

### GENERAL

UW-5000 Series is an ultrasonic non-contact level meter that can measure liquid, slurry and solid level continuously.

UW-5000 can be used for wide range of application and measuring span with variety of sensors.

The combination of the high efficiency sensors as well as state of the art signal treatment and evaluation based on years of experiences ensures the measurement in a difficult condition, which used to be judged uncertain to measure by ultrasonic technology.

UW-5000 offers either integral or remote sensors by application. Simple push button commissioning, AC and/or DC power supply are available for both integral and remote type sensors.

RS485 MODBUS output is standard even for 2 wire system instruments that are suitable for remote commissioning and data acquisition by a PC with dedicated software.

UW-5000 series is an ultimate level meter for the most applications in any industry.

### FEATURES

- ❑ Non contact, Continuous level measurement in use of acoustic wave
- ❑ Suitable for liquids, slurries, powders, granulates and even rocks
- ❑ Selectable 2 wires loop power or AC/DC power supply type
- ❑ Integral and remote type are selectable by mounting and measurement conditions
- ❑ High efficiency, high power sensors realizes up to 60 m range
- ❑ Built-in temperature sensor as standard for sound velocity compensation
- ❑ Automatic controlled threshold, false echo mapping are the standard features
- ❑ Relays are integrated to AC/DC power type for pump control, overflow protection and elimination of empty pumping
- ❑ Outputs of level, distance, volume, difference of two sensors, average of measurement values

### APPLICATION AREA

- Water/Waste water, Fluvial and Agricultural water :  
Open-channel, Under-drain, Water-intake screen control, Pump station, Dam, River water, Chemical additives
- Steel, Stone crushing, Mining, Cement :  
Crusher, Hopper, Conveyer junction, Stacker/Reclaimer, Storage silo, Water treatment plant
- Power station :  
Coal bunker, Coal silo, Bottom & Fly ash, Water-intake screen control, Water treatment plant
- Foods/Animal feeds :  
Flour, Wheat, Mice, Cereal, Grain, Morasses, Syrup, Additives, Water, Cacao, Paste, Butter, Edible oil, Margarine
- Chemicals/Plastics :  
Pellets silo, Powder silo, Chemicals
- Pulp and paper :  
Wood chips, White liquid, Black liquid, Chemicals, Water treatment plant
- Semiconductor industry :  
Pure water, Ultra pure water, Chemicals, Water treatment



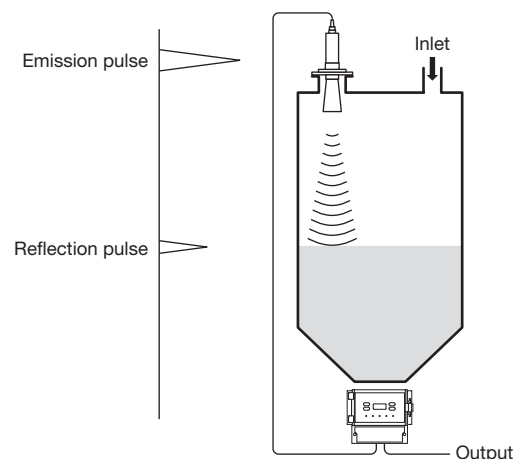
### MEASURING PRINCIPLE

UW5000 emits high powered acoustic wave transmit pulse, which propagate through the air approx. 340 m/sec and reflected from the surface of the measured material.

The reflected signal is received by the same sensor. UW5000 measures the time interval from emission to receipt of the pulse and calculates distance from sensor to the surface by the sound velocity. The sound velocity is a function of the temperature so the built-in temperature sensor is used for the compensation of the sound velocity to distance.

The transmission of high powered acoustic wave ensures minimal losses through the environment where the sensor is mounted and therefore the return signal is much bigger than the conventional ultrasonic level meter. Thus the Signal to Noise ratio is fundamentally good. Moreover, newly developed software eliminates noisy signal and enhances the correct signal. The measured distance generates output in the form of 4 to 20mA DC. (directly in ullage or calculate level from zero point registered in UW5000.)

UW5000 with the optional relay outputs contact signals at pre-determined measuring level.



