



丹东德泽科技有限公司
DANDONG VIRTUE RIVER TECHNOLOGY CO., LTD

ULTRASONIC LEVEL TRANSMITTERS (VRPWCS 60 SERIES)



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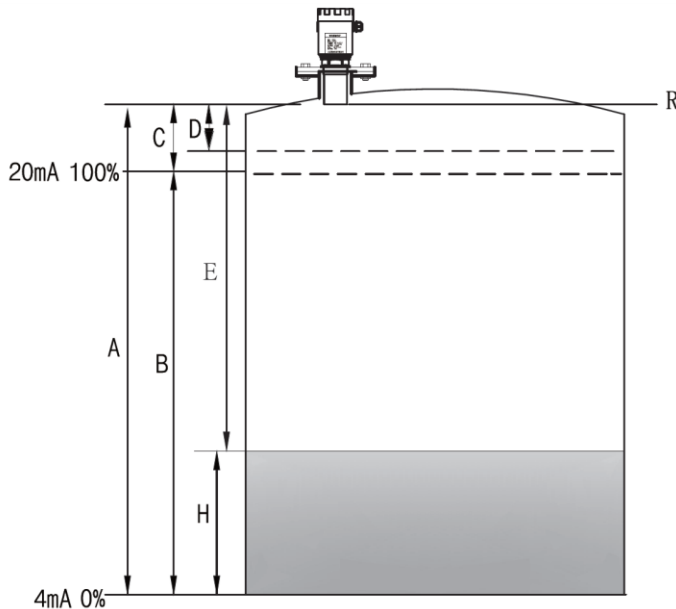
1. Working principle

1.1. Principle of measurement

The ultrasonic level metering technology is based on the principle that the energy transducer (the sensor) emits an ultrasonic pulse train, receives, and selects some echoes reflected by the medium surface, converting them into electrical signals.

The ultrasonic pulse travels at the speed of sound, and the time interval between emitting and receiving is in proportion to the distance between the sensor and the medium surface. The formula relating the distance S , sound speed C and the transmitting time T is as following: $S=C \times T/2$

The overlapping of the emitting and reflecting pulse within an area close to the sensor can not be identified and measured due to the limit width of the emitting ultrasonic pulse, the area is called Dead Zone. The distance of the dead zone is associated with the working frequency of the ultrasonic level meter.



The measuring reference level is at the bottom of the sensor.

- A. Empty tank (Max. Measurement Distance)
- B. Measuring Range
- C. Full of Medium (Full range)
- D. Dead zone
- E. Distance
- H. Level
- R. Measurement reference point

1.2. Features

Easy operation and mounting. Economic, plastic housing

1.3. Typical applications

It is suitable for being used for liquid level measurement in different industrial areas, especially in water treatment areas.

2. Product Description

Measuring range: Standard probe: 0.3 ... 5m for liquids



VRPWCS61

Anti-corrosive sealed probe: 0.3 ... 4m for liquids

Process connection: G1 1/2A or flanges

Housing material of the transducer: PA66+GF30 or PVDF

Process temperature: -40°C ... +70°C

Process pressure: -0.02MPa – 0.1MPa

Accuracy: $\pm 0.4\%$ of full range

Output: 4 – 20 mA

Power supply: 24 V DC (2- wire or 4-wire); 220V AC (4-wire)

Enclosure grade: IP66



VRPWCS62

Measuring range: Standard probe: 0.4 ... 10m for liquids

Anti-corrosive sealed probe: 0.4 ... 8m for liquids

Process connection: G2A or flanges

Housing material of the transducer: PA66+GF30 or PVDF

Process temperature: -40°C ... +70°C

Process pressure: -0.02MPa – 0.1MPa

Accuracy: $\pm 0.4\%$ of full range

Output: 4 – 20 mA

Power supply: 24 V DC (2- wire or 4-wire); 220V AC (4-wire)

Enclosure grade: IP66



VRPWCS63

Measuring range: Standard probe: 0.5 ... 15m for liquids

Anti-corrosive sealed probe: 0.5 ... 10m for liquids

Process connection: M66×2 or flanges

Housing material of the transducer: PA66+GF30 or PVDF

Process temperature: -40°C ... +70°C

Process pressure: -0.02MPa – 0.1MPa

Accuracy: $\pm 0.4\%$ of full range

Output: 4 – 20 mA

Power supply: 24 V DC (2- wire or 4-wire); 220V AC (4-wire)

