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Radar level meter

Committed to process automation solutions

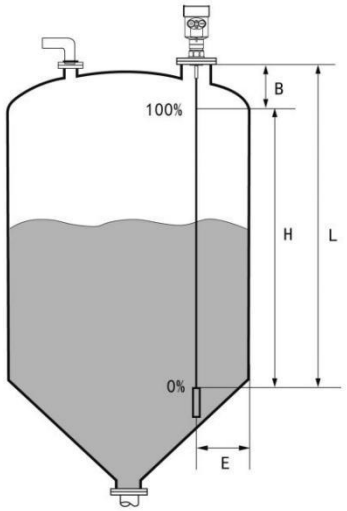
Datasheet

SUP-RD70X

Add : 5th floor, Building 4, Singapore Hangzhou Science Technology Park, Hangzhou Economic Development Area, 310018, Hangzhou, China

Principle

High-frequency microwave pulses issued by the guided wave radar propagate along detection components (steel cable or steel rod), met the media to be measured, since the dielectric constant of the mutation, cause reflections, a portion of the pulse energy is reflected back. Transmit pulse and the reflected pulse is proportional to the distance and the time interval measured media.



Explanation:

H--- Measuring range

L---Empty distance

B---The top of the blind

E---The minimum distance from the probe to the tank wall

--Blind spot is the minimum distance between the top of the highest material surface materials and measurement reference point.

--The bottom of the blind refers to a distance near the very bottom of the cable can not be accurately measured.

--Between the top and bottom of the blind is blind effective measure distances.

Note:

In order to ensure the accuracy of level measurement, the material should be located between the top and bottom of the blind the blind.

Feature

As a result of advanced microprocessor and unique choDiscovery echo processing technology, guided wave radar level meter can be used in a variety of complex conditions.

Because of the type of process connections and detection components, making 70X Series Guided Wave Radar Level Meter is suitable for a variety of complex conditions and applications. Such as: high temperature, high pressure and low dielectric constant media.

Pulsed work, guided wave radar level instruments transmit power is very low, can be installed in a variety of metals, non-metallic container, no harm to humans and the environment.

Product Introduction

SUP-RD701

Suitable for Medium: Liquid, solid powder
Application: Liquid and solid powder measure, complicated process conditions
Measuring Range: 30m
Frequency: 500MHz-1.8GHz
Antenna: Single cable or single rod antenna
Accuracy: ±10mm
Process Temperature:（-40～250）℃
Process pressure:（-0.1～4）MPa
Signal output:（4～20）mA/HART
The Scene Display: Four LCD/Can be programmed
Power Source: Two-wire (DC24V)
Four-wire（DC24V/AC220V）
Shell: Aluminum /Plastic
Connection: Flange (optional) / Thread

SUP-RD702

Suitable for Medium: Liquid, especially corrosive liquids
Application: Acids, bases or other corrosive media
Measuring Range：20m
Frequency: 500MHz-1.8GHz
Antenna: Full PTFE sealing cable type or rod antenna
Accuracy:±10mm
Process Temperature:（-40～200）℃
Process pressure:（-0.1～4）MPa
Signal output: （4～20）mA/HART
The Scene Display: Four LCD/Can be programmed
Power Source: Two-wire (DC24V)
Four-wire（DC24V/AC220V）
Shell: Aluminum /Plastic
Connection: Flange (optional) / Thread

SUP-RD703

Suitable for Medium: Solid powder
Application: Cement silo powder measure;
Ash powder measure
Measuring Range：30m
Frequency: 500MHz-1.8GHz
Antenna: Double cable type antenna
Accuracy:±10mm
Process Temperature:（-40～150）℃
Process pressure:（-0.1～4）MPa
Signal output: （4～20）mA/HART
The Scene Display: Four LCD/Can be programmed
Power Source: Two-wire (DC24V)
Four-wire（DC24V/AC220V）
Shell: Aluminum /Plastic
Connection: Flange (optional) / Thread