SPCIFICATION

Object	Item		Description
Common Specification	Measurement	Purpose	Non contact continuous level measurement.Vessel top mounting
		Measuring object	Liquid, Slurries, Powders, Granulates, Rocks
		Measuring principle	Acoustic wave Pulse Echo

Object	Item		Description	
Common Electric Specification	Output	Analogue output	Output items	Level, Distance (Ullage), Volume, Average level, Difference level
			Output signal	4 to 20mA DC
			Maximum load	750Ω : UW5200, UWC520 (2 wire system) 270Ω : UW5100, UWC510 (AC/DC power supply)
		Relay output (Only AC/DC type)	Numbers of relays	2 relays (Integral sensor type, AC/DC power supply) 5 relays (Remote converter type, AC/DC power supply)
			Contact rating	SPDT Max. 0.5A, 240V AC
		Digital output	Specification /Protocol	RS485 MODOBUS / RTU Connection should be individual twisted pair (screened for longer distance)
	Accuracy	Under reference condition	±0.25% of Max. range for each sensor	
	Power supply	AC/DC type	90 to 260V AC 50/60 Hz, 12 to 30 V DC	
		2 wire loop powered	12 to 30 V DC (Max. ripple 100mV)	
	Power consumption	AC/DC type	Max. 10VA (AC)	
2 wire loop powered		Max. 10W (DC)		

Object	Item		Description
Environmental/Process Specification	Temperature	Remote sensor	-40 to 80°C
		Integral sensor/Remote converter	-40 to 80°C
	Pressure	Process pressure	ATM to 50kPa
	Protection class	Remote sensor/Integral sensor	IP67 (IEC60529)
		Remote converter	IP65 (IEC60529)
	Cable Length	Built-in cable to remote sensor	6m (Standard), 15m, 30m, 50m (Option)
		Remote sensor to remote converter	Max.500m (4 cores : 2X twisted pair individually/screed/communication)
	Approval	IEC Ex	Integral sensor : UW5205, 5210,5220, 5230, 5250, 5260
Ex ia IIA T4 (-20C, +70C)		Remote sensor : UWS505, 510, 520, 530, 550, 560 (Combination to UWC520)	

