

SERIES KRG



KRG series includes radar level transmitters. Using 26GHz microwaves[†], the liquid reflect them back to the instrument. The travel time, proportional to the distance between the surface and the gauge, is processed by instrument electronic generating output signal. KRG instrument works in a non-contact and a non-mechanical way so:

- *It has a least request of maintenance for long term;*
- *It can't be damaged by the process liquid;*
- *It has a long durability ;*



APPLICATION FIELDS

KRG Series can be used for:

- *Tank level measurement*
- *Natural and artificial basins level measurement*
- *Level measurement for aggressives fluids*
- *Fire protection system monitoring*
- *Flow-rate for open channels*

[†] Electromagnetic waves with frequencies between 300 MHz and 300 GHz

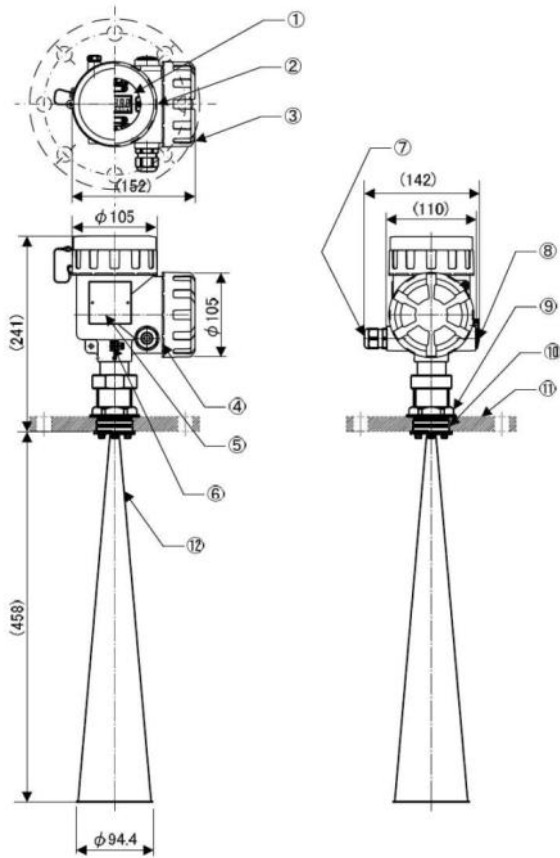
GENERAL FEATURES

- *“Full range search mode” function boosts detection speed and track up to 2 m/s level change*
- *Delayed echo generated by multi-bounce between liquid surface and tank will be eliminated*
- *In case of disturbed input signal, KRG can **predict** output signal by analyzing data reported previously*
- *Possibility to calculate level and flow-rate of open channels*
- *Level measurement up to 30 meters with ± 2 mm accuracy (depending by sensor type)*

TRANSMITTER HEAD TECHNICAL FEATURES

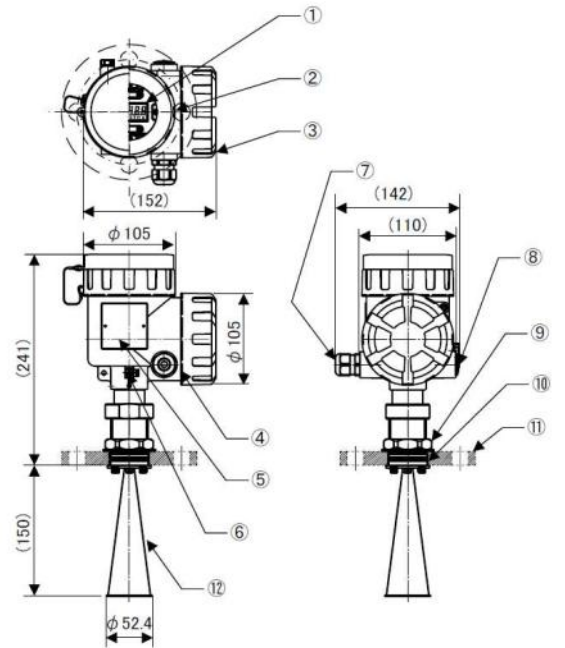
- **Supply:** EX d \rightarrow DC 18V-36V
EX ia \rightarrow DC 12V-30V
Non-EX \rightarrow DC 10.5V-36V
- **Output:** 4-20 mA+HART[®]
- **Frequency:** 26 GHz
- **Beam angle:** 8° (4in Cone antenna / Flush antenna)
18° (2in Cone antenna / Flush antenna)
25° (1in rod antenna)
- **Measuring field:** see tables
- **Total accuracy:** Cone / Flush antenna ± 2 mm
Rod ± 3 mm
- **Repeatability:** ± 1 mm
- **Max working pressure:** 1.5 MPa (15 bar)
- **Storage temperature:** Ex -40-+60°C
Non-Ex -40-+70°C
- **Process temperature:** see tables
- **Tracking rate:** 2 m/s
- **Protection rating:** IP66, NEMA4X

