TKWL-1300系列导波雷达料位计

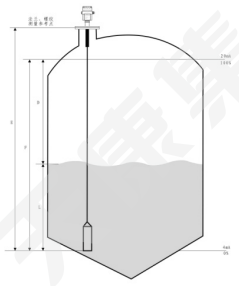
TKWL-1300 Guided wave radar material level meter

一、概述 Overview

测量原理 Measuring principle

导波雷达是基于时间行程原理的测量仪表，雷达波以光速运行，运行时间可以通过电子部件被转换成物位信号。探头发出高频脉冲并沿缆式探头传播，当脉冲遇到物料表面时反射回来被仪表内的接收器接收，并将距离信号转化为物位信号。

Guided wave radar is a measuring instrument based on the principle of time travel, radar wave operates at the speed of light and the operation time can be converted into material level signal through electronic components. The probe sends out high-frequency pulse and tansmit along with the cable type probe. When pulse reflected back after encountering material surface and received by receiver in the meter, it will convert the distance signal into material level signal.



输 入 Input

反射的脉冲信号沿缆绳传导至仪表电子线路部分，微处理器对此信号进行处理，识别出微波脉冲在物料表面所产生的回波。正确的回波信号识别由智能软件完成，距离物料表面的距离D与脉冲的时间行程T成正比： D=C×T/2 其中C为光速。

The reflected pulse signal transmits along the cable into the electronic circuit of meter; microprocessor will process this signal and identify the echo produced by microwave pulse on the surface of material. Correct echo signal identification is accomplished by intelligent software and the distance D to the surface of material and the time travel T of pulse are in the direct ratio: D=C×T/2, in which C is speed of light.

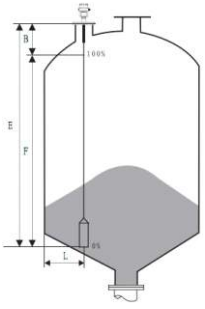
因空罐的距离E已知，则物位L为：L=E-D

As the distance of empty tank is known, and then the material level L is L=E-D.

输 出 Output

通过输入空罐高度E（=零点），满罐高度F（=满量程）及一些应用参数来设定，应用参数将自动使仪表适应测量环境。对应于4~20mA输出。

Through inputing the height of empty tank E (=zero point), the height of full tank F (=full measuing range) as well as some application parameters to set, adapt the meter to measuring environment based on parameters automatically, corresponding to 4—20mA output.



测量范围 Measuring range

测量范围 Measuring range
F----测量范围 measuring range
E----空罐距离 distance of empty tank
B----顶部盲区 top blind area
L----探头到罐壁的最小距离 minimum distance between probe to tank wall
顶部盲区是指物料最高料面与测量参考点之间的最小距离。
Top blind area refers to the minimum distance between the highest material surface and reference point of measurement.
底部盲区是指缆绳最底部附近无法精确测量的一段距离。
Bottom blind area refers to the distance at the bottom of cable which can’ t be measured accurately.
顶部盲区和底部盲区之间是有效测量距离。
Distance between op blind area and bottom blind area is effective measuring distance.

注意 Attention:
只有物料处于顶部盲区和底部盲区之间时，才能保证罐内物位的可靠测量。
A reliable measurement for the material level in the tank can only be guaranteed when the material is located between top blind area and bottom blind area.

二、产品款型信息　　Products Model Information

TKWL-1301



应　用 Application	液体、固体颗粒 Liquids, solid particles
测量范围 Measurement range	30米 30 meters
过程连接 Process Connection	螺纹、法兰 Screw thread, flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

TKWL-1302



应　用 Application	液体、固体颗粒 Liquids, solid particles
测量范围 Measurement range	6米 6 meters
过程连接 Process Connection	螺纹、法兰 Screw thread, flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

TKWL-1303



应　用 Application	液体、固体颗粒 Liquids, solid particles
测量范围 Measurement range	6米 6 meters
过程连接 Process Connection	螺纹、法兰 Screw thread, flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