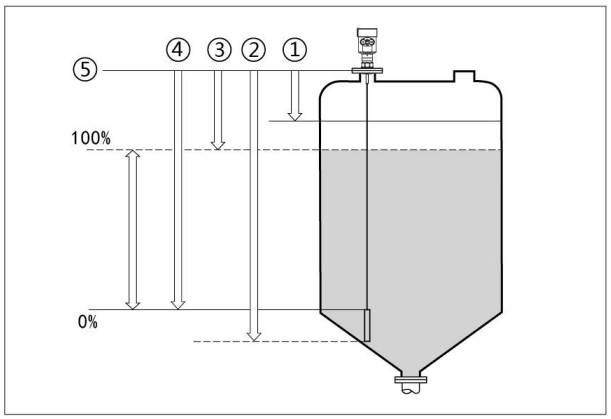
SUP-RD704

Suitable for Medium: Liquids, particularly low dielectric constant liquid
Application: Measuring deionized water, deoxygenated water and other liquids
Measuring Range：6m
Frequency: 500MHz-1.8GHz
Antenna: Coaxial tube type antenna
Accuracy:±5mm
Process Temperature:（-40～250）℃
Process pressure:（-0.1～4）MPa
Signal output: （4～20）mA/HART
The Scene Display: Four LCD/Can be programmed
Power Source: Two-wire (DC24V)
Four-wire（DC24V/AC220V）
Shell: Aluminum /Plastic
Connection: Thread / Flange (optional)

Installation

Within the measurement range, determined not to come into contact with the cable or rod internal obstacles, Therefore, the installation should be avoided as far as possible the tank facilities, such as: human ladder, limit switches, heating devices, stand etc. Also note that the cable or rod may not intersect with the material during feeding.

Also note that when installing the meter : Highest Level measurement can not enter into the blind; Must be maintained between the instrument and the tank wall a certain distance; When the meter is installed, try to stick with cable or perpendicular to the surface of the measured medium. Meter installation in hazardous areas must comply with state regulations explosion hazardous installation area. Intrinsically safe instrument requires the use of shell with aluminum. Intrinsically safe instrument can be installed in explosion-proof requirements of the occasion, the instrument must be connected to the earth.



Measurement reference plane is the sealing surface of the thread.

①Blind Range (Menu 1.9)

②Cable Length (Menu 1.8)

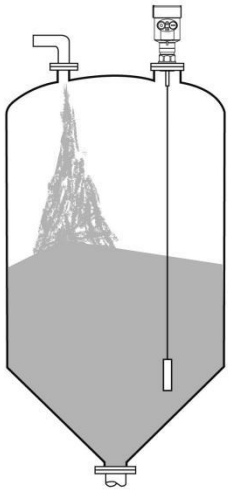
③Max.Measurement Range (Menu 1.2)

④Min.Measurement Range (Menu 1.1)

⑤reference Plane

The following guidelines apply to the installation of the cable and the rod radar level measuring solid powder or liquid.

● Installation position:



➢Far away from the discharge port and inlet.

➢Metal cans in the entire measuring range, not to touch the tank wall and tank bottom.

Recommended meter installed in 1/4 or 1/6 of the silo diameter, and the minimum distance is 1/10 of the tank wall of the measuring range.

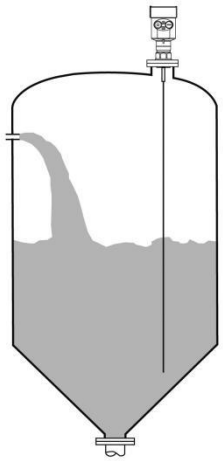
➢Cable type or rod probe the minimum distance from the tank wall ≥300mm.

➢Bottom of the probe from the tank bottom ≥30mm.

➢The minimum distance from the probe obstructions ≥200mm.

➢If the bottom of the container is a cone, you can install a central tank top.

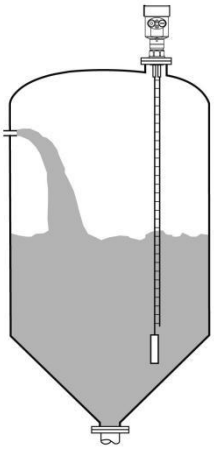
- **Below is a single rod radar level meter installation drawings, mainly used for liquid level measurement**



Features:

➢You can measure any dielectric permittivity of ≥1.8 .
➢Generally used to measure viscosity ≤500cst, not prone to adhesion medium.
➢Rod radar maximum range of 6 m.
➢Instrumentation for steam and foam has a strong penetrating power, the measurement is not affected.
➢For a lot of foam liquid measurement environment, you should select a single rod guided wave radar level meter measurement.

