Ultrasonic Level Measurements (Compact)

1 Product Overview

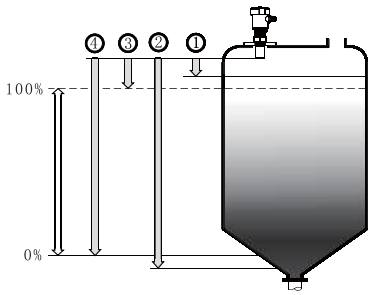
 LM-USL-551	Application:	Level measurement in various industrial fields, especially water treatment industry
	Measurement Range:	0.25…4m (Liquids version)
	Process Connection:	G1 1 / 2 A
	Material for Transducer Housing:	PVDF,PU/PC
	Process Temperature:	- 40…+70℃
	Process Pressure:	- 0.2…1 bar
	Signal Output:	2/4-Wire 4…20mA/HART
 LM-USL-552	Application:	Level measurement in various industrial fields, especially water treatment industry
	Measurement Range:	0.4…8m (Liquids version)
	Process Connection:	G2 A
	Material for Transducer Housing:	PVDF,PU/PC
	Process Temperature:	- 40…+70℃
	Process Pressure:	- 0.2…1 bar
	Signal Output:	2/4-Wire 4…20mA/HART
 LM-USL-553	Application:	Level measurement in various industrial fields
	Measurement Range:	0.5…15m (Liquids version)
	Process Connection:	Flange or swiveling holder
	Material for Transducer Housing:	PU/PC
	Process Temperature:	- 40…+70℃
	Process Pressure:	- 0.2…1 bar
	Signal Output:	2/4-Wire 4…20mA/HART

2 Mounting Requirement

Be cautious during the installation:

1. the highest level of target medium must Not enter into blanking zone;
2. the measurement must keep certain distance to vessel walls;
3. every possible measure needs to be taken to position the measurement so that the direction of transducer emission is perpendicular to the surface of measured medium;
4. the installation of measurements in explosion proof area must abide by relevant local or federal safety regulations. Aluminium housing should be used on intrinsically safe version, which is also applicable in explosion proof areas. The measurement must be connected with ground in this case.

Illustration

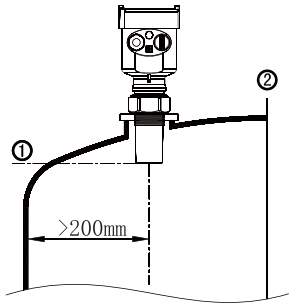


1 Blanking Zone
2 Empty (Max. Measurement Distance)
3 Max. Measurement Range
4 Min. Measurement Range

Reference Plane for Measurement: the lower edge of probe

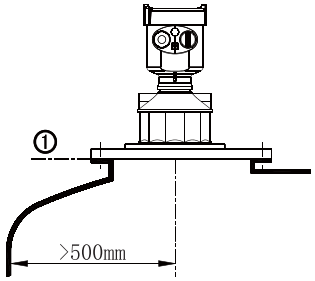
Note: The highest level of measured medium must not enter into blanking zone while ultrasonic level measurement is in operation.

Mounting Position



1 Reference Plane
2 Center of Vessel or Symmetrical Axis

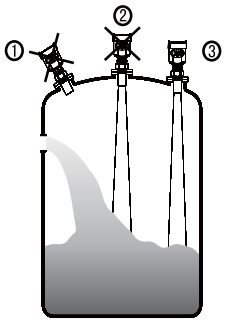
Note: Minimum distance of 200mm between measurement and vessel wall must be assured while mounting LM-USL-551 or LM-USL-552.



1 Reference Plane

Note: Minimum distance of 500mm between measurement and vessel wall must be assured while mounting LM-USL-553.

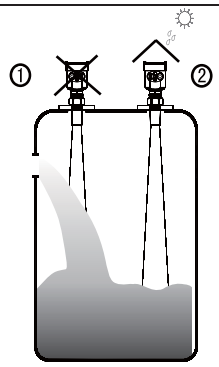
Illustrative Diagram on Installation



1 Wrong: Fail to turn the antenna perpendicular to the surface of target medium.

2 Wrong: Measurements are mounted in the center of concave or arched vessel tops, which results in multiple echoes.

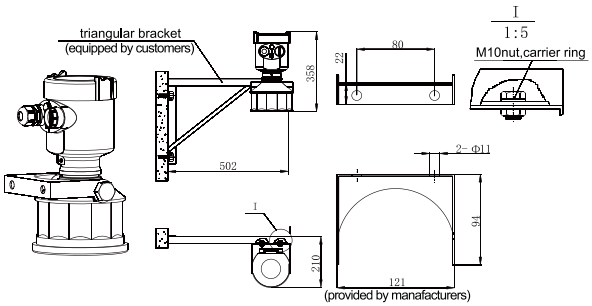
3 Correct



1 Wrong: Mount the measurement in/above filling stream, which results in the measurement of filling stream not the target medium.