Enclosure grade: IP66



VRPWCS64

Measuring range: Standard probe: 0.6 ... 20m for liquids

Anti-corrosive sealed probe: 0.6 ... 15m for liquids

Process connection: M95×2 or flanges

Housing material of the transducer: PA66+GF30

Process temperature: -40°C ... +70°C

Process pressure: -0.02MPa – 0.1MPa

Accuracy: ±0.4% of full range

Output: 4 – 20 mA

Power supply: 24 V DC (2- wire or 4-wire); 220V AC (4-wire)

Enclosure grade: IP66

3. Guidance for installation

3.1. Installation position

- The installation of VRPWCS61, VRPWCS62 and VRPWCS63

During the installation of VRPWCS61, VRPWCS62 and VRPWCS63, please keep each the symmetrical central line of them at least 200mm away from to the inner wall of the tank, 500mm or above is suggested.

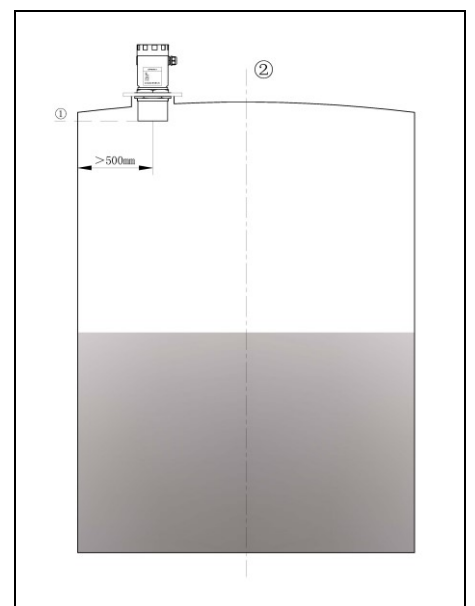
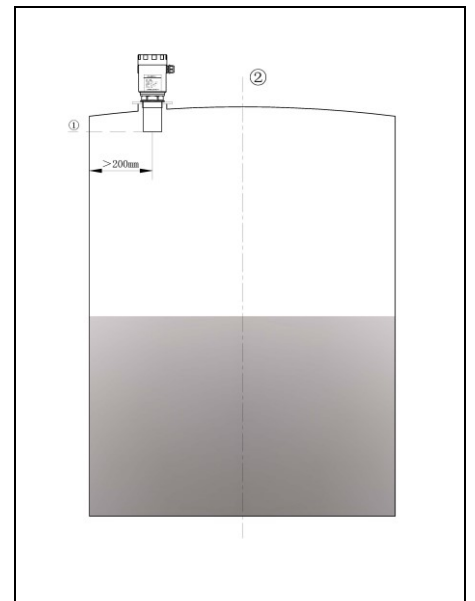
Note:

- ① The bottom line of the sensor (The emission surface of sound wave)
- ② The symmetrical central line of the tank

- The installation of VRPWCS64

During the installation of VRPWCS64, please keep the symmetrical central line of the meter at least 500mm away from to the inner wall of the tank.

- ① The bottom line of the sensor (The emission surface of sound wave)
- ② The symmetrical central line of the tank





3.2 Installation

● Installation requirements

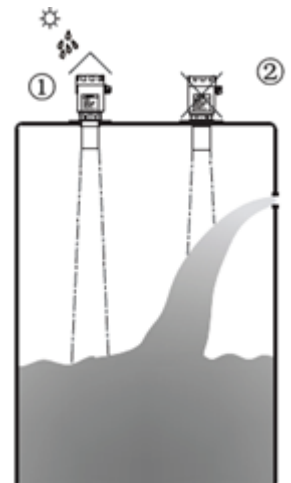
- A certain distance between the meter and the inner tank wall should be kept (please see the installation position instructions for details.).
- There is a certain beam angle when the transducer emits ultrasonic pulse. Therefore, make sure that no obstacle A or B (e. g. ladders, level switches, heating coils, diversion trenches, etc.) is in the area of the sensing cone
- Make sure that there is no crossing between the ultrasonic beam and the feeding flow.
- The highest liquid level cannot get into the dead zone during installation.
- Try to install the meter at the position where the emitting direction of the transducer is vertical with the liquid surface.

The installation of the instruments with explosion-proof should comply with the regulations of the state on the instrument installation in dangerous area. The housing material of the intrinsically safe instrument should be aluminum, which can ensure the instrument to be installed in dangerous area. The instruments must be grounded.