- **Below is double rod radar level meter installation drawings, mainly for low dielectric constant liquid and solid lightweight powder measurements**



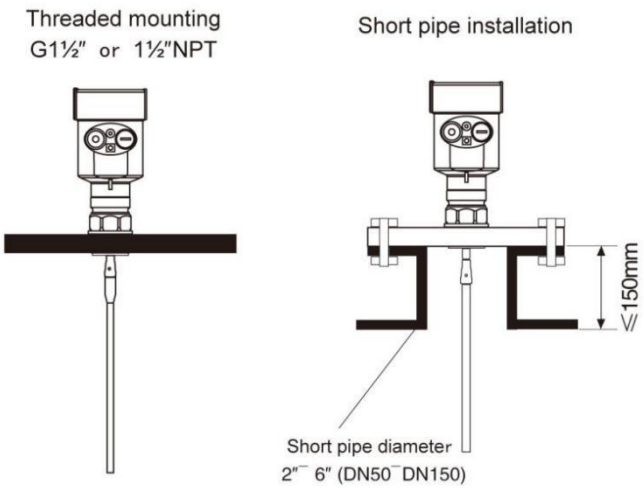
Features:

➢For low dielectric constant of the liquid and light solid powder, can double cable measurement mode, in order to ensure accurate measurements.
➢You can measure the dielectric constant of ≥1.6 in any medium.
➢Generally used to measure viscosity ≤500cst, not prone to adhesion medium.
➢Double cable radar level meter maximum range of up to 30 meters.

● Installation Method:

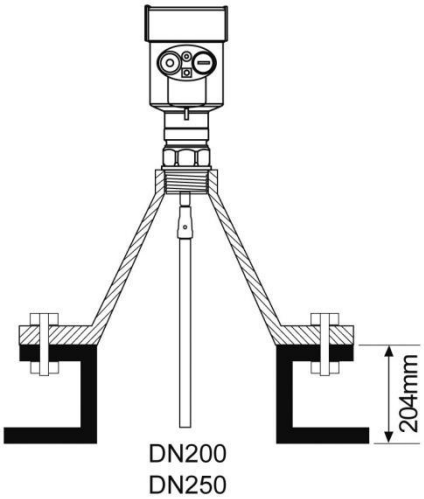
➢ **Reasonable meter installation to ensure long-term reliable and accurate measurement**

Guided Wave Radar Level Meter can be connected by threaded, thread length should not exceed 15mm, also can be installed on a short tube. When installing a short tube diameter of 2 "to 6", the installation of a short tube height should ≤100mm（Thread length and short tube shorter measurement will be more stable）, If you install a short pipe is longer, it is best to cut it short, or using insulation bracket fixed cable type probe, avoiding probe in contact with the short end of the pipe to further to affect the measurement.



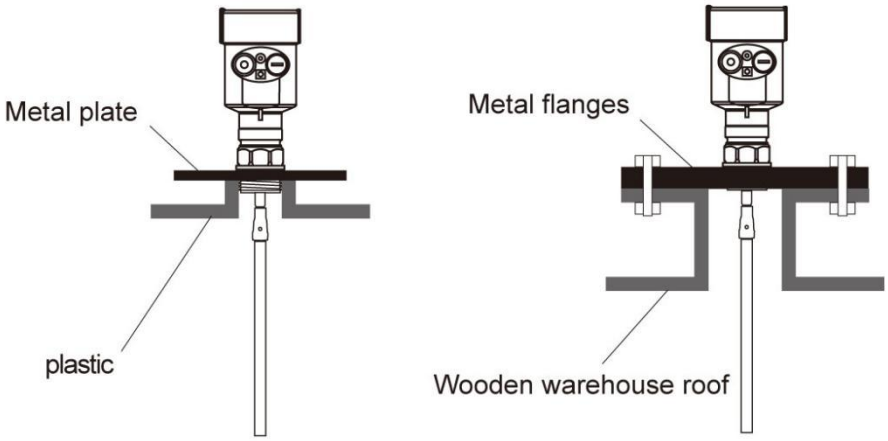
➢ **DN200 or DN250 installed in the short tube**

When guided wave radar level meter need to be installed at the short pipe diameters greater than 200mm, the short tube wall will produce an echo, the medium in the case of a low dielectric constant can cause measurement errors. Therefore, with a diameter of 200mm or 250mm short tube, you need to choose a special flange with a "horn Interface" of.



➢ **Installation Notes on plastic containers**

Whether cable or rod type, if you want to guided wave radar is working properly, the process of connecting to the metal surface should be. When the guided wave radar mounted on a plastic pot, If the tank top is plastic or other non-conductive material, the instrument needs with metal flanges, the use of threaded connections, to be equipped with a metal plate.



