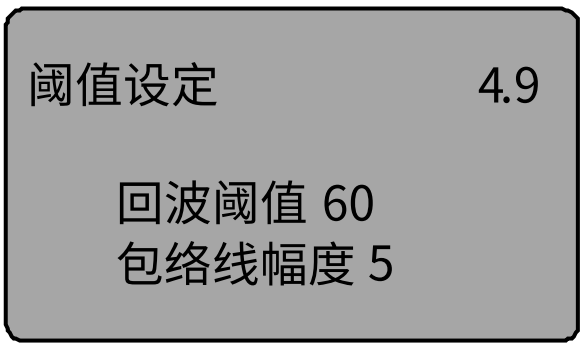


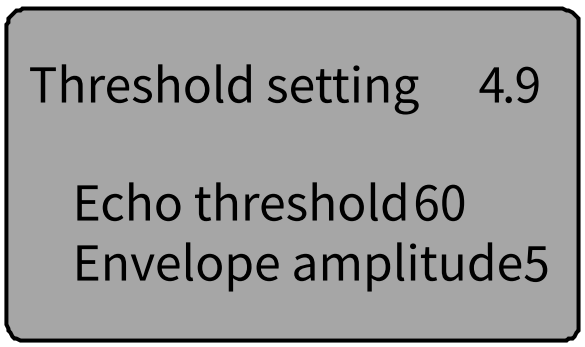
（注：本菜单需要专业人员操作）
(Note: this menu requires specialized personnel to operate)

4.9 阈值设定threshold setting

阈值设定有效回波的阈值大小，阈值设定越大，要求现场有效回波幅度越强，越有利于剔除小信号杂波干扰；但一定注意：如果修改阈值大于有效回波幅度时，会造成误会波的结果。该菜单包括回波阈值和包络线幅度，其中回波阈值的默认幅度为60mV，包络线幅度的默认值为5mV。

Threshold sets the threshold size of the effective echo, the larger the threshold setting, the stronger the required field effective echo amplitude, the more conducive to the elimination of small-signal clutter interference; but be sure to pay attention to: if the modification of the threshold value is greater than the effective echo amplitude, it will result in the result of the wrong wave. The menu includes echo threshold and envelope amplitude, in which the default amplitude of echo threshold is 60mV and the default value of envelope amplitude is 5mV.





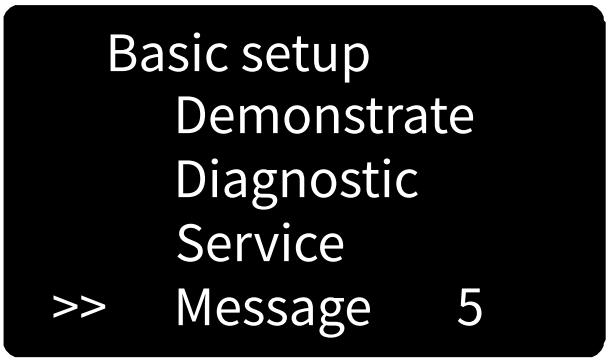
5. 信息message

信息菜单包括了仪表有关生产的基本信息，如产品序列号、生产日期、软件版本号等。当液晶

显示主菜单时，按键，将箭头移至信息项，液晶显示。

The Info menu includes basic information about the meter's production, such as product serial number, production date, software version number, etc. When the LCD displays the main menu, press the key and move the arrow to the information item, the LCD displays.





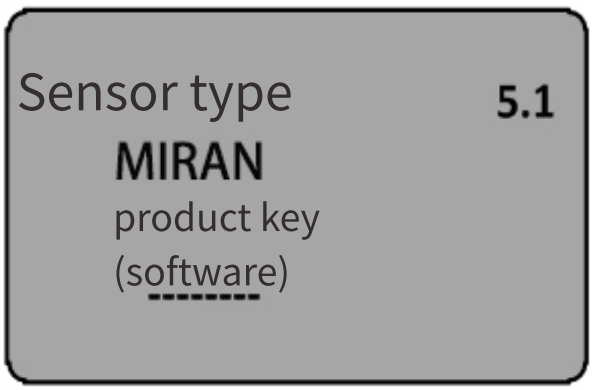
按OK键进入信息显示功能，液晶显示。

Press OK to enter the information display function, LCD display.