CONE ANTENNA TECHNICAL FEATURES



1. Window / Toughened glass
2. Cover (display) / Aluminum
3. Cover (terminal block) / Aluminum
4. Housing / Aluminum
5. Label
6. Ground terminal (M5) / SUS304

7. Cable gland (option)
8. Blind plug
9. Flange lock nut / SUS304
10. O-ring
11. Flange (option)
12. 4" cone antenna / SUS316L



1. Window / Toughened glass
2. Cover (display) / Aluminum
3. Cover (terminal block) / Aluminum
4. Housing / Aluminum
5. Label
6. Ground terminal (M5) / SUS304

7. Cable gland (option)
8. Blind plug
9. Flange lock nut / SUS304
10. O-ring
11. Flange (option)
12. 2" cone antenna / SUS316L

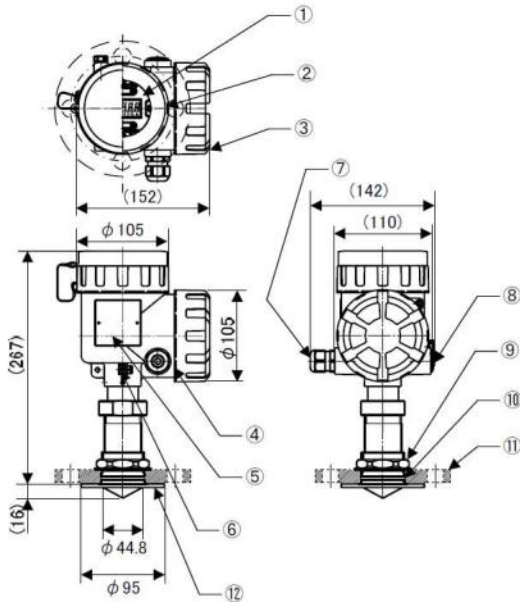
Picture 1: KRG with 4" cone antenna

Picture 2: KRG with 2" cone antenna

	Cone 2''	Cone 4''
H_{max}^s [m]	10	30
Temp [°C]	-40 / +150	
Accuracy	±2 mm	
Press [MPa]	-0.1 / 1.5	

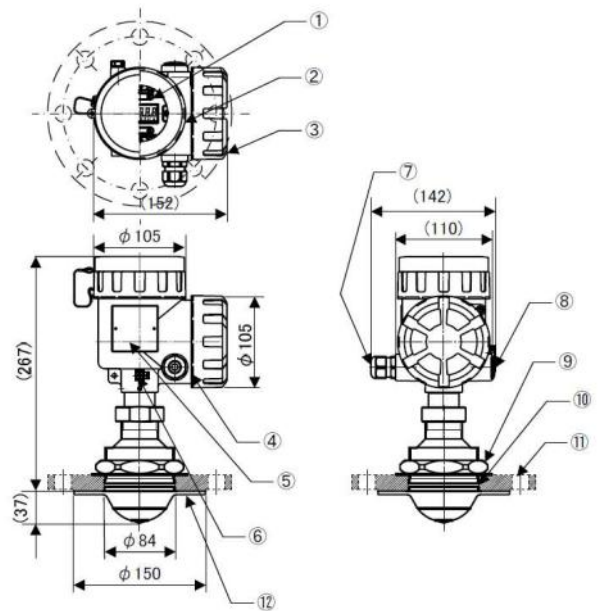
^s
H max is the maximum measuring distance

PTFE FLUSH ANTENNA TECHNICAL FEATURES



1. Window / Toughened glass
2. Cover (display) / Aluminum
3. Cover (terminal block) / Aluminum
4. Housing / Aluminum
5. Label
6. Ground terminal (M5) / SUS304