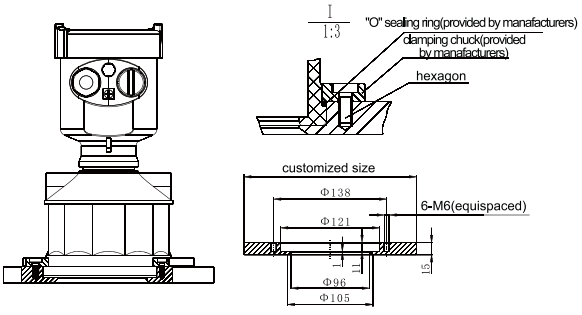
2 Correct: Sun shield or rain-proof is required for outdoor mounting.

Installation Methods



Installation with Swivelling Holder

Mount LM-USL-553 with swiveling holder



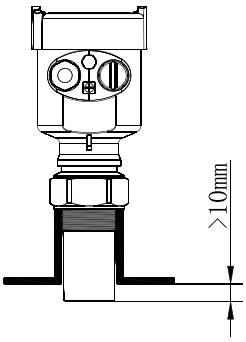
Installation with Flange

Use flange to mount LM-USL-553

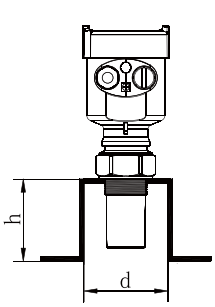
Ultrasonic Level Measurements (Compact)

Socket

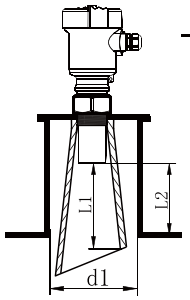
The transducer end must at least protrude 10mm out of socket.



In case of strong reflective properties of target medium (Fig 1) and big socket diameter, you can mount measurements on sockets higher than the antenna length. The recommended values for socket heights are shown in the illustration below. The socket end should be smooth and burr-free, if possible also rounded. Moreover, false echo storage must be carried out afterwards.



(Fig1)



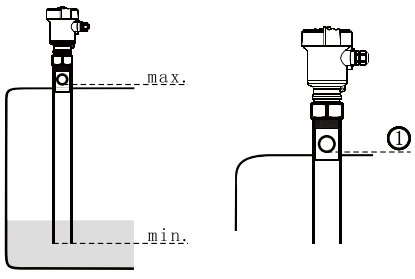
(Fig2)

d	h
50mm/2″	200mm
80mm/3″	250mm
100mm/4″	300mm
150mm/6″	500mm

d1>150mm
L2<400mm
L1>L2

On the contrary, if the reflective properties of medium are weak (Fig 2), you are advised to heighten the mounting position of measurements and also use a standpipe (optional) to reduce the influence caused by socket.

Installation with Standpipe



1 Vent hole of diameter 5…10mm

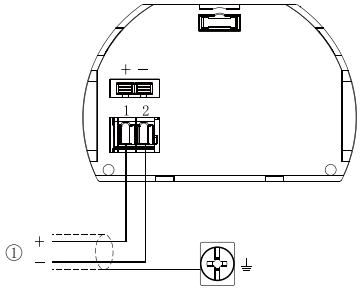
You are advised to opt for installation with standpipe (or bypass tube) to avoid the influence on measurement caused by barriers inside vessels, foam generation or air vortex.

If the measurement is undertaken by LM-USL-55X inside the standpipe the inner diameter of standpipe should be at least bigger than the outside diameter of transducer. Please see Dimensional Drawings for actual sizes. Avoid large cracks or welding seam when connecting standpipe. False echo storage must be carried out in this case.

Note: You must NOT mount measurement inside standpipe while measuring adhesive medium.