5.1 传感器类型、系列号

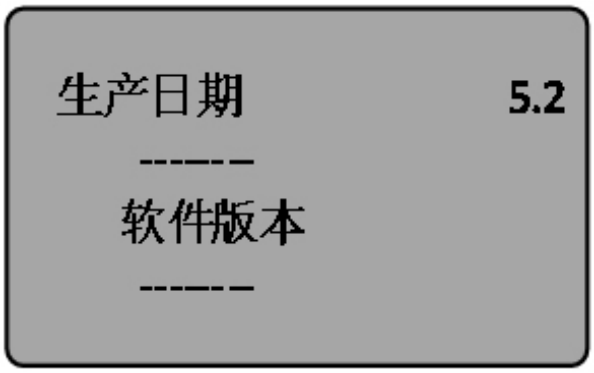
5.1 sensor type, series number

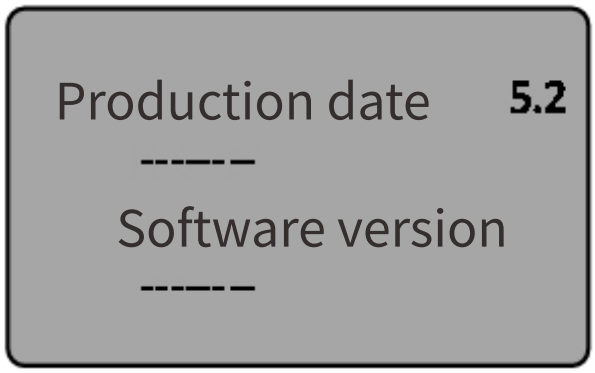




5.2 生产日期、软件版本

5.2 date of manufacture, software version





MLD-30系列故障诊断分析
MLD-30 series troubleshooting analysis

故障代码 trouble code	故障描述 fault description	排除办法 avoidance methods
Err11	供电电源故障 power supply failure	使用万用表检查产品电源两端是否超出正常使用范围，请确保产品的供电电源在正常使用范围内 use a multimeter to check whether the power supply of the product is out of the normal use range at both ends
Err12	HART 通讯故障 communication failure	检查负载电阻(250 欧)接线是否正确，再检查产品与上位机通讯是否正常 check whether the load resistance (250Ω) is wired correctly, and then check whether the communication between the product and the host computer is normal. check if the communication between the product and the host computer is normal
Err13	RS485 MODBUS 通讯故障 communication failure	先检查 RS485 通讯线的正负端是否按照标示正确连接，以及确认 RS485 转RS232 通讯转换模块是否正常工作,硬件连接正确无误后，再确认发送的RS485 MODBUS指令是否依据指令表正确发送 first, check whether the positive and negative ends of the RS485 communication cable are connected correctly according to the label, and confirm whether the RS485 to RS232 communication converter module is working properly, and after the hardware is connected correctly, then confirm whether the RS485 MODBUS commands are sent correctly according to the command table
Err14	没有接收到有效的 回波信号 no valid echo signal received	查看回波曲线菜单确认回波是否存在，确认产品当前是否进入盲区内，另检查量程设置是否满足实际使用，最后确认安装位置是否符合要求 check the echo curve menu to confirm whether the echo exists, confirm whether the product is currently in the blind zone, and check whether the range setting meets the actual use, and finally confirm whether the installation location meets the requirements
Err15	设备内存储器数据 读写错误 device internal memory data read/write error	返厂维修 return to factory for repair

故障代码 trouble code	故障描述 fault description	排除办法 avoidance methods
Err16	设备温度超出许可范围 equipment temperature exceeds the permissible range	提示电子仓的实际工作温度已超出-40~85℃，请确保产品运行在正常操作范围内 the actual operating temperature of the electronic compartment has exceeded -40~85°C. make sure that the product is operated within the normal operating range
Err17	设备EEPROM 数据读写错误 device EEPROM data read/write error	返厂维修 return to factory for repair
Err18	系统部件参数不匹配 mismatch of system component parameters	返厂维修 return to factory for repair

RS485系列通讯协议规范
RS485 series communication protocol specification

1.MODBUS 协议介绍
1.MODBUS protocol introduction

Modbus是一种工业协议，于1979年开发，旨在实现自动化设备之间的通信。

Modbus is an industrial protocol developed in 1979 to enable communication between automation devices.