● Typical wrong installations

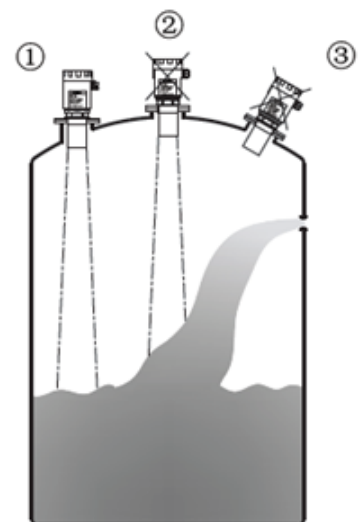
- Instrument can not be mounted above feeding inlet, which cannot measure the actual liquid level. Keep the mounting position away from sunshine or rain for the outdoor installation.

- ① Correct
- ② Wrong



- The transducer should be vertical with the liquid surface.
- The instrument cannot be mounted at the middle of a tank with an arch top in order to avoid possible multiple echoes.

- ① Correct
- ② Wrong
- ③ Wrong

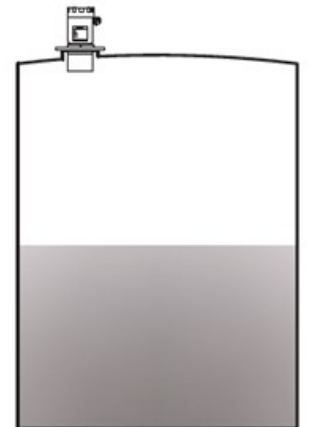
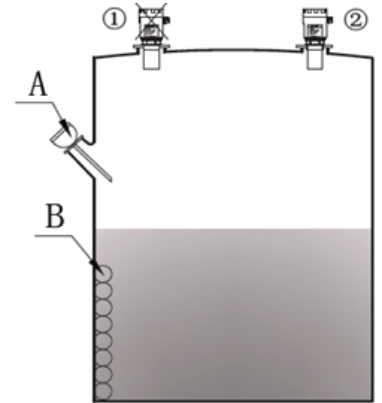
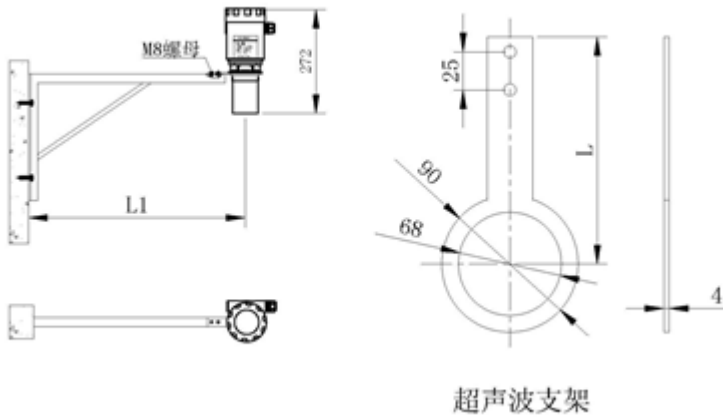


- Obstacles A or B should be avoided during installation. Refer to the picture at the right top of the next page.



- **Installation with bracket**

PWCS63 can be installed with brackets.



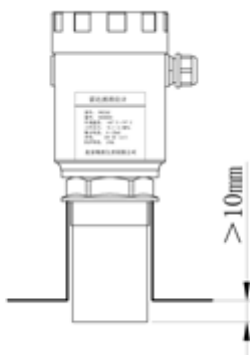
Installation with flange is also available for VRPWCS64. See the picture right.

- **Damp-proof**

Cable gland should be tightened for instruments mounted at outside or damp environment, and the cable at inlet should be bent down into U. Shown as following:

- **Mounting with an extension pipe**

The length of extension pipe: Make sure that the sensor should be at least 10mm out of the vessel surface



- **Foam**

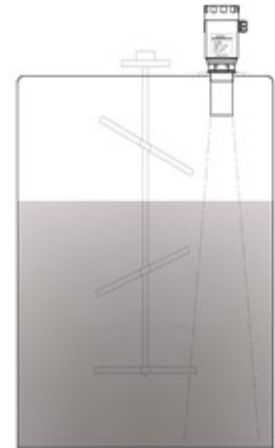
Foaming of some of the liquid surface due to feeding, agitating or other process inside the vessel is to weaken the emission signal. When foaming may cause measuring error, the sensor should be installed in a stilling pipe or guided wave radar level transmitter should be used. Guided wave radar



level transmitter is the best choice for this application, which will not be affected by foam.

- **Agitating**

When there is agitating within the tank, please keep the mounting position away from the agitator during installation. When there is foam or wave caused by agitating, a wave guiding pipe should be used during installation.