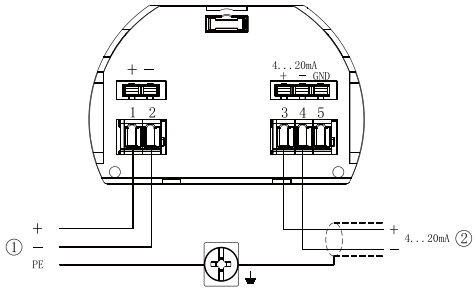
3 Electrical Connection

Wiring Diagram



1 Power Supply and Signal Output

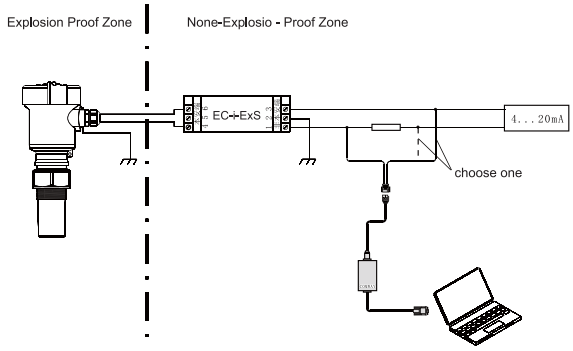
2-Wire Wiring Plan Used for HART



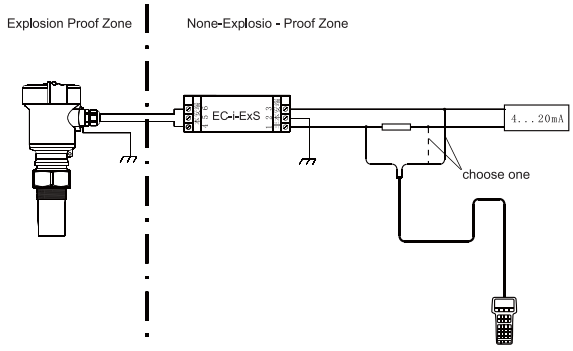
1 Power Supply
2 Signal Output

4-Wire Wiring Plan Used for HART

Explosion Proof Connection



Adjust with ELCO ware



Adjustment with HART Handheld Programmer

4 Adjustment Instructions

Adjustment Methods

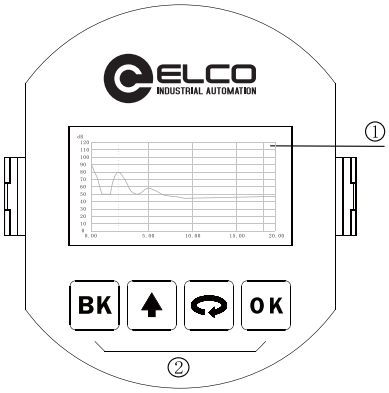
Three adjustment methods available for LM-USL-55X

1 Display /adjustment module

2 An adjustment software- ELCO ware

3 HART handheld programmer

Display/ Adjustment Module



1 LCD 2 Adjustment Keypad

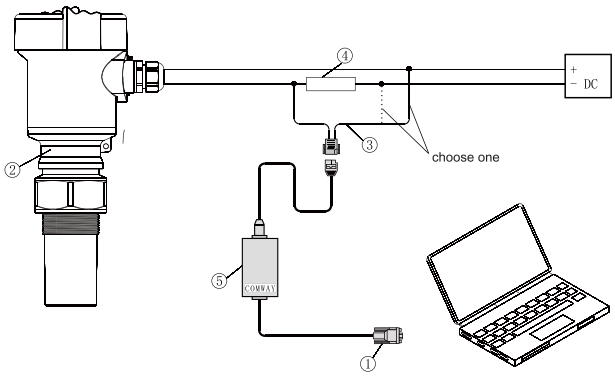
[**OK**]: - Enter programming mode;
- Confirm programming options;
- Confirm modifications to parameters.

[ ]: - Choose programming options;
- Choose the digit of parameters to edit;
- Display the contents of parameters.

[▲]: - Modify parameter values.

[**BK**]: - Programming mode exit;
- Return to higher menu level.