➢ **Optimized interference**

✧Interference echo suppression：Software can be realized on disturbance echo suppression, to achieve the desired measurement results.

✧For a medium viscosity of less than 500cst, can bypass pipe or waveguide (Only for liquids) to avoid interference.

➢ **Installation of low dielectric constant of the liquid**

For dielectric constant greater than 1.3, the viscosity ≤500cst, and is not easy adhesion medium, guided wave radar meter can be installed in the waveguide is measured, has the following characteristics:

✧superior reliability, high-precision

✧ Can be used in any medium of dielectric constant ≥1.3, it doesn't matter between measurement and conductive medium.

✧obstructions and short pipe size does not affect the measurement

➢ **Corrosive media measurement**

If the measurement of corrosive media, the choice of rod or cable probe sets PTFE, PFA sleeve measurement.

➢ **installed in horizontal and vertical tank on tank**

✧Rod probe can be up to six meters, more than six meters for measuring distances tank, the choice of

4mm rope probe.

✧Installation and fixation with the same measurement of solid powder compartment.

✧Distance from the tank wall ≥300mm, the probe must avoid contact with the tank wall.

✧In the choice of probe length, note at the bottom of the probe from the tank bottom distance> 30mm.

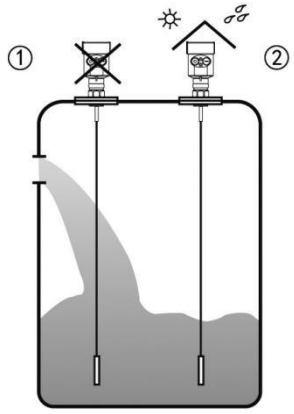
✧If obstructions are more, or too close to the probe by the sensor, it can then be measured by installing tube waveguide.

➢ **The matters needing attention:**

✧ To be measured in the waveguide radar, generally used in rod probe sensors, during installation You should use insulated bracket fixed probe, ensuring rod probe with concentric waveguide, or they will have a very strong false echoes.

✧ When measuring range exceeds the maximum measuring range rod probe should be used in guided wave radar probe cable, In this case waveguide diameter should be greater than or equal to 6 ", otherwise it will generate strong false echoes.

● Installation of right and wrong

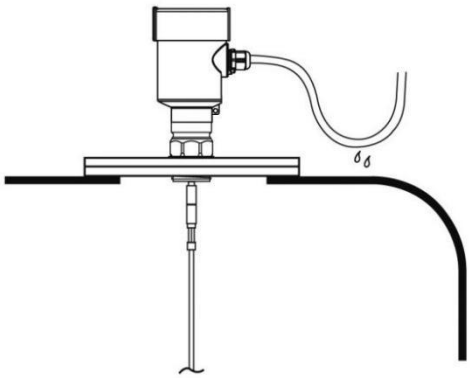


Wrong: Do not install the meter above the feed inlet stream, cable or rod should avoid material entrance.

Correct:

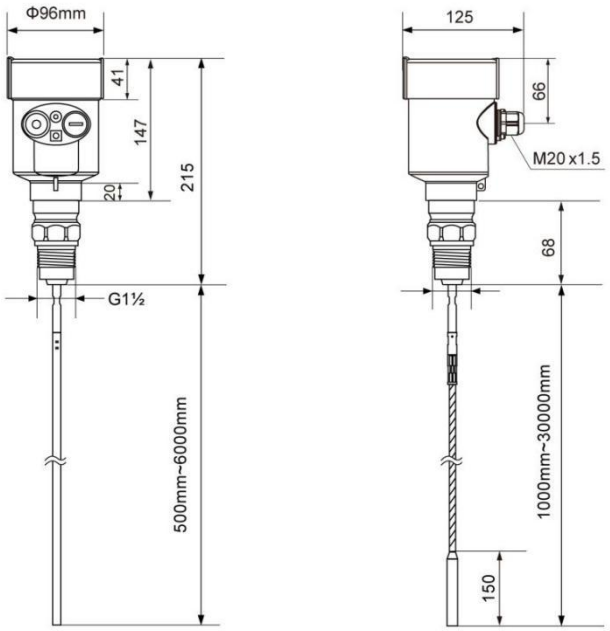
Note: when installed outdoors take shade, rain

- **Moisture:**



For instruments installed outdoors or indoors and wet cooling or heating of the tank, in order to moisture, should tighten the cable jacket, but also to the cable at the inlet

Structure Size



Electrical Connection

- **Power Supply**

(4～20) mA/HART（Two-wire）

Power supply and current signal are carried by the same two-wire connection cable. See the Technical Specifications of this guide for detailed requirement on power supply. A safety barrier should be placed between power supply and instrument for intrinsically safe version.

