

WD-HL700系列超声波液位计

WD- HL700 SERIES ULTRASONIC LEVEL TRANSMITTER

测量原理 Measuring Theory

超声波物位计的工作原理是由换能器（探头）发出高频超声波脉冲，遇到被测介质表面被反射回来，部分反射回波被同一换能器接收，转换成电信号。超声波脉冲以声波速度传播，从发射到接收到超声波脉冲所需时间间隔与换能器到被测介质表面的距离成正比。此距离值S与声速C和传输时间T之间的关系可以用公式表示： $S=C \times T/2$ 。

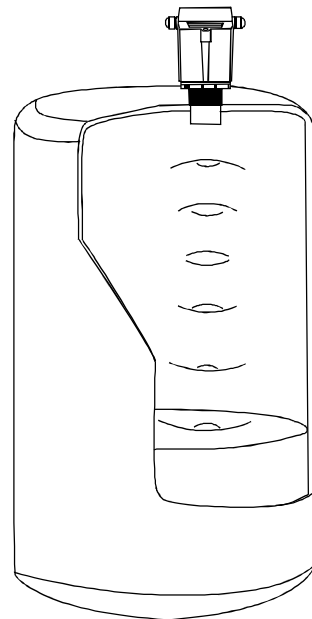
由于发射的超声波脉冲有一定的宽度，使得距离换能器较近的小段区域内的反射波与发射波重叠，无法识别，不能测量其距离值。这个区域称为测量盲区。盲区的大小与超声波物位计的型号有关。

The theory of ultrasonic wave meter : the detector issues high frequent ultrasonic pulse, it will be reflected back once it meets the measured surface. Some reflected wave will be absorbed by the detector, and be transferred to electrical signal. The ultrasonic pulse spread out by sound speed, the time interval from issuing to receiving the pulse is direct ratio with the distance between the detector and the measured surface. The relation among distance S、sound speed C and transmitting time T can show with a formula: $S=C \times T/2$.

Due to pulse width, some reflected wave are overlapped with some issued wave where is near the detector, it will cause no distinguishable, can't measure the distance. This area is called measuring blind area. The distance of the blind area is relative with the ultrasonic meter model.

技术参数 Technical Parameters

测量范围：0~15m（根据实测量程选定）
 Measuring range: 0~15m (according to actual measuring range)
 盲区 Blind area: 0.25m~0.6m
 测距精度：0.3%（标准条件）
 Accuracy: 0.3% (standard condition)
 测距分辨率 Resolution: 1mm
 压力：4个大气压以下
 Pressure: below 4atm
 仪表显示：自带LCD显示液位或空间距离
 Display: with LCD display the distance of level or space
 模拟输出 Analog output: 4~20mA
 数字输出：RS485、Modbus协议或定制协议
 Digital output: RS485、Modbus agreement
 供电电压：DC24V/AC220V，防雷装置内置
 Power supply: DC24V/AC220V, internal lightning protection system
 环境温度 Ambient temperature: $-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$
 防护等级 Grade of Protection: IP65

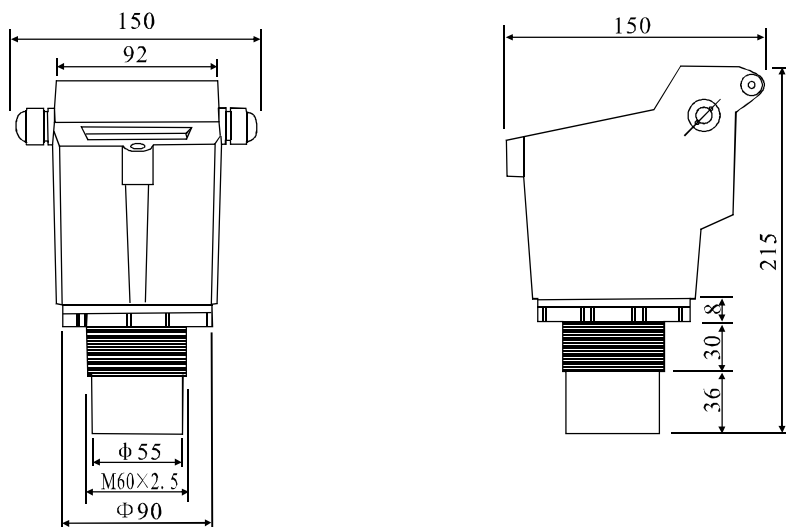


型号规格表 Model & Spec

WD-HL700		一体化超声波物位计 Ultrasonic Wave Meter	
A	0~5000mm	量程范围 measuring range	
C	0~10000mm		
E	0~15000mm		
1	2"螺纹	连接形式 connecting type	
2	DN50法兰		
3	DN80法兰		
4	DN100法兰		
F	PTFE	换能器外壳材料 detector housing material	
U	PU/PC		
4	二线制4-20mA	信号输出 signal output	
5	二线制4-20mA带485协议		
0	24VDC	供电电压 Power supply	
1	220VAC		
P	普通型 Normal	防爆等级 explosion proof classification	
D	隔爆型 Explosion proof type		
B	本安型 Intrinsically safe type		
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仪表安装 Installation