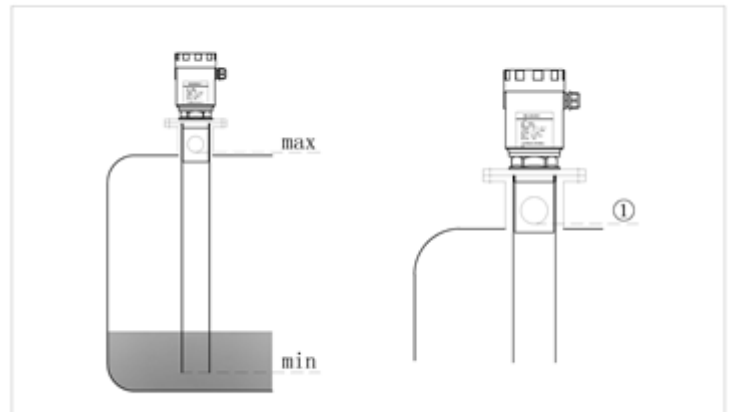


- **Air flow**

If there is strong air flow in the vessel, e.g. outdoor installation with strong wind, or there is turbulence in the vessel, the sensor is recommended to be installed into a wave guiding pipe, or pulse radar level transmitter or guided wave radar level transmitter is also recommended.

- **Installation of wave guiding pipe**

Wave guiding pipe (wave guiding pipe or by-pass pipe) with air hole with diameter of 5 -10mm can be used, which can avoid measurement error affected by obstacles, foam or air turbulence.

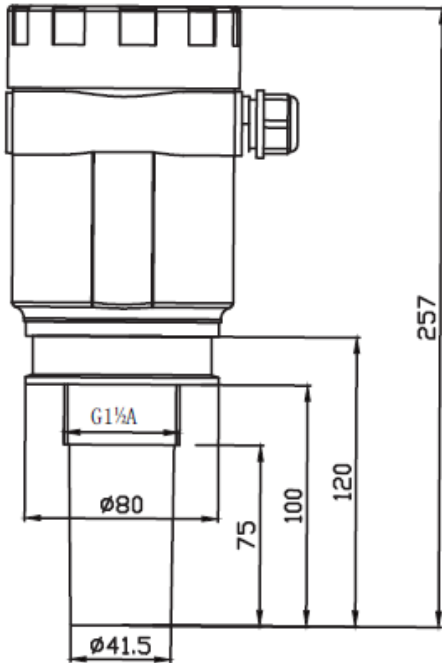


Note: Wave guiding pipe cannot be used for measurement with sticky medium.