Modbus串行链路协议是一个主-从协议。在同一时刻，只有一个主节点连接于总线，一个或多个子节点(最大编号为247)连接于同一个串行总线。Modbus 通信总是由主节点发起。子节点在没有收到来自主节点的请求时，从不会发送数据。子节点之间从不会互相通信。主节点在同一时刻只会发起一个 Modbus 事务处理。通常，主设备是人机界面（HMI）或监控和数据采集（SCADA）系统，从设备是传感器、可编程逻辑控制器（PLC）或可编程自动化控制器（PAC）。

The Modbus serial link protocol is a master-slave protocol. At the same time, only one master node is connected to the bus and one or more child nodes (maximum number 247) are connected to the same serial bus. Modbus communication is always initiated by the master

node. A child node never sends data without receiving a request from the master node. The child nodes never communicate with each other. The master node will only initiate one Modbus transaction at a time. Typically, the master is a Human Machine Interface (HMI) or supervisory control and data acquisition (SCADA) system, and the slave devices are sensors, programmable logic controllers (PLC), or programmable automation controllers (PAC).

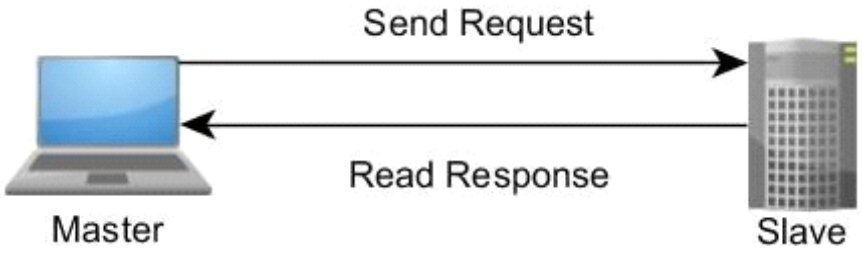


图1 主从网络关系

fig. 1 master-slave network relationship

在物理层，Modbus 串行链路系统可以使用不同的物理接口(RS485 、RS232) 。最常用的是TIA/EIA-485 (RS485) 两线制接口。

At the physical layer, the Modbus serial link system can use different physical interfaces (RS485, RS232). The most commonly used is the TIA/EIA-485 (RS485) two-wire interface.

Modbus有两种串行传输模式:RTU(Remote Terminal Unit)模式和ASCII模式。RTU模式的主要优点是有较高的传输密度，在相同的波特率下比ASCII模式有更高的吞吐率。ChinaSimba雷达液位计使用的是RTU传输模式。

Modbus has two serial transmission modes: RTU (Remote Terminal Unit) mode and ASCII mode. The main advantage of RTU mode is that it has higher transmission density and higher throughput than ASCII mode at the same baud rate. ChinaSimba radar level meter uses RTU transmission mode.

2.RTU模式的帧结构
2.frame structure in RTU mode

Modbus RTU帧里面一般包含以下字段:

Modbus RTU frames generally contain the following fields inside:

1.地址:从设备的地址，取值范围为1~247.

1.Address: address of the slave device, the value range is 1~247.

2.功能码：主设备的操作类型，比如读取数据的功能码为0x03，写入数据的功能码为0x06.

2.Function code: the type of operation of the master device, e.g. the function code for reading data is 0x03 and for writing data is 0x06.

3.寄存器地址：主设备要操作的数据所在地址。

3.Register address: the address where the data to be operated by the master device is located.

4.寄存器个数：主设备要操作的数据个数，以2个字节为单位，比如寄存器个数为1时，读取或写入的字节数为2个字节。寄存器个数取决于要操作的数据长度，比如读取一个浮点型数据，那么寄存器个数为2.

4.Number of registers: the number of data to be operated by the master device, in units of 2 bytes, for example, when the number of registers is 1, the number of bytes read or written is 2 bytes. The number of registers depends on the length of the data to be operated, for example, if reading a floating point data, then the number of registers is 2.