TKWL-1304



应 用 Application	液体 Liquids
测量范围 Measurement range	6米 6meters
过程连接 Process Connection	螺纹、法兰 Screw thread, flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

TKWL-1305



应 用 Application	腐蚀性液体 Corrosive liquid
测量范围 Measurement range	杆式6米/缆式20米 Rod type 6 meters/cable type 20 meters
过程连接 Process Connection	螺纹、法兰 Screw thread, flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

TKWL-1306

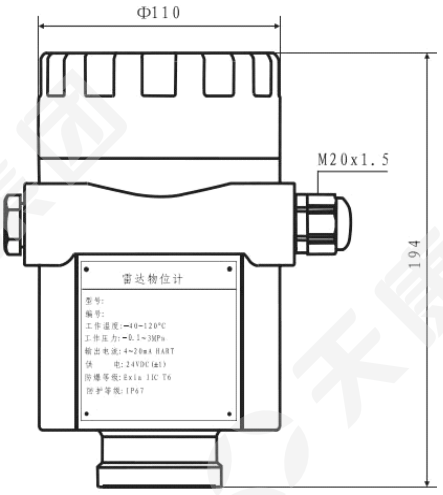


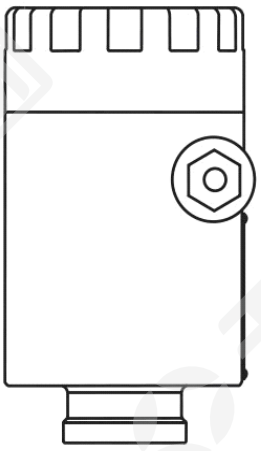
应 用 Application	介电常数低或表面波动液体 Liquid with low dielectric constant or surface fluctuation
测量范围 Measurement range	6米 6 meters
过程连接 Process Connection	法兰 Flange
过程温度 Process Temperature	-40~250℃
过程压力 Process Pressure	-0.1~2MPa
精度 Accuracy	±1mm
频率范围 Frequency Range	100MHz~1.8GHz
防爆/防护等级 Explosion-proof/protection Class	Exia IIC T6/IP67
信 号 输 出 Signal Output	4~20mA/HART(两线)(Two-wire)