7. Cable gland (option)
8. Blind plug
9. Flange lock nut / SUS304
10. O-ring
11. Flange (option)
12. 2" PTFE sealing antenna / PTEE



1. Window / Toughened glass
2. Cover (display) / Aluminum
3. Cover (terminal block) / Aluminum
4. Housing / Aluminum
5. Label
6. Ground terminal (M5) / SUS304

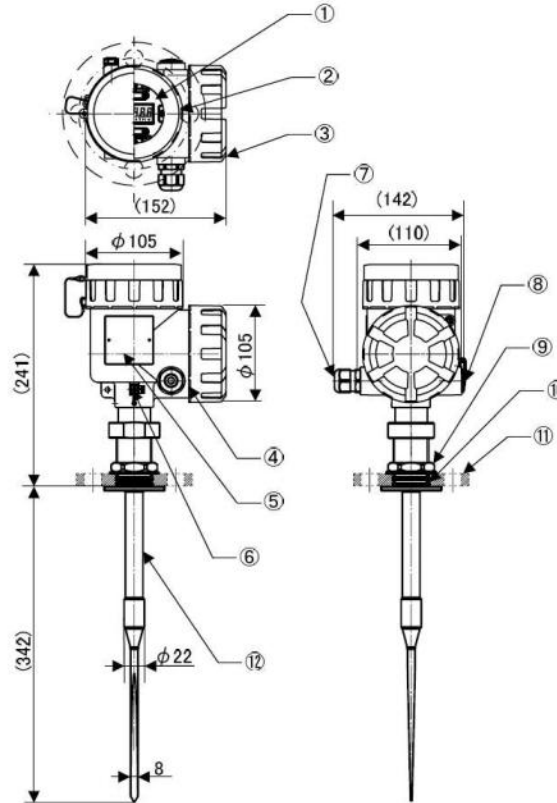
7. Cable gland (option)
8. Blind plug
9. Flange lock nut / SUS304
10. O-ring
11. Flange (option)
12. 4" PTFE sealing antenna / PTEE

Picture 3: KRG with 2" flush antenna

Picture 4: KRG with 4" flush antenna

	2" PTFE	4" PTFE
H max [m]	10	20
Temp [°C]	-40 / +200	
Accuracy	±2 mm	
Press [MPa]	-0.1 / 1.5	