(4～20) mA/HART（Four-wire）

Power supply and current signal are carried by two 2-wire connection cables respectively. See the Technical Specifications of this guide for detailed requirement on power supply.

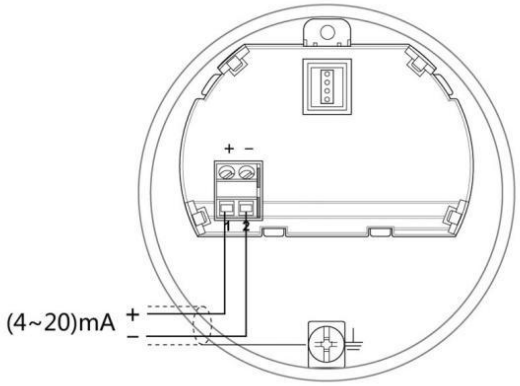
Earth-connected current output can be used for standard version of level instruments, while the explosion proof version must be operated with a floating current output. Both instruments and earth terminals should be connected with ground firmly and securely. Normally you can either choose to connect with the earth terminal on vessel or adjacent ground in case of plastic vessels.

● Cable Connection

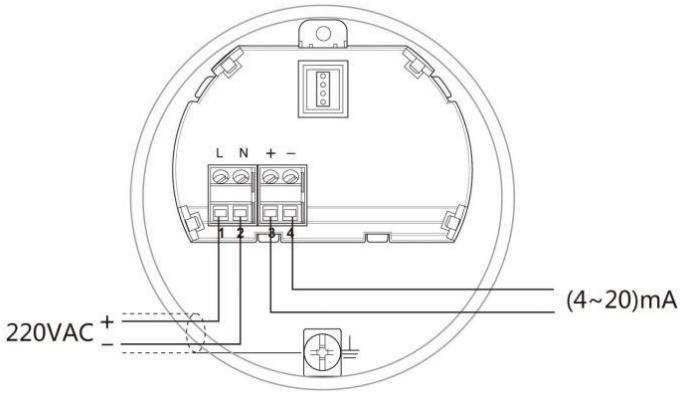
General Introduction	Supply cable can use ordinary two-core cable, the cable diameter should be (5 ~ 9) mm, to ensure that the cable entry seal. If electromagnetic interference exists, recommended to use shielded cable.
(4～20) mA/HART（Two-wire）	Supply cable can use ordinary two-core cable.
(4～20) mA/HART（Four-wire）	Supply cable should be used with a dedicated ground cable.
Shielding and wiring	The two ends of shielded cable must be connected with earth terminal. The shielded cable must be connected with inner earth terminal directly inside the transducer, while the outside earth terminal on housing must be connected with ground. In the event of earth-connected current, the shielding side of shielded cable must be connected to ground potential via a ceramic capacitor (e.g. 1nF/1500V) in order to dampen the low frequency grounding current and avoid the disturbance caused by high frequency signals.

● Wiring Diagram

➢24V two wire wiring diagram as follows:



➢220V four wire connection is as below:



Adjustment Instructions

●Adjustment Methods：

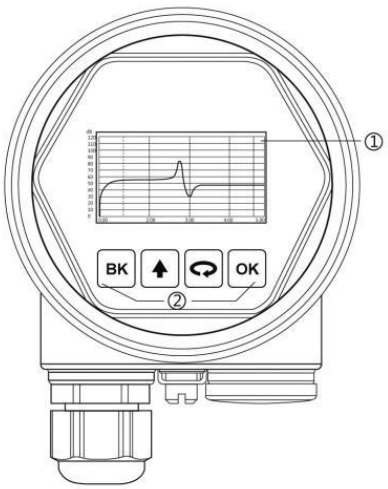
① Display/adjustment module ViewPoint）
② An adjustment software
③ HART handheld programmer

●Display / Adjustment Module

ViewPoint is a pluggable display/adjustment module. The adjustment can be done through operating with four buttons on ViewPoint. Optional menu operation languages are available for selection. ViewPoint is only used for display after adjustment in that the measurement results can be seen clearly through the glass window.