三、产品系列尺寸　　Dimensions of products series

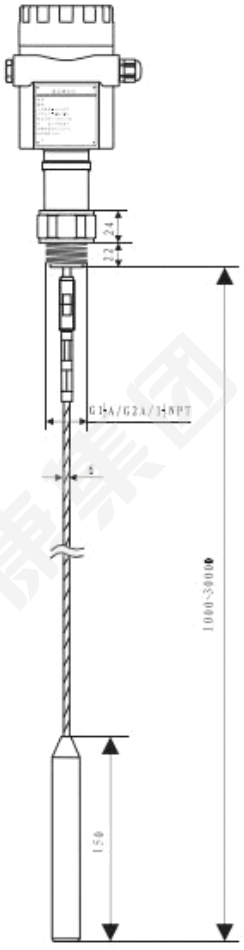
外壳 Shell

材质：AL/316L
Material: AL/316L

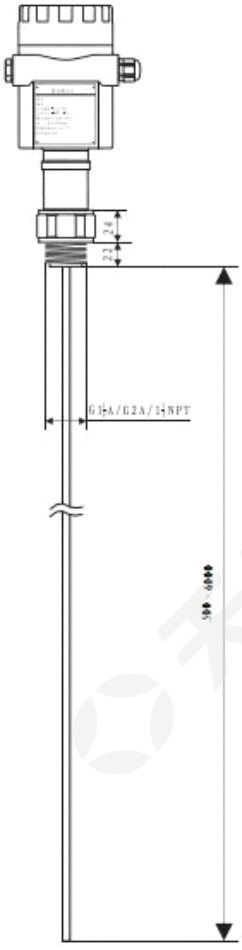




缆式 Cable type



杆式 Bar type



四、技术参数 Technical Parameters

参数 Parameters	工作频率:100MHz~1.8GHz Working efficiency: 100MHz~1.8GHz
	测量范围:缆式：0~30m;杆式、双杆式、同轴管式：0~6m; Working efficiency: 100MHz~1.8GHz
	重复性：±2mm Repeatability: ±2mm
	分辨率：1mm Resolution: 1mm
	采样：回波采样55 次/s Sampling: echo sampling 55 times/s
	响应速度：>0.2S（根据具体使用情况而定） Sampling: echo sampling 55 times/s
	输出电流信号：4~20mA Output current signal: 4~20mA
	精度：<0.1% Accuracy: <0.1%
	通讯接口：HART通讯协议 Accuracy: <0.1%
	过程连接: G11/2A螺纹 Process connection: screw thread
	法兰（flange)DN50，DN80，DN100，DN150，DN200,DN250
	过程压力: -0.1~2MPa Process pressure: -0.1~2MPa
	电源：24VDC(±10%),纹波电压：1Vpp Power: 24VDC(±10%), ripple voltage: 1Vpp
	耗电量：max 22.5mA Electricity consumption: max 22.5mA
	环境条件：温度-40℃~+70℃ Environmental condition: temperature -40℃~+70℃
	外壳防护等级: IP67 Environmental condition: temperature -40℃~+70℃
	防爆等级： EXia IIC T6 Explosion proof class: EXia IIC T6
	两线制接线：仪表供电和信号输出共用一根两芯屏蔽电缆线 Two wire connection: power supply of meter and signal output use the same two-core cable.
	电缆入口：2个M20*1.5或1/2NPT(电缆直径5--9mm) Cable entrance: 2 M20*1.5 or 1/2NPT (diameter of cable 5-9mm)

五、测量距离

下表列出不同类别被测介质与测量距离的关系

Measuring distance

The intelligent float liquid level meter is made up of a float, an indicator and a sensor, as shown in the figure:

介质分组 Medium Group	DK(ε)	固体颗粒 Solid particle	液体 Liquid	测量范围 Measuring Range
1	1.4~16	/	冷凝气，如N2CO2 Condensing gas, such as N2CO2	3m（仅指同轴杆式探头） 3m(only refers to coaxial rod probe)
2	1.6~19	塑料带粒子 白灰石，特种水泥、糖 Plastic belt particles Lime stone, special cement Sugar	液化气，如丙烷溶剂 氟利昂12/氟利昂棕榈油 Liquefied petroleum gas, such as propane SolutionFreon 12/Freon Palm oil	30m
3	1.9~25	普通水泥，石膏 Common cement, gypsum	矿物油，燃料 Mineral oil, fuel	30m
4	2.5~4	谷物，种子，石头，砂粒 Grain, seed,Stone,Sand	苯，苯乙烯，甲苯，呋喃，萘 Benzene, styrene, toluene Furane,naphthalene	30m
5	4~7	潮湿的石头，矿石，盐 Wet rock, ore Salt	含水液体，酒精，液氮 Liquid with water Alcohol Liquid ammonia 30m	30m
6	>7	金属粉末，碳黑，煤炭 Metal powder Carbon black Coal	氯苯，氯，仿纤维素喷雾 异氰盐酸，本胺 Benzene, chloroform Cellulose spray ISO cyanide, the amine	30m

六、产品选型 Products Selection

TKWL-1301											
探头类型 Probe Model 6mm杆式探头 6mm Cable type probe											
最大量程 Maximum Meauring Range 30000mm											
材质 Material 不锈钢 Stainless steel											
探头长度(mm) length of probe											
编程器 Programmer 带 With 不带 Without					B X						
现场显示 Site display 带 With 不带 Without						V X					
电缆接口 Cable interface M20*1.5 ½NPT							M N				
外壳/防护等级/天线防护等级 Shell/protection class/antennaprotection class 铝/IP67 Aluminum/IP67								L			
密封温度Seal temperature 普通密封-40~100℃ Common seal -40~100℃ 高温密封-40~250℃带散热器 High temperature seal -40~250℃ with radiator									P G		
一体化过程连接/材质 Integrated process connection/materia 法兰DN50 PN16C 不锈钢 Flange DN50 PN16C Stainless Steel 法兰DN80 PN16C 不锈钢 Flange DN80 PN16C Stainless Steel 法兰DN100 PN16C 不锈钢 Flange DN100 PN16C Stainless Steel 法兰DN150 PN16C 不锈钢 Flange DN150 PN16C Stainless Steel 法兰DN200 PN16C 不锈钢 H Flange DN200 PN16C Stainless Steel 特殊约定 Special agreement										C D E F H Y	
防爆 Explosion proof 非防爆型（普通型）电流信号输出（4~20mA）HART协议 Non explosion proof type (common type) Current signal output agreement (4~20mA) HART 本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART											P I D