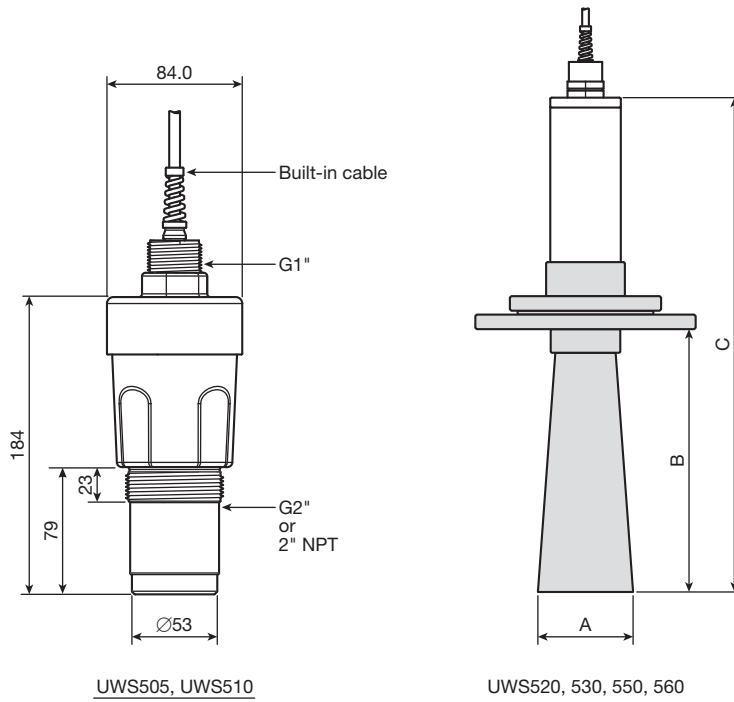
Object	Range Category	Short Range		Middle Range		Long Range			
Sensor specification	(Integral sensor)	Type	UW5□05	UW5□10	UW5□20	UW5□30	UW5□50	UW5□60	
		Measuring Range	5m (Liquid)	10m (liquid)	20m (liquid) 10m (solid)	30m (liquid) 20m (solid)	50m (liquid/solid)	60m (liquid/solid)	
		Frequency	50kHz	30kHz	20kHz	15kHz	10kHz	5kHz	
		Blocking Distance (From transmitter side)	Min. 0.3m	Min. 0.4m	Min. 0.6m	Min. 0.8m	Min. 1.5m	Min. 2.0m	
		Beam Angle (One side)	4° (With focalizer horn)	6° (With focalizer horn)	6° (With focalizer horn)				
			7.5° (Without focalizer horn)						
		Resolution	±1mm		±4mm				
		Material	Body : PBT *2 /ETFE Membrane (Gas-contacting part): ETFE		Body : PBT/PP *2 Flange, Focalizer horn : PP Membrane (Gas-contacting part): PTFE		Body : PBT/PP *2 Flange, Focalizer horn : PP Membrane (Gas-contacting part): Polyolefine		
	Mounting	4" flange (with focalizer horn) or 2" screw without focalizer horn *1		4" flange (with focalizer horn)	10" flange (with focalizer horn)				
	(Remote sensor)	Type	UWS505	UWS510	UWS520	UWS530	UWS550	UWS560	
		Measuring Range	5m (Liquid)	10m (liquid)	20m (liquid) 10m (solid)	30m (liquid) 20m (solid)	50m (liquid/solid)	60m (liquid/solid)	
		Frequency	50kHz	30kHz	20kHz	15kHz	10kHz	5kHz	
		Blocking Distance (From transmitter side)	Min. 0.3m	Min. 0.4m	Min. 0.6m	Min. 0.8m	Min. 1.5m	Min. 2.0m	
		Beam Angle (One side)	4° (With focalizer horn)	6° (With focalizer horn)	6° (With focalizer horn)				
			7.5° (Without focalizer horn)						
		Resolution	±1mm		±4mm				
Material		Body : PBT *2 /ETFE Membrane (Gas-contacting part): ETFE		Body : PBT/PP *2 Flange, Focalizer horn : PP Membrane (Gas-contacting part): PTFE		Body : PBT/PP *2 Flange, Focalizer horn : PP Membrane (Gas-contacting part): Polyolefine			
Mounting	4" flange (with focalizer horn) or 2" screw without focalizer horn *1		4" flange (with focalizer horn)	10" flange (with focalizer horn)					

\*1 4" flange mounting with focalizer horn is recommended.

\*2 PBT (Polybutylene terephthalate), PP (Polypropylene)