1" ROD ANTENNA TECHNICAL FEATURES



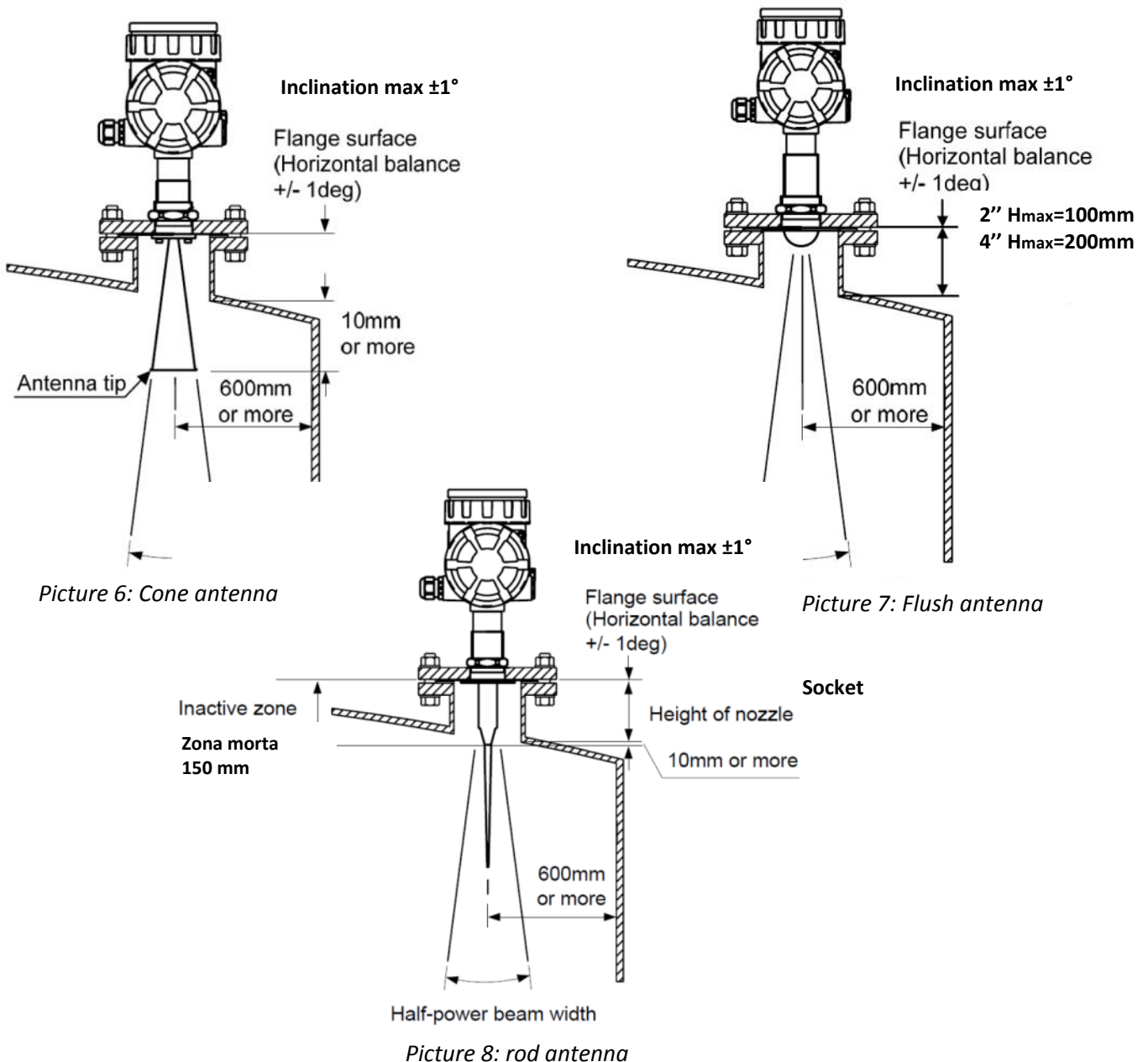
- | | |
|--------------------------------------|-----------------------------|
| 1. Window / Toughened glass | 7. Cable gland (option) |
| 2. Cover (display) / Aluminum | 8. Blind plug |
| 3. Cover (terminal block) / Aluminum | 9. Flange lock nut / SUS304 |
| 4. Housing / Aluminum | 10. O-ring |
| 5. Label | 11. Flange (option) |
| 6. Ground terminal (M5) / SUS304 | 12. 1" rod antenna / PFA |

Picture 5: KRG with 1" rod antenna

	Rod 1"
H max [m]	5
Temp [°C]	-40 / +150
Accuracy	±3 mm
Press [MPa]	-0.1 / +1.5

INSTALLATION INFORMATION

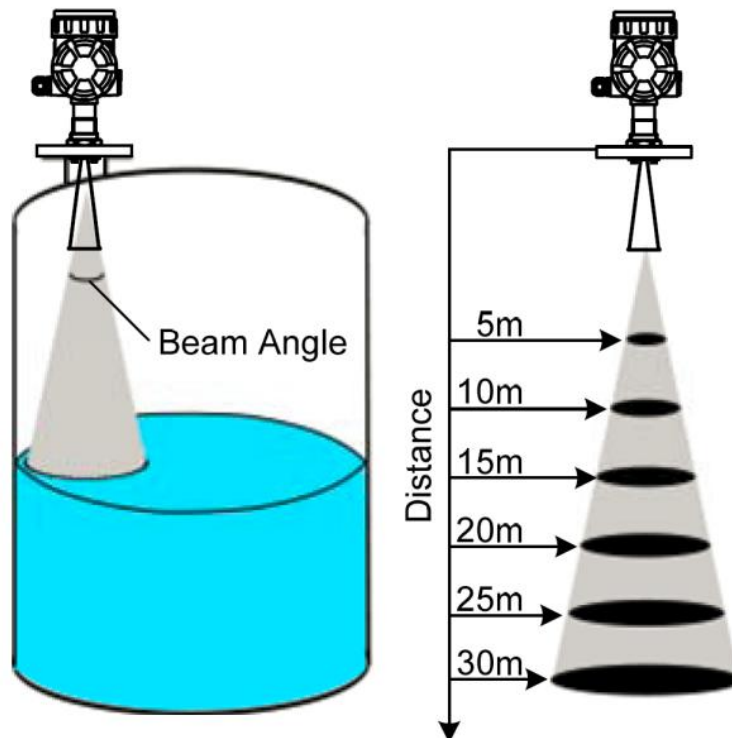
To avoid disturbance reflections in the beam irradiation we suggest to follow the following mounting schemes:



Considering pictures 6,7,8 we send back to the following table reporting diameters in function of the beam angles, sensor types and distances.