1. 仪表外形尺寸（探头尺寸会根据量程的不同而有所改变，若有不同会预先告知）
 Outside size(the length of the detector can be changed with the measuring range)

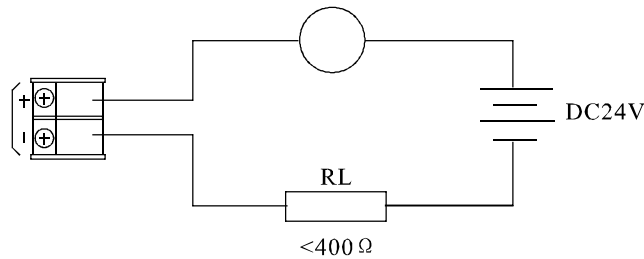


2. 安装方法 installation

敞口环境下一般采用支架安装方式，用仪表自带法兰固定。池或罐在安装位置上割一个略大于探头直径（60mm）的圆孔，将仪表放入，然后将法兰自下而上旋紧。安装必须保证仪表的探头面与被测液面水平。

In general, using bracket to install if the tank is opening, fixing the bracket with the flange of the ultrasonic level meter. It is important to ensure the detector surface and the liquid level on the same level.

3. 仪表接线 Wiring



4. 安装参数 installing parameters

TH---安装高度 installing height

L---测量距离 measured distance

H---当前液位 actual liquid level

如图所示，仪表的探头发射波打到液位后反射回探头，探头接收到后计算发射波到接收波的时间，得到测量距离L，仪表安装高度TH减去测量距离L将得到当前液位H。

As is shown, the meter emit the wave to meet the measured level and receive the wave again, the time of this process can be transferred to measured distance L, actual level H is that installing height minus measured distance $H=TH-L$.

仪表量程指仪表能够测量的距离，安装高度TH应小于仪表量程。

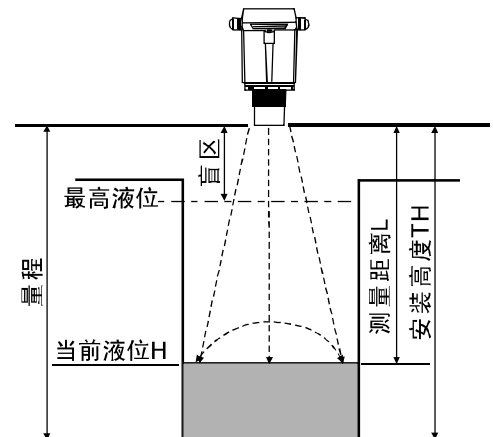
The measuring range is the maximum range the meter can measure, installing height must be less than the measuring range.

仪表盲区指仪表在探头附近无法测量的区域，最高液位与探头间距应大于盲区，例盲区为0.3m，则最高液位与探头间距必须大于0.3m。

Blind area: the distance between the highest level and the detector must more than blind area. FE the blind area is 0.3m, the distance between the highest level and the detector must more than 0.3m.

探头发波是个扩散过程，即有方向角，安装的时候要注意，否则可能打到池壁的凸起物或渠道边沿。

The emitted wave have direction angle, pls pay attention to avoid the emitted wave meet the wall or others.



选型和安装注意事项 Model selection & installation attention

- 1) 探头发射面到最低液位的距离，应小于选购仪表的量程。

The distance between detector surface and the lowest level must be less than the measuring range of the meter.

- 2) 探头发射面到最高液位的距离，应大于选购仪表的盲区。

The distance between the detector surface and the highest level must be more than the blind are.

- 3) 探头的发射面应该与液体表面保持平行。
The detector surface is on the same level with the measured level.
- 4) 探头的安装位置应尽量避免开正下方进、出料口等液面剧烈波动的位置。
The meter should not be installed these location: below the meter just the material entrance or material outlet.
- 5) 若池壁或罐壁不光滑, 仪表安装位置需离开池壁或罐壁0.3m以上。
If the tank wall is not smooth,the distance between the meter and wall is more than 0.3m.
- 6) 若探头发射面到最高液位的距离小于选购仪表的盲区, 需加装延伸管, 延伸管管径大于120mm, 长度0.35m~0.50m, 垂直安装, 内壁光滑, 罐上开孔应大于延伸管内径。或者将管子通至罐底, 管径大于80mm, 管底留孔保持延伸管内液面与罐内等高。
If the distance between the detector surface and the highest level is less than the blind area,should install extension pipe. The diameter of the pipe is more than 120mm,length is 0.35m~0.50m ,vertical installing, wall smooth,the installing hole on the vessel must be larger than the extention pipe. Another way to extend the pipe to the bottom of the vessel,the diameter more than 80mm.
- 7) 仪表在室外安装建议加装遮阳板以延长仪表使用寿命。
Suggest to install sunvisor to ensure long service life.
- 8) 电线、电缆保护管, 要注意密封防止积水。
Ensure cable protection pipe sealing
- 9) 仪表虽然自身带有防雷器件, 但仪表在多雷地区使用时, 建议在仪表的进出线端另外安装专用的防雷装置。
Lightning protection device is installed in the meter,but in some more-lightning area,suggest to install another protection device at the entrance and outlet of the meter wire.
- 10) 仪表在特别炎热、寒冷的地方使用, 即周围环境温度有可能超出仪表的工作要求时, 建议在液位仪周围加设防高、低温装置。
Under some special hot or cool condition, suggest to install some device to protect the meter too hot or too cool.