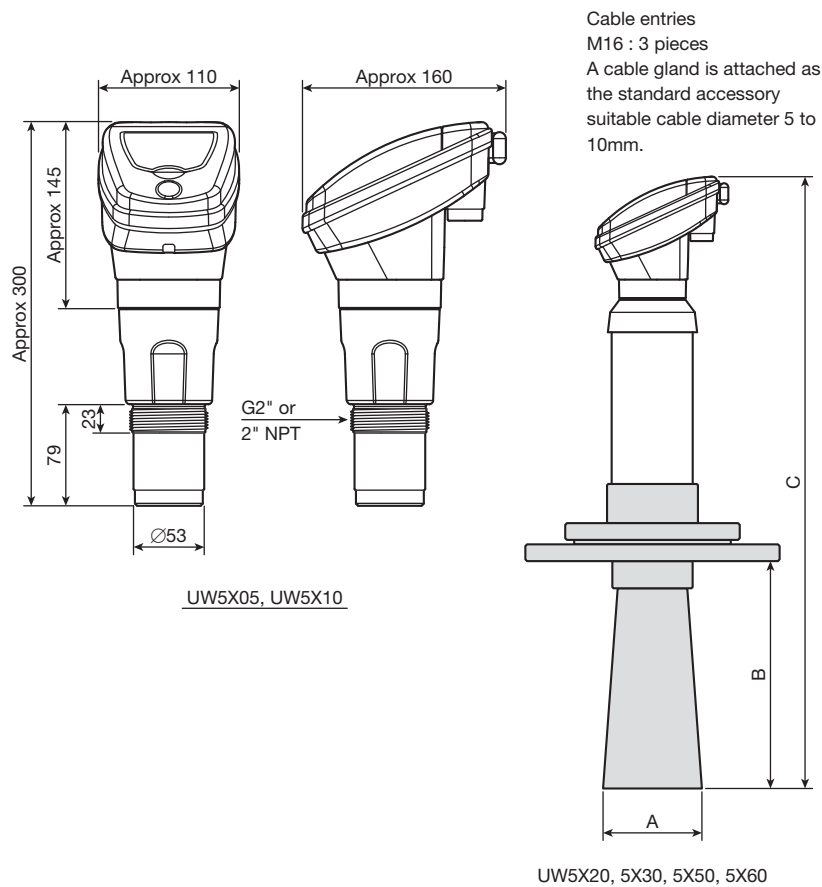
OUTLINE DRAWING

Remote Sensor



Sensor Type	Flange equivalent to JIS 10K or ANSI Class150	Dimensions		
		A	B	C
UWS505	100mm/4"	Ø98	265	410
UWS510	100mm/4"	Ø98	265	485
UWS520	100mm/4"	Ø98	270	537
UWS530	250mm/10"	Ø235	450	795
UWS550	250mm/10"	Ø235	420	845
UWS560	250mm/10"	Ø235	460	1170

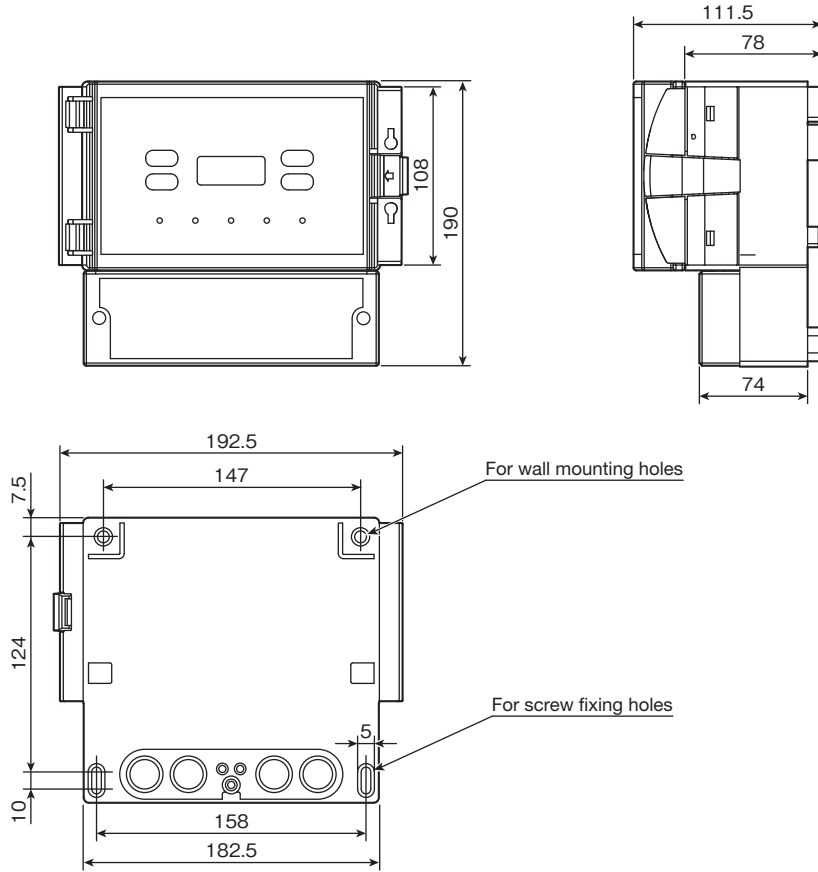
Integral sensor



Sensor Type	Flange equivalent to JIS 10K or ANSI Class 150	Dimensions		
		A	B	C
UW5X05	100mm/4"	Ø98	265	525
UW5X10	100mm/4"	Ø98	265	525
UW5X20	100mm/4"	Ø98	270	650
UW5X30	250mm/10"	Ø235	450	900
UW5X50	250mm/10"	Ø235	420	950
UW5X60	250mm/10"	Ø235	460	1270

**Remote Converter**

Cable entries  
(at the bottom of housing)  
1×16mm  
4×20mm



**TERMINALS**

**Integral sensor, AC/DC supply (UW5100)**

Sensor terminals

NC	COM	NO	A	B	SHLD	BNC	COM	NO
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
L1	N	⊕	-	+	IS	Test	-	+
AC-IN			4-20mA				DC-IN	