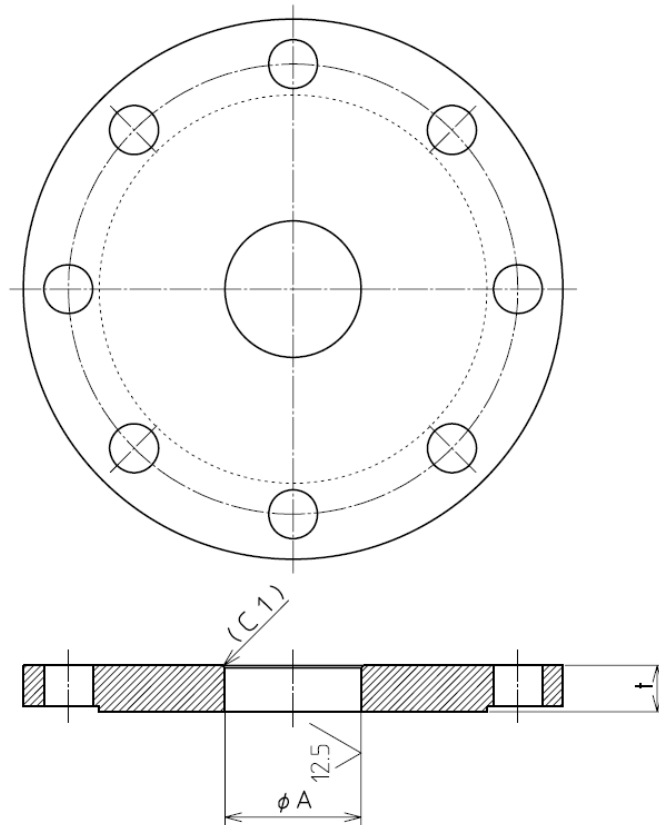
Antenna		Cone		Flush antenna		1" rod
		2"	4"	2"	4"	
Beam angle (a)		18°	8°	18°	8°	25°
Distance [m]	5	1.6	0.7	1.6	0.7	2.2
	10	3.2	1.4	3.2	1.4	
	15		2.1		2.1	
	20		2.8		2.8	
	25		3.5			
	30		4.2			

Beam irradiation diameter = 2 x Distance x tan(a/2)



Picture 9: Beam angle

Concluding installation section, we have to mention the flange typology for the instrument. It must be a machined flange with a center hole depending by antenna size. Refer to the following dimension table for flanges dimensions in function of antennas sizes.