Display / Keypad

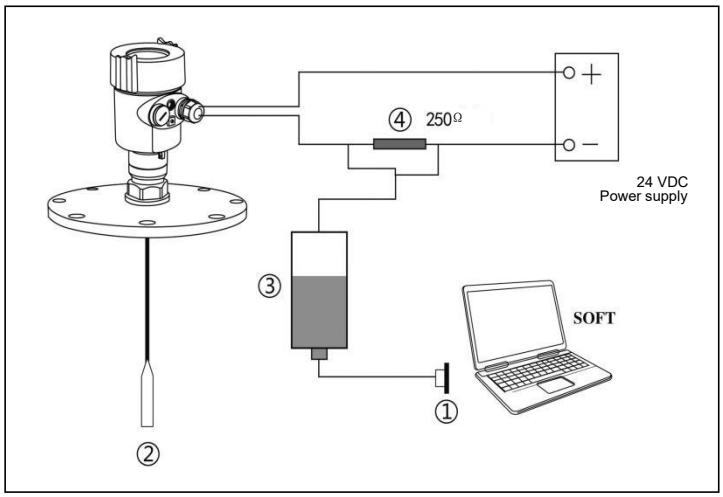
① Liquid Crystal Display
② Adjustment Keypad



- **PC debugging**

Connect with another unit through HART

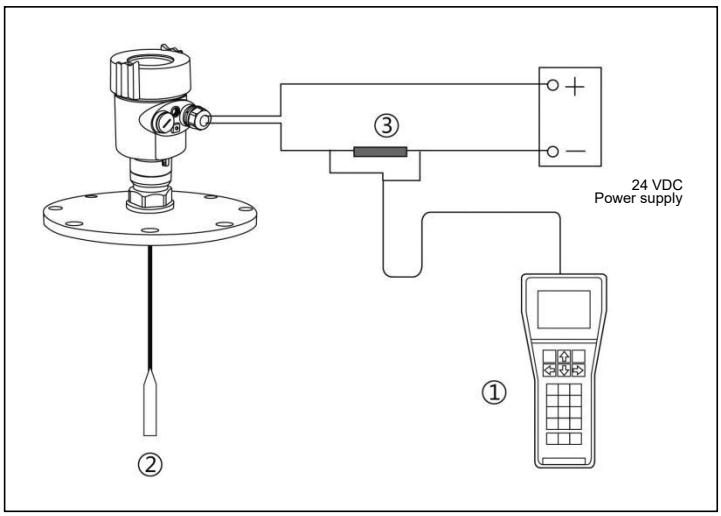
① RS232 Connect Cable /USB port
② Radar level meter
③ HATR port adapter used on COMWAY convertor
④ 250 ohm Resistance