**Integral sensor, 2 wire system (UW5200)**

Sensor terminals

COMMS		
A	B	SHLD
⊘	⊘	⊘
4-20mA		TEST
⊘	⊘	⊘
-	+	

**Remote converter, AC/DC supply (UWC510)**

Converter terminals

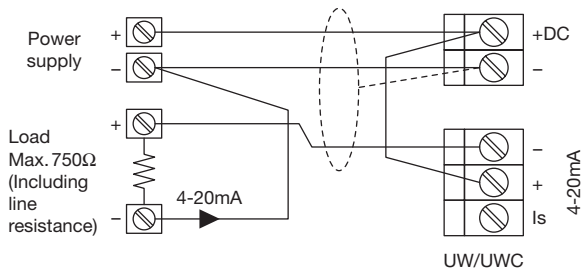
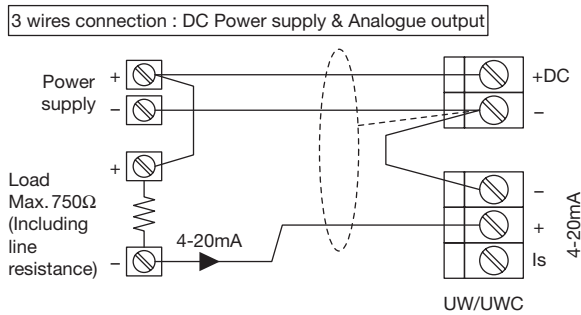
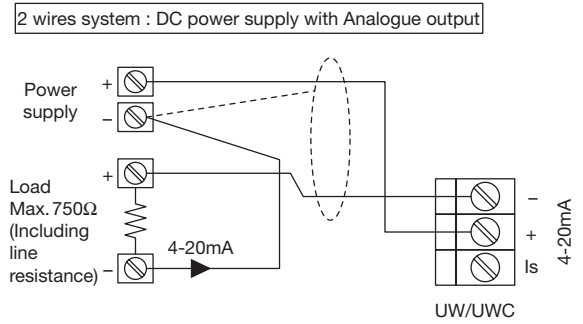
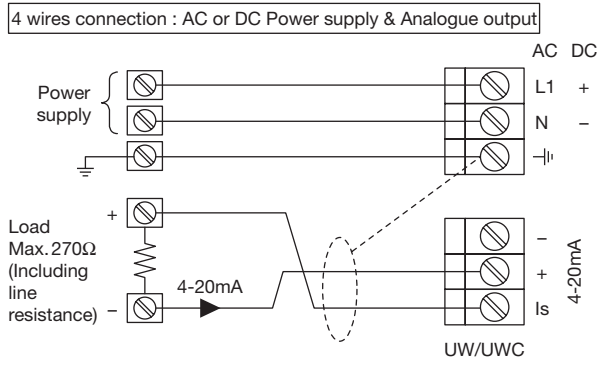
RELAY1			RELAY2			RELAY3			RELAY4			RELAY5		
NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO	NC	COM	NO
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
ANALOG			TRANSDUCER			COMMS			DC-IN			AC-IN		
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
IS	+	-	RED	BLK	BLUE	WHIT	Test-in	B	A	-	+	⊕	N	L1
4-20mA			RED	BLK	BLUE	WHIT	Test-in	COMMS		DC-IN		AC-IN		