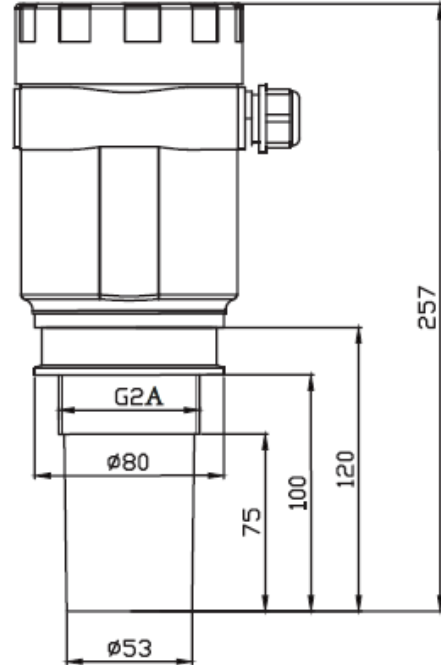


4. Structure Dimension (Unit: mm)

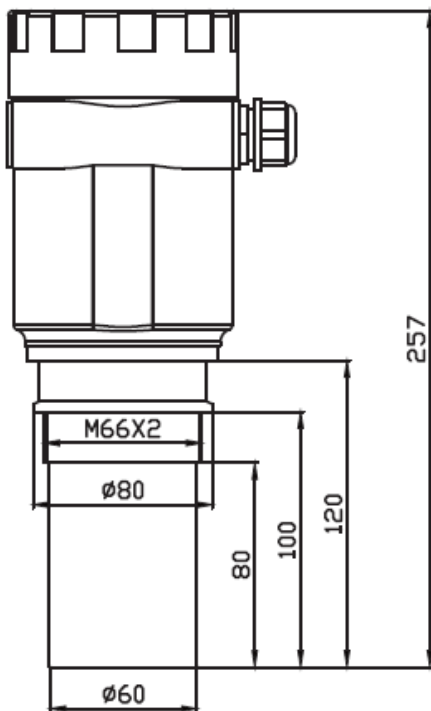
VRPWCS61



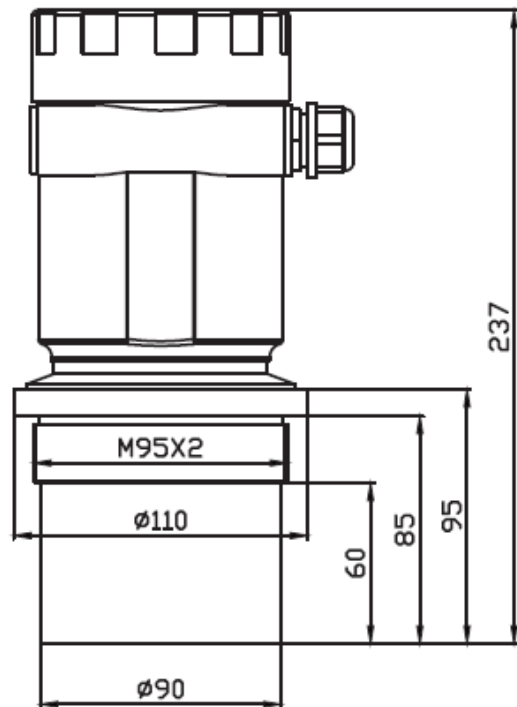
VRPWCS62



VRPWCS63

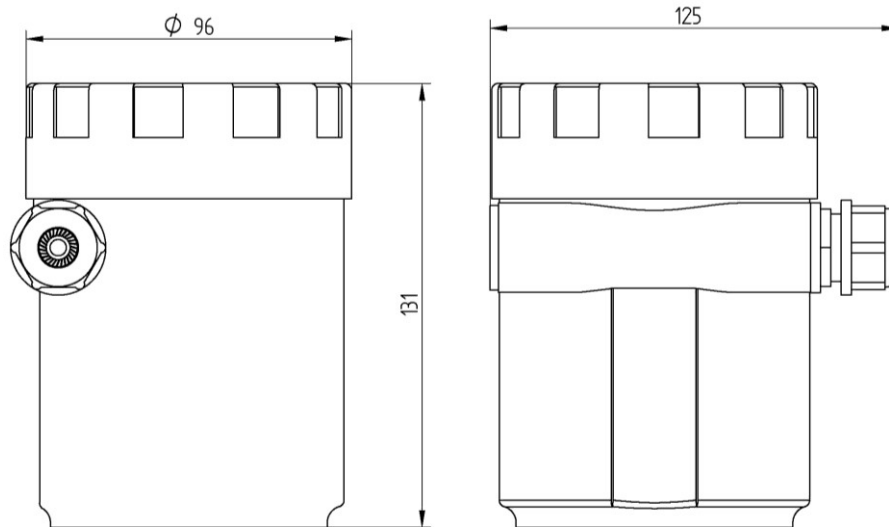


VRPWCS64





Housing material: Plastic



5. Wiring

● Power supply

Two wires: Power supply shares one 2-wire cable with the output signal. Please see the technical data for the actual power supply voltage.

Four wires: Power supply and signal current are separate, using one 2-wire cable respectively. Please see the technical data for the actual power supply voltage.

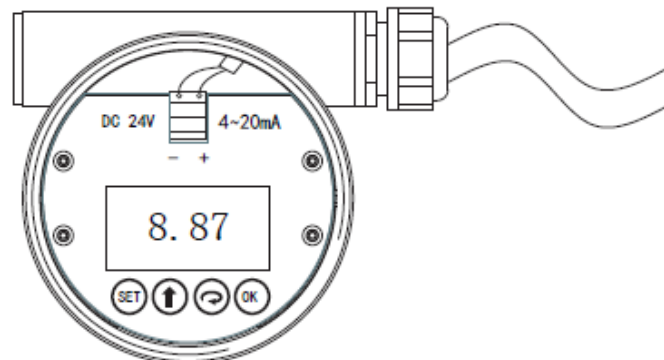
Cable connection

General introduction

Common 2-wire cable can be used for power supply. The outer diameter of the cable should be 5 – 9 mm to ensure cable entry sealing. Shielded cable is recommended when there is electromagnetic interference.