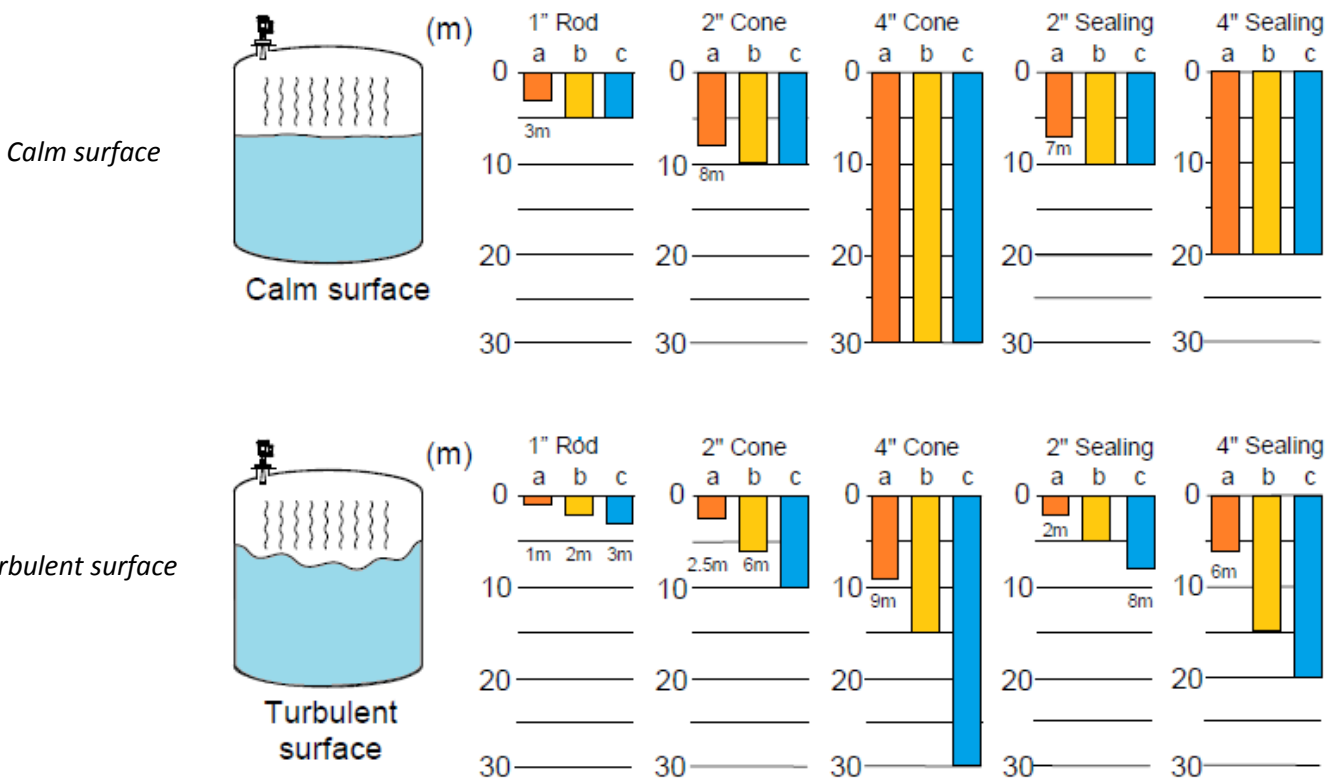
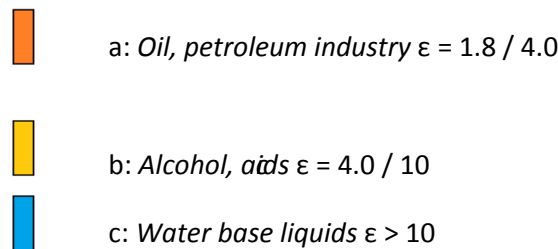
Picture 10: Process connection

Antenna Type	Ø A [mm]**	T [mm]
Cone 2'' & 4''	45	13 - 34
Flush antenna 2''	50	12 - 25
Flush antenna 4''	80	13 - 34
1'' rod	45	10 - 34

** Tolerance [- 0 / + 0.1]

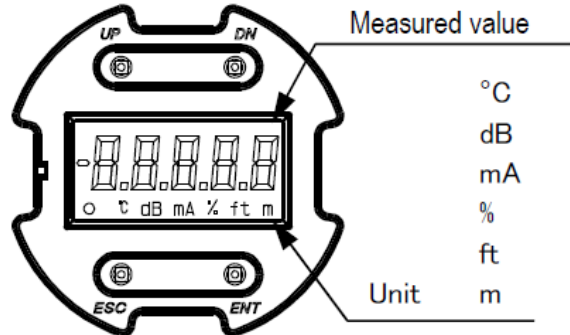
MEASURING PERFORMANCES

Measuring performances will be decided by products character (dielectric constant ϵ), surface conditions and antenna size. Generally the liquid which has higher dielectric constant number such as water is easily to measure, and calm liquid surface is the same. On the contrary, low dielectric constant liquid, turbulence surface or dirty antenna conditions are relatively difficult to measure. Below graphs, show suitable antennas, products and ranges.