**Remote converter, 2 wire system (UWC520)**

Converter terminals

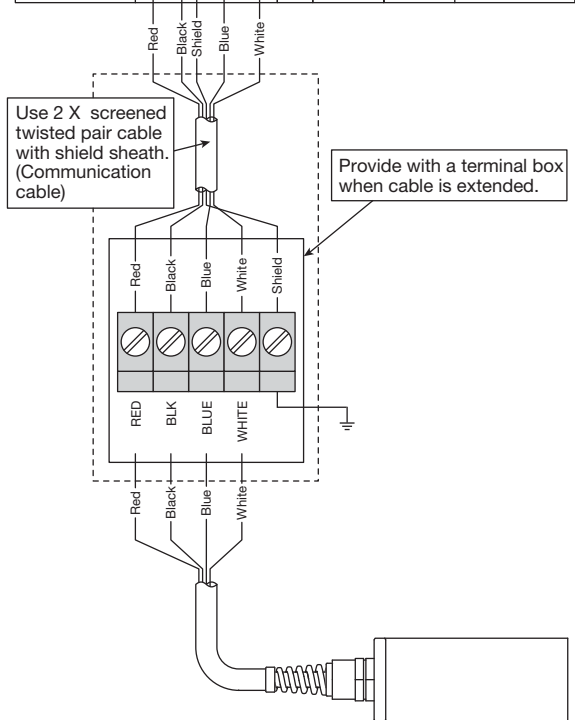
TEST	⊕	COMMS		SHLD	SHLD
		A	B	SHLD	SHLD
⊘	⊘	⊘	⊘	⊘	⊘
TRANSDUCER			DC-IN		
⊘	⊘	⊘	⊘	⊘	⊘
RED	BLK	BLUE	WHIT	-	+
4-20mA					

CONNECTION DIAGRAM



Connection of remote sensor

RELAY1		RELAY2		RELAY3		RELAY4		RELAY5	
NC	COM	NO	COM	NO	COM	NO	COM	NO	COM
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
ANALOG			TRANSDUCER			COMMS		DC-IN	
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
Is	+	-	RED	BLK	BLU	WHI	Test-in	B	A
4-20mA								-	+
								⊕	N
									L1

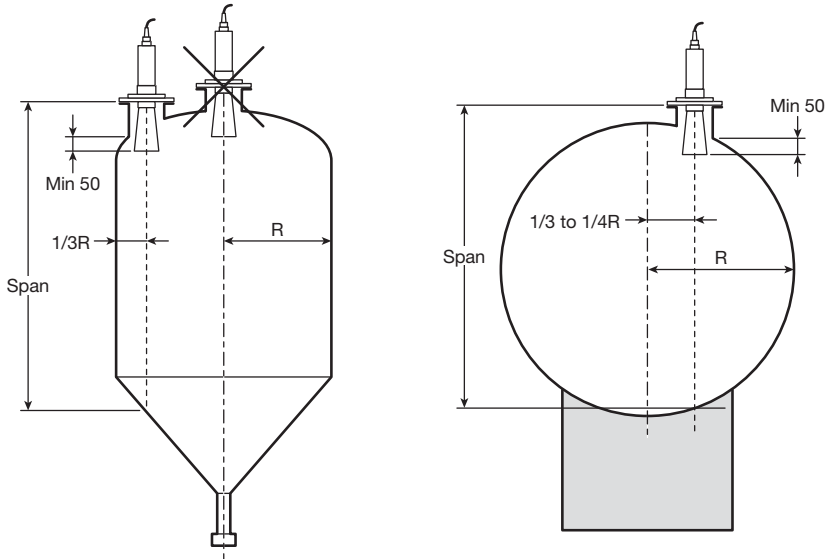


**NOTICE OF USE**

Mounting location

- ① Mount the sensor around 1/3 of the vessel radius from the vessel wall. Do not mount the sensor at the center of the vessel.
- In case of mounting to a horizontal cylindrical tank, mount the sensor offset 1/4 to 1/3 of radius from the center line.

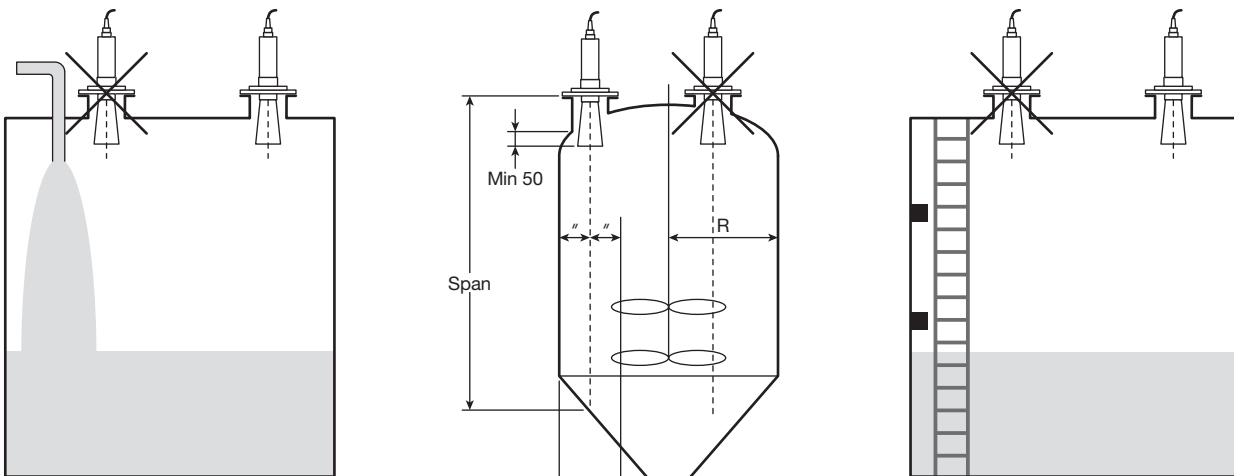
Do not mount the sensor at the center of the vessel