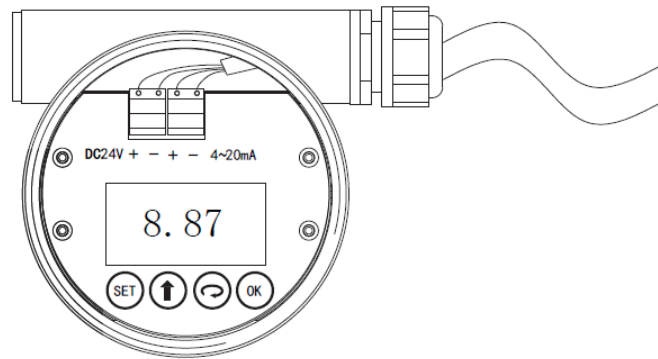
● Wiring

2-wire, 24V DC for power supply:

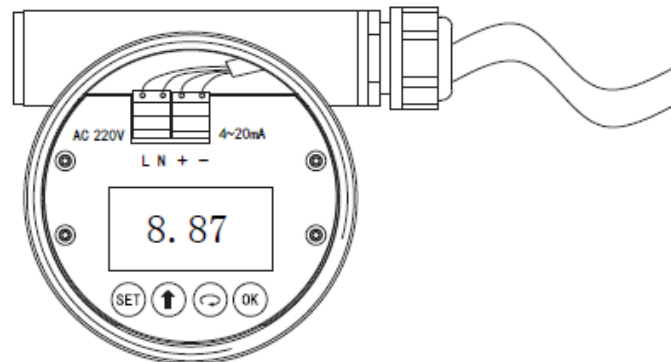




4-wire, 24V DC for power supply:



4-wire, 220V AC for power supply:



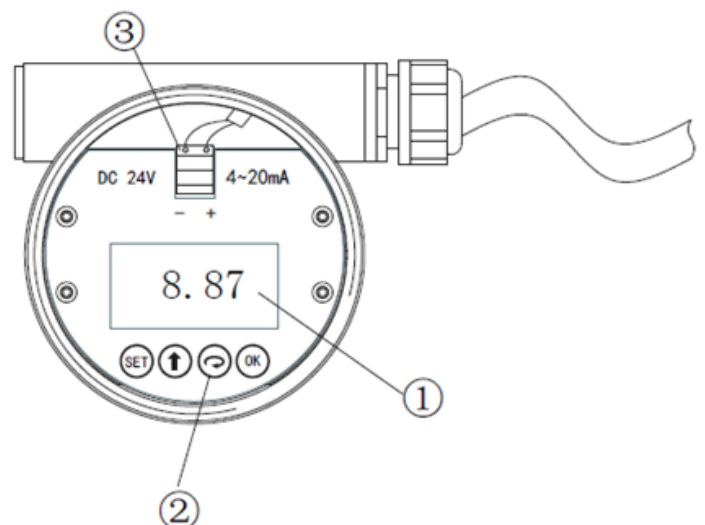
6. Calibration

Debugging methods of VRPWCS60X:

With buttons

Debugging can be done with the 4 buttons on the display board. Please refer to the picture below. After debugging, the display keeps the normal working condition.

- ① LCD display
- ② Buttons
- ③ Wiring terminals





7. Technical Data

General data

Model		VRPWCS61	VRPWCS62	VRPWCS63	VRPWCS64
Process connection		Thread G1 1/2A	Thread G2A	Thread M66×2	Thread M95×2
Material	Transducer	PA66+GF30/ PVDF		PA66+GF30	
	Transducer seal	Silicon			
	Housing	Plastic			
	Housing seal	Silicone rubber			
	Cover window	Polycarbonate			
Weight (Depends on the process connection)		0.7kg	0.8kg	0.9kg	1.2kg
Power supply	2-wire	Standard type: 24V DC			
		Power consumption: max.22.5mA			
		Allowed ripple: <100Hz, U _{ss} <1V; (100~100k) Hz, U _{ss} <10mV			
	4-wire	Standard type: 24V DC/ 220V AC			
Power consumption: max.1VA, 1W					
Cable parameter		Cable inlet/ plug: 1 M20×1.5 cable entry (cable diameter 5...9mm), one plug, M20×1.5			
		Spring wiring terminal: cross section 2.5mm ²			
Output parameter		Output signal: 4 – 20m A			
		Resolution: 1.6μA			
		Error output: 20.5mA; 22mA; 3.9mA			
		Damping time: 0 – 30S adjustable			
Features	Dead zone	0.25m	0.3m	0.4m	0.5m
	Max. measuring range	Stan. probe: 5m	Stan. probe: 10m	Stan. probe: 15m	Stan. probe: 20m
		Sealed probe: 4m	Sealed probe: 8m	Sealed probe: 12m	Sealed probe: 16m
	Frequency	60kHz	50kHz	40kHz	28kHz
	Emission angle	5°	5°	5°	3°
	Resolution	1mm			
	Repeatability	±3mm			
	Accuracy	±0.4% for full range			
	Process tem.	-40°C ... +70°C			
	Re. humidity	<95%			
	Pressure	<0.1MPa			
Resistance to vibration	Mechanic vibration 10m/s				