TKWL-1302											
探头类型 **Probe Model** 10mm杆式探头 10mm Cable type probe											
最大量程 **Maximum Meauring Range** 6000mm											
材质 **Material** 不锈钢 Stainless steel											
探头长度(mm) length of probe											
编程器 Programmer 带 With B 不带 Without X											
现场显示 Site display 带 With V 不带 Without X											
电缆接口 Cable interface M20*1.5 M ½NPT N											
外壳/防护等级/天线防护等级 **Shell/protection class/antennaprotection class** 铝/IP67 L Aluminum/IP67											
密封温度Seal temperature 普通密封-40~100℃ P Common seal -40~100℃ 高温密封-40~250℃带散热器 G High temperature seal -40~250℃ with radiator											
一体化过程连接/材质 **Integrated process connection/materia** G1 1/2A 螺纹 screw thread 不锈钢Stainless Steel G N 1 1/2NPT 螺纹 screw thread 不锈钢Stainless Steel N C Flange 法兰 DN50 PN16C 不锈钢Stainless Steel C D Flange 法兰 DN80 PN16C 不锈钢Stainless Steel D E Flange 法兰 DN100 PN16C 不锈钢Stainless Steel E F Flange 法兰 DN150 PN16C 不锈钢Stainless Steel F 特殊约定 Special agreement Y											
防爆 **Explosion proof** 非防爆型（普通型）电流信号输出（4~20mA）HART协议 P Non explosion proof type (common type) Current signal output agreement (4~20mA) HART 本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 I intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART											

TKWL-1303											
探头类型 **Probe Model** 6mm杆式探头 6mm Cable type probe											
最大量程 **Maximum Meauring Range** 30000mm											
材质 **Material** 不锈钢（法兰安装） Stainless steel (flange installation)											
探头长度(mm) length of probe											
编程器 Programmer 带 With 不带 Without					B X						
现场显示 Site display 带 With 不带 Without						V X					
电缆接口 Cable interface M20*1.5 ½NPT							M N				
外壳/防护等级/天线防护等级 **Shell/protection class/antennaprotection class** 铝/IP67 Aluminum/IP67								L			
密封温度Seal temperature 普通密封-40~100℃ Common seal -40~100℃ 高温密封-40~250℃带散热器 High temperature seal -40~250℃ with radiator									P G		
一体化过程连接/材质 **Integrated process connection/materia** D Flange 法兰DN80 PN16C 不锈钢Stainless Steel E Flange 法兰DN100 PN16C 不锈钢Stainless Steel Flange 法兰DN150 PN16C 不锈钢Stainless Steel Flange 法兰DN200 PN16C 不锈钢Stainless Steel Flange 法兰DN250 PN16C 不锈钢Stainless Steel 特殊约定 Special agreement										D E F H K Y	
防爆 **Explosion proof** 非防爆型（普通型）电流信号输出（4~20mA）HART协议 Non explosion proof type (common type) Current signal output agreement (4~20mA) HART 本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART											P I D