- ② Mounting location should be carefully selected where inlet material will not intrude into the sound robe. Also locate the sensor where no inner structure those reflects sound such as agitator blade, ladder or beam in the sound robe. In case of mounting to the tank with agitator, locate the mounting position in the center between tank wall and tip of the agitator blade.

- When the vessel wall is straight and smooth, it is able to mount the sensor close to the vessel wall where sound robe touching to the vessel wall.
- If the welding bead is rough and juts out, avoid the mounting position where the welding bead is in the sound robe or make the welding bead flat and smooth.
- Do not install the sensor at the center of the vessel. Do not install the sensor in the area where inflow of liquids and powders is within the sound robe.

Do not mount close to any obstacle that reflects sound.



Do not install level meter in the place where vibration is fierce. Install a shade in the place where direct sunlight hits.

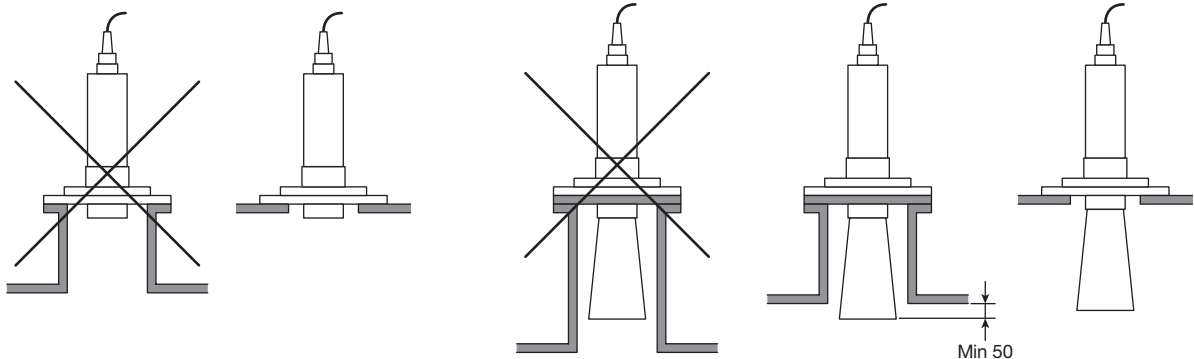
Center the sensor between tank wall and blade

### Mounting of the sensor

#### ① Nozzle length

Mount the sensors for both integral and remote sensor types using flange or screw. The mounting nozzle on the vessel shall have the length so that the sensor (vibrating membrane) or lower end of focalizer horn protrudes at least 50mm into the inside vessel.

Mount the sensor that the end of the sensor or focalizer horn juts to the vessel minimum 50 mm.



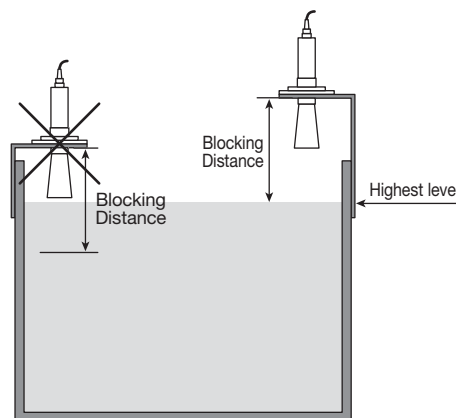
#### ② Blocking distance

UW5000 sensors has its own blocking distance, where sensor is not able to measure the level.