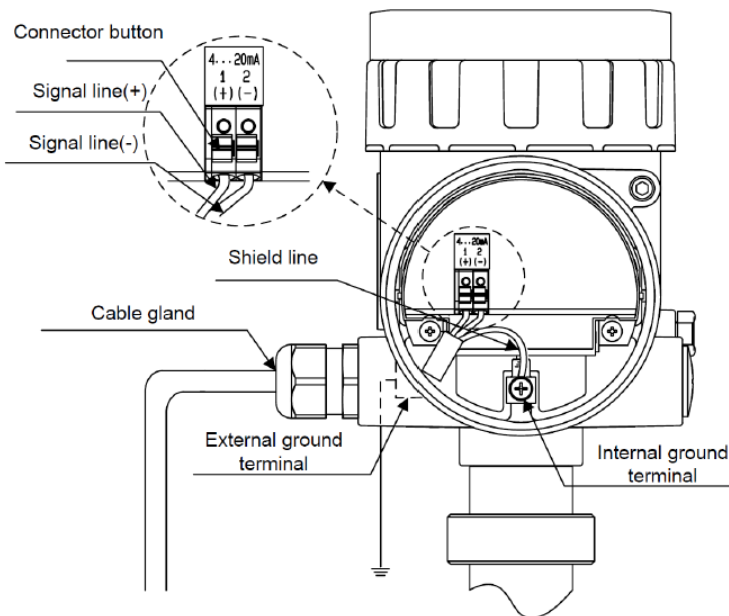
ELECTRICAL WIRING

LCD module represented in picture (11) has been studied in order to be protected against Sun, LCD front face can also be rotated to all four points of the compass and it's customer discretion.

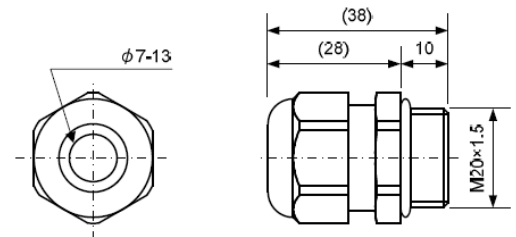


Picture 11: Display

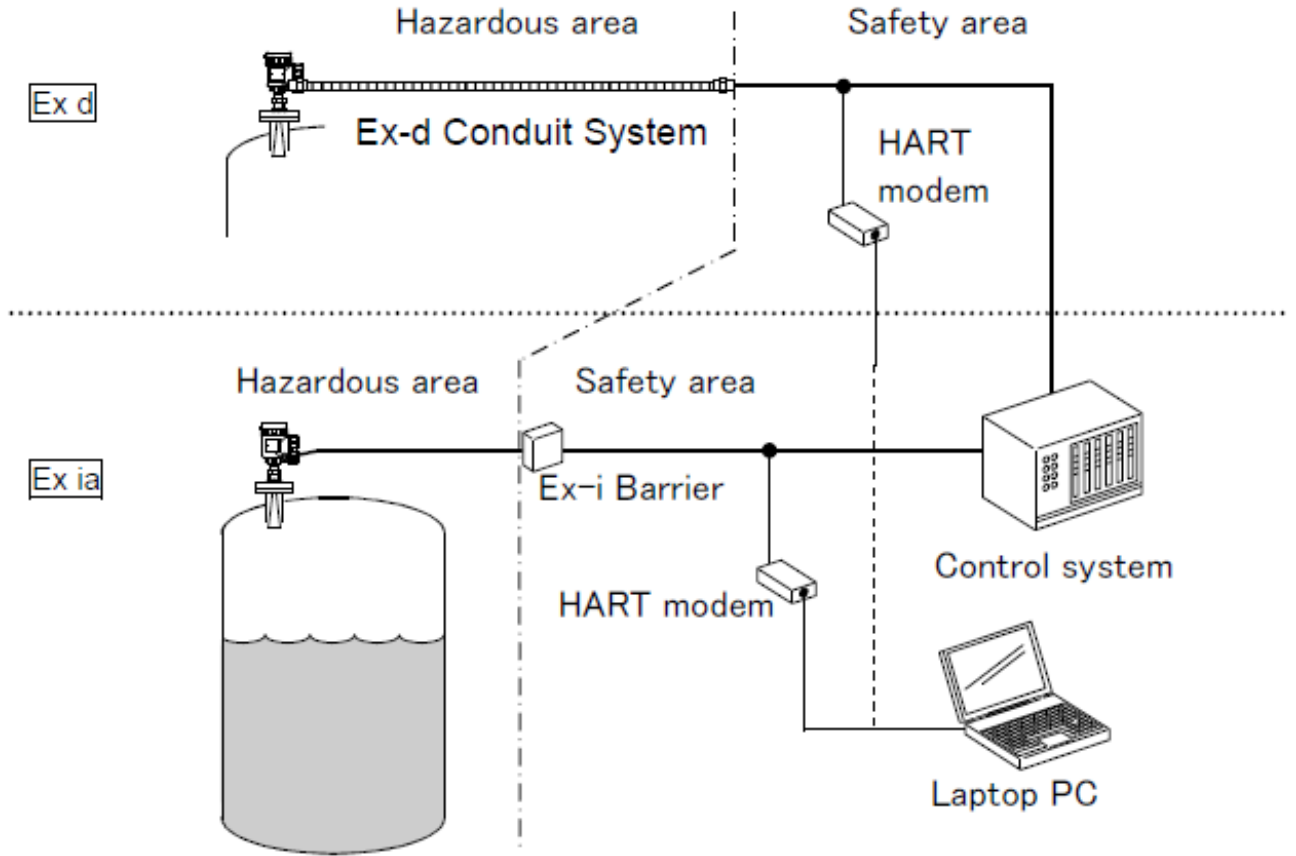
KRG-10 is a 2-wire system, which means both signal and power are available on the same wiring. The power source voltage is 10.5-36 VDC in non-hazardous areas and 12-30 VDC (Ex-i) or 18-36 VDC (Ex-d+i) in hazardous areas. KRG-10 is certified as explosion proof (Ex-d) and intrinsically safe (Ex-ia).