- **HART Handheld Programmer**

Adjust meter with HART Handheld Programmer

① HART Handheld Programmer
② Radar level meter
③ 250 ohm Resistance

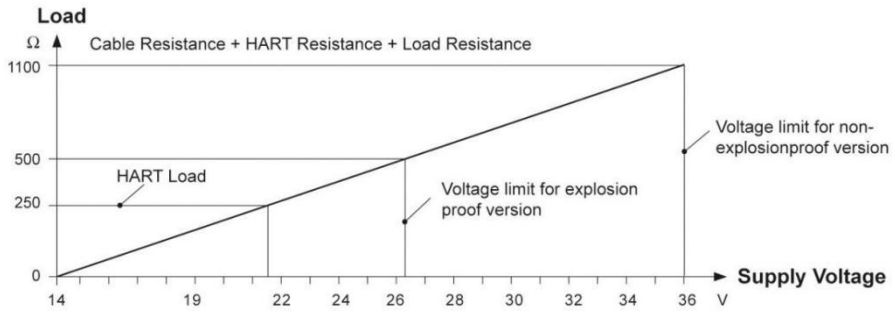


Technical Parameters

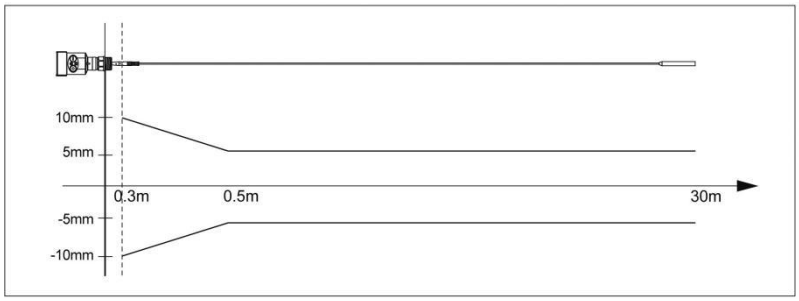
General Parameters		
	Probe Material:	
	Rod	Stainless Steel 316L/PTFE
	Cable	Stainless Steel 316L/PTFE
	Coax	Stainless Steel 316L/PTFE
	Seal	Viton fluoroelastomer , Kalrez perfluoroelastomer
	Process Connection	Stainless Steel 316L/PTFE
	Shell	Stainless Steel 316L, Plastic，Aluminum，Alu-die casting, Powder Coated
	Seal ring between the shell and the shell	Silicone Rubber

	ViewPoint Window	Polycarbonate
	Ground Terminal	Stainless Steel 316L
Power		
	2-Wire	
	Standard Version	(16～26)V DC
	Intrinsic Safe Version	(21.6～26.4)V DC
	Power Consumption	max. 22.5mA
	Ripple Allowed - <100Hz - (100～100K)Hz	 Uss < lV Uss < l0mV
	4-wire	
	Intrinsic Safe	(22.8～26.4)V DC，(198～242)V AC
	Power Consumption	max. 1VA，1W
Parameters on Cable		
	Cable Entry/Plug	One cable entry of M20xl.5 (cable diameter of 5～9mm) One blind stopper M20xl.5
	Spring Connection Terminal	Applicable for cables with cross section of 2.5mm
Output		
	Output Signal	(4～20)mA/HART
	Resolution	1.6μA
	Failure mode	20.5mA；22mA；3.9mA, hold
	2-wire load resistance	See the diagram below
	4-wire load resistance	Max.500 ohm
	Integration Time	(0～36)sec, adjustable

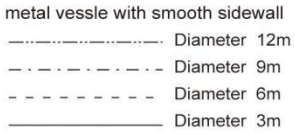
2-Wire Load Resistance Diagram

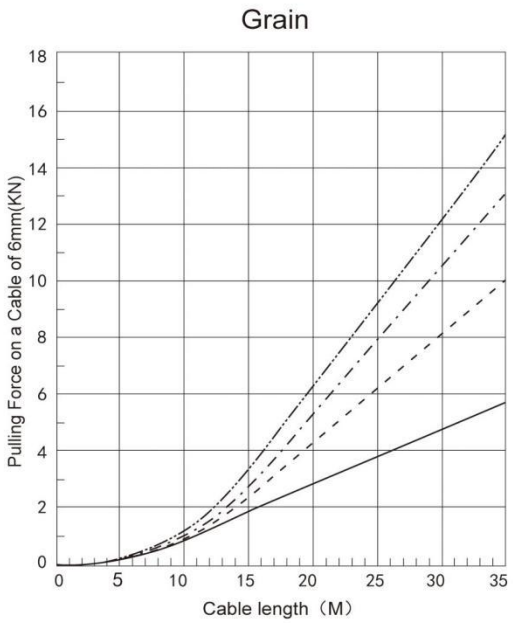


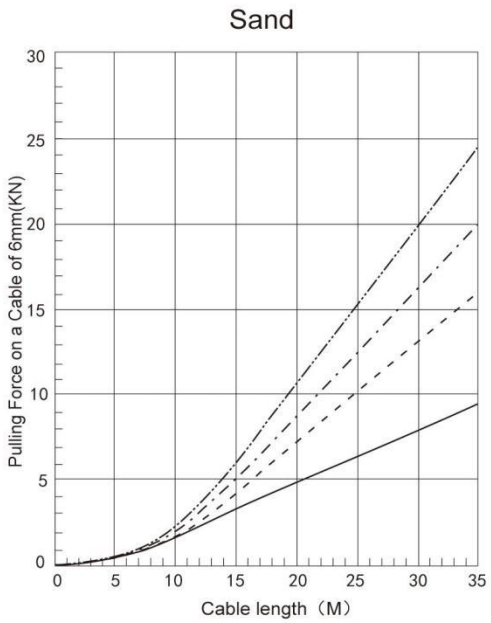
Technical data		
	Max Measurement Distance	
	701	30m/6m（Cable /Rod）