5.字节数：寄存器值的字节数。

5. Number of bytes: the number of bytes of the register value.

6.CRC校验：对所有的帧数据进行校验，CRC校验码包含两个字节，传送时低字节优先（LSB）。

6.CRC checksum: checksums all frame data, CRC checksum code contains two bytes, low byte first (LSB) when transmitting.

除CRC校验外，对于多个字节的数据（如浮点型），传送时都以高字节优先（MSB）。

with the exception of CRC checksums, for data of multiple bytes (eg. floating-point), transmission is done with high byte precedence (MSB).

2.1 读取数据的帧结构

2.1 frame structure for reading data

数据读取的请求帧,功能码为0x03.其帧结构如表1所示：

The request frame for data reading, the function code is 0x03. The frame structure is shown in table 1:

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	2B	2B	1B	1B

表1 数据读取的请求帧结构

table 1 structure of request frame for data reading

数据读取的应答帧(假设请求帧的寄存器个数为N)的帧结构如表2所示:

The frame structure of an answer frame for a data read (assuming that the number of registers in the request frame is N) is shown in table 2:

地址 Address	功能码 Function code	字节数 Byte count	寄存器值 Register value	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	1B (=2*N)	(2*N) Bytes	1B	1B

表2 数据读取的应答帧结构

table 2 structure of answer frame for data reading

2.2 写单个数据的帧结构

2.2 frame structure for writing single data

此命令只能写入2个字节的数据。

This command can write only 2 bytes of data.

写单个数据的请求帧,功能码为0x06.其帧机构如表3所示:

The request frame for writing a single data, the function code is 0x06. The frame organization is shown in table 3:

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器值 Register value	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	2B	2B	1B	1B

表3 写单个数据的请求帧结构

table 3 structure of the request frame for writing a single piece of data

写单个数据的应答帧,其帧结构如表4所示:

Write a single data answer frame with the frame structure shown in table 4:

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器值 Register value	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	2B	2B	1B	1B

表4 写单个数据的应答帧结构

table 4 structure of the answer frame for writing a single piece of data

2.3 写多个数据的帧结构

2.3 frame structure for writing multiple data

此命令可写入多个字节的数据。

This command writes multiple bytes of data.

写多个数据的请求帧，功能码为0x10。假设寄存器个数为N，其帧结构如表5所示：

The request frame for writing more than one data, the function code is 0x10. Assuming the number of registers is N, the frame structure is shown in table 5:

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	字节数 Byte count	寄存器值 Register value	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	2B	2B (=N)	1B (=2*N)	(2*N) Bytes	1B	1B

表5 写多个数据的请求帧结构

table 5 structure of the request frame for writing multiple data

写多个数据的应答帧（假设请求帧的寄存器个数为N），其帧结构如表6所示：

The answer frame that writes multiple data (assuming the number of registers in the request frame is N) has the frame structure shown in table 6:

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	CRC低字节 CRC low byte	CRC高字节 CRC high byte
1B	1B	2B	2B(=N)	1B	1B

表6 写多个数据的应答帧结构

table 6 answer frame structure for writing multiple data

3.串口配置Serial port configuration

MODBUS的串口配置参数如表7所示：

The serial port configuration parameters for MODBUS are shown in table 7:

参数Parameters	设置值Set value
波特率 baud rate	9600 bps
校验位 check digit	无 none
数据位 data bit	8
停止位 stop bit	1

表7 Modbus的串口配置参数

table 7 serial port configuration parameters for modbus

4.雷达水位计通讯协议定义

4.Radar water level meter communication protocol definition

4.1 数据读取命令data read command

假设设备的地址为0x01。表中的数据都是十六进制格式。

assume that the address of the device is 0x01. the data in the table are in hexadecimal format.

4.1.1 旧版本命令older commands

此次协议更新，可兼容旧版本中的常用命令，使用旧版本协议的数据采集程序（Modbus主设备）无需更新协议也可正常通信。

This protocol update is compatible with the common commands in the old version. Data acquisition programs (Modbus master devices) using the old version of the protocol can communicate normally without updating the protocol.

表8中所列为空高、料高的读取命令，表9为发送和应答的示例。

The read commands for null height and material height are listed in table 8, and examples of send and answer are shown in table 9.