仪表设置 Menu Setting

1. 键盘说明 key introduction



【Mode】: 菜单键Menu key

按【Mode】出现密码界面, 输入密码进入菜单, 在设置时按【Mode】取消设置, 设置完毕后, 按【Mode】键退出菜单。

Press 【Mode】then appear password page,input password to enter the menu.Pressing the key 【Mode】 while setting is regarded as canceling the setting;press the key to exit the menu after finishing setting.

【▲】: 下翻键和数字键Down key & number key

在菜单中, 该键作为菜单的下翻键用, 在更改数据时, 该键作为数字键用。

In the menu,the key is down key; while adjusting data,the key is as number key.

【▶】: 移位键和上翻键Shift key & up key

在菜单中, 该键作为菜单的上翻键用, 在更改数据时, 该键作为移位键用。

In the menu,the key is up key;while adjusting data,the key is as shift key.

【OK】: 确认键Confirm key

选择菜单或确认选项和数据。

Select menu or confirm option and data.

2. 密码说明Password

按Mode键, 出现密码界面: “0000”, 按【▲】键将第一位改为1, 按【OK】键即可进入参数设置菜单界面。

Press Mode,appear password page: “0000”, press 【▲】 change first number to 1,press 【OK】 to enter setting menu.

3. 参数设置Parameter setting

3.1 液位标定 (P01) Level Calibration

仪表安装完毕、上电后，液晶上会显示液位数值，而该数据往往与实际液位不符，故需要液位标定。

液位标定步骤如下：按Mode键，输入密码，再按OK键进入参数设置菜单。P01为液位标定菜单，按OK键进行P01液位标定，用键（移位）和▲键（数字更改）将数字改为实际液位值（如2.100），按OK键确认，再按Mode键退出参数设置菜单，此时液晶将显示2.100。

After finishing installation & supply power to the meter, the display number is always not same as the actual level, so need calibrate: press Mode, input password, press OK to enter setting menu. P01 is level calibration menu, press OK to confirm, press &▲ to change the number to actual level (FE 2.100), press OK to confirm, press Mode to exit the menu.

3.2 20mA设置 (P02) 20mA setting

在仪表正常工作时按Mode键进入参数设置菜单，按▲键选择P02菜单，第二行数字即为20mA对应液位，按OK键进行设置。

As the meter is working, press Mode to enter the menu, press▲ to select P02, the number of line 2 is level height which 20mA is corresponding, press OK to set.

3.3 显示模式设置 (P03) Display mode setting

P03菜单可更改显示模式，共有3种显示模式可供选择 Three mode for selection

1. 00 显示液位 display level
2. 01 显示距离 display space
3. 02 显示距离和气温 display space & temperature

按▲键选择所需模式然后按OK键确认 press ▲ to select needed mode, then press OK to confirm.

3.4 探头高度 (P04) Detector height

P04菜单可以显示探头高度，可查看探头高度是否符合现场情况，也可用于液位标定。直接按照现场情况更改探头高度值。P04 display detector height, change the parameter according to the actual installing height.

3.5 反应速度设置 (P05) Reaction rate setting

P05菜单可更改仪表反应速度。液位变化速度越快，相应要求仪表反应的速度越快。本仪表有4中模式可供选择：

1. 00 最快反应速度 the fastest reaction rate
2. 01 较快反应速度 faster reaction rate
3. 02 中速反应速度 fast reaction rate
4. 03 慢速反应速度 slow reaction rate

按▲键选择所需模式然后按OK键确认 press▲ to select, then press OK to confirm

【注意】：仪表反应速度越快，仪表显示数据跳动越大；相反，仪表反应速度越慢，仪表显示数据越稳定。如果液位变化不是特别快，一般不用修改出厂设置。

Attention: the faster the reaction rate is, the wider range the meter number jump; the slower the reaction rate is, the more stably the meter display. If the level change not quickly, suggest not to change default setting.

3.6 盲区设置 (P06) Blind area setting

可更改仪表盲区以适应现场一些复杂工况。例如可以避开探头附近凸起物对仪表的影响。一般情况不用修改出厂设置。Change blind area to adapt some complex and difficult working conditions. In general, suggest not to change default setting.

3.7 4~20mA测试设置 (P09) 4~20mA test setting

P09为4~20mA测试菜单，按OK键再按▲键可进行4~20mA输出测试。

P09 is 4~20mA testing menu, press OK, then press▲ to test 4~20mA output.