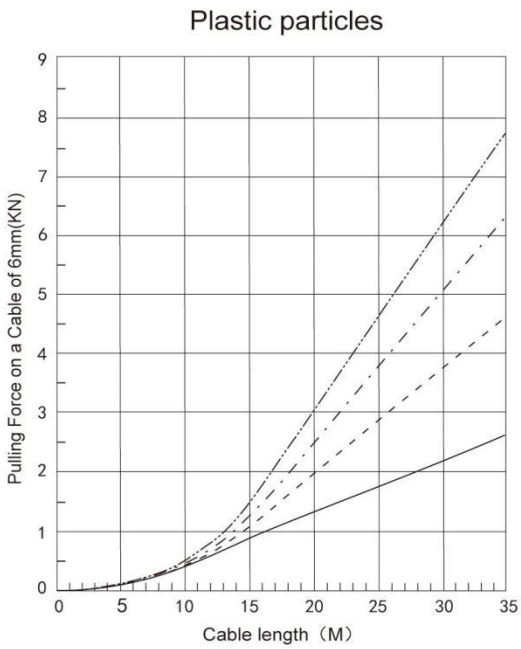
	702	20m/6m（Cable /Rod）
	703	30m/6m（Cable /Rod）
	704	6 m
	Measurement Interval	About 1sec (Depend on parameter settings)
	Adjustment Time	About 1sec (Depend on parameter settings）
	Resolution of Display	1mm
	Accuracy	±10mm(See the accuracy illustration diagram below)
The accuracy illustration diagram 		
	Temperature for Storage/ Transport Process Temperature (Probe)	(-40～80) ℃
	701、704	(-40～250)℃
	702	(-40～200)℃
	703	(-40～150)℃
	705	(-200～400)℃
	Relative Humidity	＜95%
	Pressure	Max. 4MPa
	Vibration Proof	Mechanical vibration 10m/s² , (10～150)Hz
	Max Pulling Force	See the illustrative diagram on pulling force

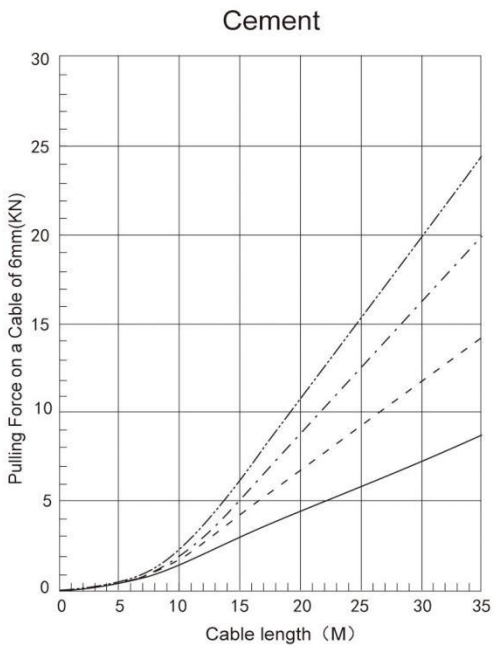
When measuring solid medium, the pulling force is determined by the diameter of vessel and medium level, some examples of pulling force generated by typical medium are shown on the diagrams below.











Company:_____Contact:_____
Address:_____ZIP code:_____
The Telephone:_____Fax:_____Mobile phone:_____
Email:_____Date:_____

Tank/Container Information
The Types of Tank：
☐Tank ☐Reaction Tank ☐Separation Tank ☐Marine Tank
The Tank Structure：
Material of Tank:_____Pressure:_____
Tank size：
Tank Height:_____m Diameter:_____
The top of the tank：
☐Vault ☐Flat ☐Open ☐Cone type
The bottom of the tank：
☐Cone bottom ☐Flat ☐Slope bottom ☐Arc bottom
Installation：
☐Top installation ☐Side installation
☐The bypass pipe mount ☐Guided wave pipe installation
Installation takes over the top of the tank（information）：
Height of take over:_____mm Diameter of take over:_____mm

Measurement of Medium
Media name: ☐Liquid ☐Solid ☐Mixed Media
Medium temperature：_____℃
Dielectric Constant：
Linked material: ☐Yes ☐No
Mixing: ☐Yes ☐No

Process Connection
Thread: ☐G1'A ☐1%"NPT
Flange: ☐Flange（DN= ） ☐Flange（ANSI= ）
Power supply：
☐24VDC Two wire system ☐24VDC Four wire system ☐220V AC Four wire system
Output: ☐4-20mA ☐HART
Display：☐Take the meter display program ☐ Without meter display program

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