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	CRC校验码 CRC check code	含义 Hidden meaning
01	03	0000	0002	C40B	空高empty height (单位unit:cm,unsigned short)
01	03	0001	0002	95CB	空高empty height (单位unit:cm,unsigned short)
01	03	0002	0002	65CB	料高fertilizer height (单位unit:cm,unsigned short)
01	03	0003	0002	340B	料高fertilizer height (单位unit:cm,unsigned short)

表8 旧版本协议空高料高读取命令

table 8 older versions of the protocol empty high material high read commands

示例：读取地址编号为 01 的雷达水位计当前空高值，实际返回为：304cm。

Example: read the current air height value of the radar water level meter with address number 01, and the actual return value is: 304cm.

发送 dispatch	01	03	00	00	00	02	C4	0B
返回 return	01	03	02	01	30	B9	C0	–

表9 旧版本协议示例

table 9 examples of older versions of protocols

4.1.2 新版本命令new commands

新版本命令完全符合标准Modbus协议。

The new version of the command is fully compliant with the standard Modbus protocol.

表10中列出的是主设备的请求帧，应答帧参照2.1的帧结构进行解析。

The request frames of the master device are listed in table 10, and the answer frames are parsed with reference to the frame structure of 2.1.

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	CRC校验码 CRC check code	含义 Hidden meaning
01	03	1000	0002	C0CB	空高empty height (单位unit:m, float)
01	03	1002	0002	610B	料高fertilizer height (单位unit:m, float)
01	03	1010	0002	C10E	空高empty height (单位unit:cm, int)
01	03	1012	0002	60CE	空高empty height (单位unit:mm, int)
01	03	1014	0002	80CF	料高fertilizer height (单位unit:cm, int)
01	03	1016	0002	210F	料高fertilizer height (单位unit:mm, int)
01	03	1018	0002	40CC	距离gap (单位unit:m, float)
01	03	101A	0002	E10C	距离gap (单位unit:cm, int)
01	03	101C	0002	010D	距离gap (单位unit:mm, int)
01	03	2000	0002	CFCB	低位调整值 low value of adjustment (单位unit:m, float)

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	CRC校验码 CRC check code	含义 Hidden meaning
01	03	2004	0002	8E0A	高位调整值high value of adjustment (单位unit:m, float)
01	03	200A	0002	EFC9	测量量程measuring range (单位unit:m, float)
01	03	5010	0002	54C3	序列号product key (software) (string)
01	03	5020	0010	54CC	生产日期date of production (string)
01	03	5030	0010	5509	软件版本software version (string)

表10 数据读取命令
table 10 data reading commands

注note:① 以浮点数形式返回空高值和料高值,单位为米。
① returns the air and material height values as floating point numbers in meters.
② 以长整数形式(4个字节)返回空高值或料高值。
② returns the null height value or the material height value as a long integer (4 bytes).

4.2数据写入命令data write command

表11中列出的是主设备的请求帧,应答帧参照2.3的帧结构进行解析。列表中的数据都是十六进制格式。
The request frames of the master device are listed in Table 11, and the answer frames are parsed with reference to the frame structure of 2.3.The data in the list are in hexadecimal format.

地址 Address	功能码 Function code	寄存器地址 Register address	寄存器个数 Number of registers	字节数 Byte count	寄存器值 Register value	CRC	含义 Hidden meaning
01	06	001F	—	—	0002	39CD	设置地址为2 set address to 2 (旧版本协议) (older versions of protocols)
01	03	4006	0001	02	0002	6633	设置地址为2 set address to 2
01	03	2000	0002	04	3f800000	6792	低位调整为1.0m low adjusted to 1.0m
要设置其他功能,请参照4.1节表中的寄存器地址进行设置。 to set up other functions, refer to the register addresses in the table in section 4.1.							

表11 数据写入命令
table 11 data write commands



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（尤其是在尺寸方面要求特别严格的，或者在产品实物没收到之前，就要先在自己设备上加工做好安装孔位和确定安装空间位置的，要特别注意,要在购买前3天内与我们书面再次确认好产品的实际尺寸，以免造成不必要的返工等损失，若没有在购买前3天内与我们书面确认尺寸而造成后续安装困难等损失，我司不予承担，最终尺寸要以产品实物为准。）

将致力于位移、物位、角度等测控领域

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Products and services that provide one-stop solutions for our customers

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