8. Model Selection

VRPWCS61 (Max. 5m)

Code	Approvals				
P	Standard type (Non-explosion)				
Code	Transducer material/ Transducer type/ Process temperature/ Enclosure/ Max. range				
A	PA66+GF30/ Open/ (-40 ~ +70)°C/ IP65/ Liquid 5m				
B	PA66+GF30/ Sealed/ (-40 ~ +70)°C/ IP66/ Liquid 4m				
C	PVDF/ Sealed/ (-40 ~ +70)°C/ IP67/ Liquid 4m				
Code	Process connection				
GPM Y	Thread G1 1/2 A Special design				
Code	Flange matching/ Material				
Flange size	Material	PP	PTFE	SS304	SS316L
	Code	Face Flange	Face Flange	Face Flange	Face Flange
DN80 PN16 flange		DP	DF	DA	DB
DN100 PN16 flange		EP	EF	EA	EB
DN125 PN16 flange		FP	FF	FA	FB
DN150 PN16 flange		GP	GF	GA	GB
DN200 PN16 flange		HP	HF	HA	HB
DN250 PN16 flange		JP	JF	JA	JB
ANSI 3" 150lb flange		DPM	DFM	DAM	DBM
ANSI 4" 150lb flange		EPM	EFM	EAM	EBM
ANSI 5" 150lb flange		FPM	FFM	FAM	FBM
ANSI 6" 150lb flange		GPM	GFM	GAM	GBM
ANSI 8" 150lb flange		HPM	HFM	HAM	HBM
ANSI 10" 150lb flange		JPM	JFM	JAM	JBM
X	None				
Y	Special design				



Code	Electronic unit
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
Y	Special design
Code	Housing/ Enclosure protection grade
P	Plastic/ IP 66
Code	Cable entry
M	M20x1.5
N	½" NPT
Code	Display/ Programmer
V	With
X	Without

VRPWCS62 (Max. 10m)

Code	Approvals					
P	Standard type (Non-explosion)					
Code	Transducer material/ Transducer type/ Process temperature/ Enclosure/ Max. range					
A	PA66+GF30/ Open/ (-40 ~ +70)°C/ IP65/ Liquid 10m					
B	PA66+GF30/ Sealed/ (-40 ~ +70)°C/ IP66/ Liquid 8m					
C	PVDF/ Sealed/ (-40 ~ +70)°C/ IP67/ Liquid 8m					
Code	Process connection					
GPM	Thread G2 A					
Y	Special design					
Code	Flange matching/ Material					
Flange size	Material Code	PP Face Flange	PTFE Face Flange	SS304 Face Flange	SS316L Face Flange	
	DN80 PN16 flange	DP	DF	DA	DB	
	DN100 PN16 flange	EP	EF	EA	EB	




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DN125 PN16 flange	FP	FF	FA	FB
DN150 PN16 flange	GP	GF	GA	GB
DN200 PN16 flange	HP	HF	HA	HB
DN250 PN16 flange	JP	JF	JA	JB
ANSI 3" 150lb flange	DPM	DFM	DAM	DBM
ANSI 4" 150lb flange	EPM	EFM	EAM	EBM
ANSI 5" 150lb flange	FPM	FFM	FAM	FBM
ANSI 6" 150lb flange	GPM	GFM	GAM	GBM
ANSI 8" 150lb flange	HPM	HFM	HAM	HBM
ANSI 10" 150lb flange	JPM	JFM	JAM	JBM
X None Y Special design				
Code	Electronic unit			
2	(4~20)mA/ 24V DC 2-wire			
3	(4~20)mA/ 24V DC 4-wire			
4	(4~20)mA/ 220V AC 4-wire			
Y	Special design			
Code	Housing/ Enclosure protection grade			
P	Plastic/ IP 66			
Code	Cable entry			
M	M20x1.5			
N	1/2" NPT			
Code	Display/ Programmer			
V	With			
X	Without			



VRPWCS63 (Max. 15m)