Picture 12: Housing and cable gland



The following figure (13) shows a diagram showing the connection of the instrument in the Ex-d and Ex-ia areas.



Picture 13: ATEX wiring

EX APPROVAL	
II 1G Ex ia IIC T4 Ga	II 1D Ex ia IIIC 135°C Da IP66
II 2G Ex d ia IIC T4 Gb	II 2D Ex TB IIIC 135°C Db IP66

ORDERING CODE

KRG Radar Electronic level Transmitter

01 Type of measure	
<input type="checkbox"/>	E Level
02 Sensor type	
<input type="checkbox"/>	C0 Cone Radar AISI 316 2"
<input type="checkbox"/>	C1 Cone Radar AISI 316 4"
<input type="checkbox"/>	P1 2" flush radar antenna
<input type="checkbox"/>	P2 4" flush radar antenna
<input type="checkbox"/>	R0 1" PFA rod antenna
03 Measuring range	
<input type="checkbox"/>	R01 0÷5 m
<input type="checkbox"/>	R02 0÷10 m
<input type="checkbox"/>	R03 0÷20 m
<input type="checkbox"/>	R04 0÷30 m
04 Filling oil	
<input type="checkbox"/>	N No filling
05 Process temperature limits	
<input type="checkbox"/>	L -40 ÷ 200 °C
06 Housing material and type	
<input type="checkbox"/>	D08 Aluminum painted Ø 105 mm
07 Process connection	
<input type="checkbox"/>	F33 Flange DN 50 PN 10/16
<input type="checkbox"/>	F43 Flange DN 80 PN 10
<input type="checkbox"/>	F75 Flange DN 2" ANSI 150 RF
<input type="checkbox"/>	F79 Flange DN 3" ANSI 150 RF
<input type="checkbox"/>	Z99 Special
08 Extension length	
<input type="checkbox"/>	N00 No extension
09 Sensor material (diaphragm)	
<input type="checkbox"/>	A SS AISI 316
<input type="checkbox"/>	B SS AISI 316 L
<input type="checkbox"/>	N PTFE
<input type="checkbox"/>	W PFA
10 Process gasket material	
<input type="checkbox"/>	D FKM Viton (-15/+200 °C)
<input type="checkbox"/>	Z Special
11 Wetted parts material	
<input type="checkbox"/>	A SS AISI 316
<input type="checkbox"/>	B SS AISI 316 L
<input type="checkbox"/>	Z Special
12 Electrical connection	
<input type="checkbox"/>	81 Filetti 2 x M20
13 Electrical output	
<input type="checkbox"/>	A Corrente 4÷20 mA 2 fili + HART (std 0,25% FS)
14 Ex type approval	
<input type="checkbox"/>	N0 No Ex certification
<input type="checkbox"/>	R1 Certificazione ATEX Ex-ia
<input type="checkbox"/>	R2 Certificazione ATEX Ex-d
15 Options and accessories	
<input type="checkbox"/>	RA Plastic Cable Gland PG13 screwed M20 X 1,5
<input type="checkbox"/>	Z6 Display
<input type="checkbox"/>	NN No options