Blocking distance means the one from the transmitter side of a sensor.

Be sure that the highest measured level is below the blocking distance.

Consider the blocking distance for the installation of the sensor. Highest level should be below the blocking distance.



#### ③ Mount the sensor

Vertically for liquid measurement.

In case of solid measurement, it might be effective for receiving reflection signal by inclining the sensor to the solid surface if the resting angle is steep and steady.

#### ④ Focalizer horn

Use of focalizer horn is recommended for narrowing sound robe and effective signal detection.

Especially it is recommended when using middle and long range sensor.

The focalizer horn shall be used so that lower end of focalizer horn comes out of mounting nozzle.

Without the focalizer horn, the blocking distance may be larger.

### Mounting of the remote converter

For the mounting of the remote converter, select the location where temperature is within the temperature range and avoid vibration, electrical noise and dust as much as possible. Remote converter can be mounted on the wall or stanchion pipe (pipe adapter is required).

### Cautions on the sensor handling

- ① Fasten the sensor with your hands not using tool when screwing the sensor onto the nozzle. Excess force might damage the sensor.
- ② Do not drop sensor on the floor or do not apply any mechanical shock.











## STANDARD ACCESSORIES

- Parameter sheet : 1
- Instruction Manual : 1

## OPTION

- Parameters setting and data sheet as per customer's request  
[Symbol : DS]

## ORDERING INSTRUCTIONS

Specify the following when ordering :

### 1. Model and specification code

Example) Integral sensor thread connection

Model : UW5205

Spec code : SB50T6TB20XX00-00000-00000

Example) Integral sensor flange connection

Model : UW5250

Spec code : SB10S4X0X0XX00-J10A4-10104

Example) Remot converter

Model : UWC520

Spec code : SBXX0X00

Example) Remote sensor flange connection

Model : UWS530

Spec code : 15T4X0X0X00C00-J10A4-10154

### 2. Option (If required)

Please state in Symbol

### 3. Special request (If required)

Please state special requests clearly.

Consult TokyoKeiso or representative before ordering.

## ORDERING INFORMATION

### Measuring condition

- Measuring range : The distance from the mounting nozzle to the minimum level : ( ) m  
The distance from the mounting nozzle to the maximum level : ( ) m

### Product

- Name : ( )
- Material :  Liquid  Slurry  Powder  Pellet
- Corrosiveness :  None  Medium  Strong
- Stickiness :  None  Medium  Strong
- Crystalline :  None  Medium  Strong
- Waving :  None  Medium  Heavy
- Foam :  None  Medium  High and dense

### Process condition

- Power supply : ( ) V AC, ( ) V DC
- Environment :  Outdoor use  Indoor use
- Temperature in : Operation ( ) °C, Design ( ) °C  
the vessel
- Pressure in the : Operation ( ) °C, Design ( ) °C  
vessel
- Ambient temperature : ( ) °C
- Explosion proof :  Required Intrinsically safe version  
 Not required

### Vessel

- Type :  Closed (atmospheric pressure)  
 Pressurized ( ) bar,  
 Open pit  Close pit
- Shape :  Cylindrical  Horizontal  Silo  
 Other ( )
- Roof type :  Flat  Conical  Dome  
 Other ( )
- Vessel height : ( ) m
- Diameter or width : ( ) m
- Obstructions :  
Agitator :  No  Yes : Type ( )  
Others :  Level switch  Reinforce or Stay  
 Ladder  Temperature sensor or well  
 Other ( )
- Vessel material :  Metal ( ) Non metal ( )  
Coated :  Yes  No

### Mounting nozzle

- Height ( ) mm, Diameter ( ) mm
- Distance from the vessel wall ( ) mm
- Horizontal distance from the obstruction ( ) mm
- Horizontal distance from the inlet ( ) mm

\* Specification is subject to change without notice.

**TOKYO KEISO CO., LTD.**

Head Office : Shiba Toho Building, 1-7-24 Shibakoen, Minato-ku, Tokyo 105-8558

Tel : +81-3-3431-1625 (KEY) ; Fax : +81-3-3433-4922

e-mail : overseas.sales@tokyokeiso.co.jp ; URL : http://www.tokyokeiso.co.jp