Code	Approvals				
P	Standard type (Non-explosion)				
Code	Transducer material/ Transducer type/ Process temperature/ Enclosure/ Max. range				
A	PA66+GF30/ Open/ (-40 ~ +70)°C/ IP65/ Liquid 15m				
B	PA66+GF30/ Sealed/ (-40 ~ +70)°C/ IP66/ Liquid 12m				
C	PVDF/ Sealed/ (-40 ~ +70)°C/ IP67/ Liquid 12m				
Code	Process connection				
GPM	Thread M66*2				
Y	Special design				
Code	Flange matching/ Material				
Flange size	Material Code	PP Face Flange	PTFE Face Flange	SS304 Face Flange	SS316L Face Flange
DN100 PN16 flange		EP	EF	EA	EB
DN125 PN16 flange		FP	FF	FA	FB
DN150 PN16 flange		GP	GF	GA	GB
DN200 PN16 flange		HP	HF	HA	HB
DN250 PN16 flange		JP	JF	JA	JB
ANSI 4" 150lb flange		EPM	EFM	EAM	EBM
ANSI 5" 150lb flange		FPM	FFM	FAM	FBM
ANSI 6" 150lb flange		GPM	GFM	GAM	GBM
ANSI 8" 150lb flange		HPM	HFM	HAM	HBM
ANSI 10" 150lb flange		JPM	JFM	JAM	JBM
X	None				
Y	Special design				



Code	Electronic unit
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
Y	Special design
Code	Housing/ Enclosure protection grade
P	Plastic/ IP 66
Code	Cable entry
M	M20x1.5
N	1/2" NPT
Code	Display/ Programmer
V	With
X	Without

VRPWCS64 (Max. 20m)

Code	Approvals					
P	Standard type (Non-explosion)					
Code	Transducer material/ Transducer type/ Process temperature/ Enclosure/ Max. range					
A	PA66+GF30/ Open/ (-40 ~ +70)°C/ IP65/ Liquid 20m					
B	PA66+GF30/ Sealed/ (-40 ~ +70)°C/ IP66/ Liquid 16m					
Code	Process connection					
GPM	Thread M95*2					
Y	Special design					
Code	Flange matching/ Material					
Flange size	Material	PP	PTFE	SS304	SS316L	
	Code	Face Flange	Face Flange	Face Flange	Face Flange	



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DN100 PN16 flange	EP	EF	EA	EB
DN125 PN16 flange	FP	FF	FA	FB
DN150 PN16 flange	GP	GF	GA	GB
DN200 PN16 flange	HP	HF	HA	HB
DN250 PN16 flange	JP	JF	JA	JB
ANSI 4" 150lb flange	EPM	EFM	EAM	EBM
ANSI 5" 150lb flange	FPM	FFM	FAM	FBM
ANSI 6" 150lb flange	GPM	GFM	GAM	GBM
ANSI 8" 150lb flange	HPM	HFM	HAM	HBM
ANSI 10" 150lb flange	JPM	JFM	JAM	JBM
<p>X None</p> <p>Y Special design</p>				
Code	Electronic unit			
2	(4~20)mA/ 24V DC 2-wire			
3	(4~20)mA/ 24V DC 4-wire			
4	(4~20)mA/ 220V AC 4-wire			
Y	Special design			
Code	Housing/ Enclosure protection grade			
P	Plastic/ IP 66			
Code	Cable entry			
M	M20x1.5			
N	½" NPT			
Code	Display/ Programmer			
V	With			
X	Without			



9. Model Selection Data Sheet

Customer information

Company: _____ Contact person: _____
Add.: _____ Post code: _____
Tel.: _____ Fax: _____ Mobile: _____
E-mail: _____ Date: _____

Tank/ container information

Tank type:

- Storage tank Reaction tank Separation tank Marine tank

Tank structure:

- Tank material: _____ Tank pressure: _____

Tank size:

- Height of tank: _____m Diameter of tank: _____m

Top of a tank:

- Arch Flat top Open Conic

Bottom of a tank:

- Tapered Flat Inclined Arch

Installation position:

- Top Side Bypass pipe Wave guiding pipe

Extension pipe on the tank top (Important information):

Height of extension pipe: _____mm

Diameter of extension pipe: _____mm

Measuring medium:

Medium name: _____ Liquid Solid Mixed

Medium temperature: _____ °C

Dielectric constant: _____

Adhesive: Yes No

Stirring: Yes No

Process connection:

Thread: 66×2 95×2

Flange (DN=_____) Flange (ANSI=_____)

Power supply: 24V DC 2-wire 24V DC 4-wire 220V AC

Output: 4-20mA

Display: With display and programmer Without display and programmer