TKWL-1304											
探头类型 **Probe Model** 10mm杆式探头 10mm Cable type probe											
最大量程 **Maximum Meauring Range** 6000mm											
材质 **Material** 不锈钢（法兰安装） Stainless steel (flange installation)											
探头长度(mm) length of probe											
编程器 Programmer 带 With 不带 Without						B X					
现场显示 Site display 带 With 不带 Without							V X				
电缆接口 Cable interface M20*1.5 ½NPT								M N			
外壳/防护等级/天线防护等级 **Shell/protection class/antennaprotection class** 铝/IP67 Aluminum/IP67									L		
密封温度Seal temperature 普通密封-40~100℃ Common seal -40~100℃ 高温密封-40~250℃带散热器 High temperature seal -40~250℃ with radiator										P G	
一体化过程连接/材质 **Integrated process connection/materia** D Flange 法兰DN80 PN16C 不锈钢Stainless Steel E Flange 法兰DN100 PN16C 不锈钢Stainless Steel Flange 法兰DN150 PN16C 不锈钢Stainless Steel Flange 法兰DN200 PN16C 不锈钢Stainless Steel Flange 法兰DN250 PN16C 不锈钢Stainless Steel 特殊约定 Special agreement											D E F H K Y

防爆 **Explosion proof**	
非防爆型（普通型）电流信号输出（4~20mA）HART协议 Non explosion proof type (common type) Current signal output agreement (4~20mA) HART	P
本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART	I
D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART	D

TKWL-1305

探头类型
Probe Model
14mm杆式探头
14mm Cable type probe

最大量程
Maximum Meauring Range
6000mm

材质
Material
不锈钢（法兰安装）
Stainless steel (flange installation)

探头长度(mm) length of probe

编程器 Programmer

带 With	B
不带 Without	X

现场显示 Site display

带 With	V
不带 Without	X

电缆接口 Cable interface

M20*1.5	M
½NPT	N

外壳/防护等级/天线防护等级
Shell/protection class/antennaprotection class

铝/IP67 Aluminum/IP67	L

密封温度Seal temperature

普通密封-40~100℃ Common seal -40~100℃	P

一体化过程连接/材质
Integrated process connection/materia

Flange法兰DN50 PN16C 不锈钢 Stainless steel	C
Flange法兰DN80 PN16C 不锈钢 Stainless steel	D
Flange法兰DN100 PN16C 不锈钢 Stainless steel	E
Flange法兰DN150 PN16C 不锈钢 Stainless steel	F
特殊约定 Special agreement	Y

防爆
Explosion proof

非防爆型（普通型）电流信号输出（4~20mA）HART协议 Non explosion proof type (common type) Current signal output agreement (4~20mA) HART	P
本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART	I
D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART	D

TKWL-1306											
探头类型 **Probe Model** 同轴管式探头 Maximum Meauring Range											
最大量程 **Maximum Meauring Range** 6000mm											
材质 **Material** 不锈钢（法兰安装） Stainless steel (flange installation)											
探头长度(mm) length of probe											
编程器 Programmer 带 With 不带 Without					B X						
现场显示 Site display 带 With 不带 Without						V X					
电缆接口 Cable interface M20*1.5 ½NPT							M N				
外壳/防护等级/天线防护等级 **Shell/protection class/antennaprotection class** 铝/IP67 Aluminum/IP67								L			
密封温度Seal temperature 高温密封-40~250℃带散热器 High temperature seal -40~250℃ with radiator 普通密封-40~100℃ Common seal -40~100℃									G P		
一体化过程连接/材质 **Integrated process connection/materia** Flange法兰DN50 PN16C 不锈钢 Stainless steel Flange法兰DN80 PN16C 不锈钢 Stainless steel Flange法兰DN100 PN16C 不锈钢 Stainless steel Flange法兰DN150 PN16C 不锈钢 Stainless steel 特殊约定 Special agreement										C D E F Y	
防爆 **Explosion proof** 非防爆型（普通型）电流信号输出（4~20mA）HART协议 Non explosion proof type (common type) Current signal output agreement (4~20mA) HART 本安防爆型（Exia IIC T6）电流信号输出（4~20mA）HART协议 intrinsically safe explosion proof type (Exia IIC T6) Current signal output agreement (4~20mA) HART D 本安型 + 隔爆型(Exd ia ⅡC T6)电流信号输出(4~20mA)HART协议 D intrinsically safe type+ isolating explosion type (Exd iaⅡC T6) Current signal output agreement (4~20mA) HART											P I D