Adjustment with ELCO ware



1 RS232 Connection Cable

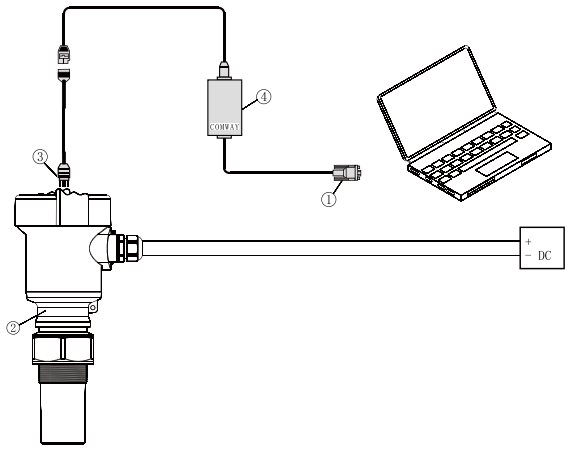
2 LM-USL-55X

3 HART Adapter Used on COMWAY Convertor

4 Resistance 250Ω

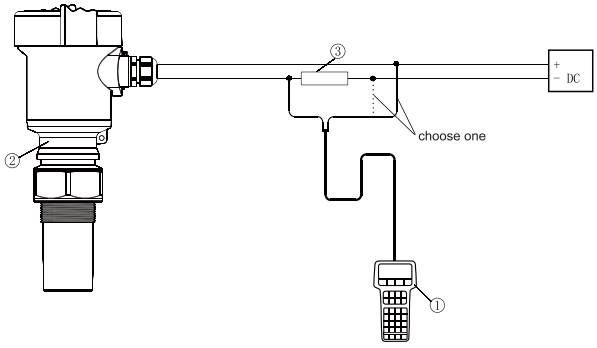
5 COMWAY Convertor

Connect with another unit through HART



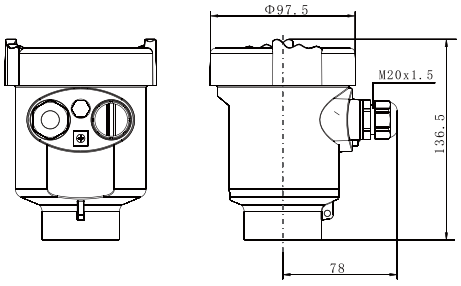
1 RS232 Connection Cable
2 LM-USL-55X
3 I^2C Adapter Used on COMWAY Convertor
4 COMWAY Convertor
Connect with another unit through I^2C

HART Handheld Programmer

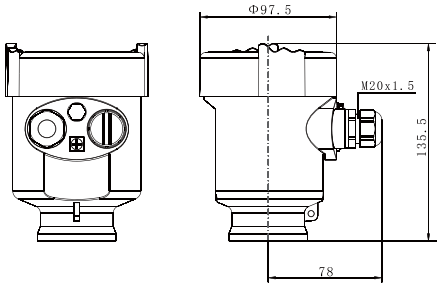


1 HART Handheld Programmer
2 LM-USL-55X
3 Resistance 250Ω

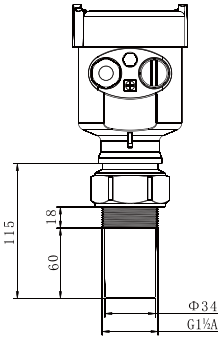
5 Dimensional Drawings (Unit: mm)



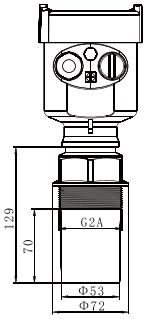
Housing: AL



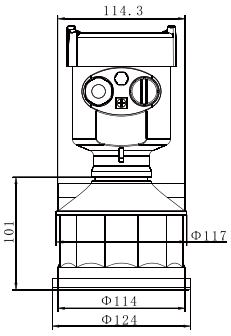
Material: PBT-FR



LM-USL-551



LM-USL-552

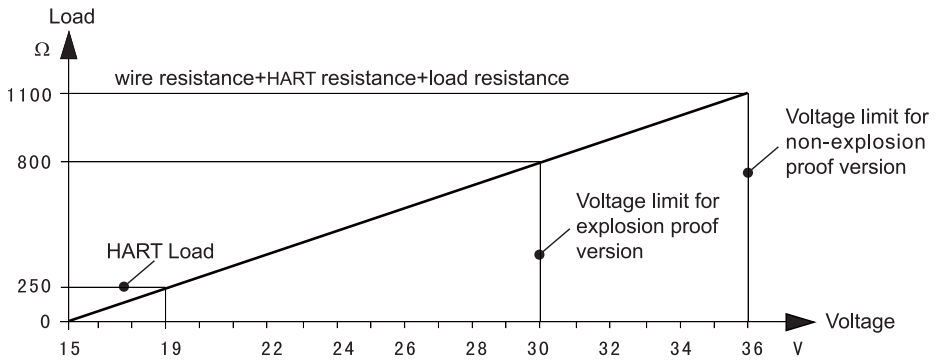


LM-USL-553

6 Technical Specifications

General Parameters	Material Transducer: PVDF, PU/PC Transducer seal: Silicone Housing: Aluminium, Plastic PBT-FR Seal ring between Housing and Housing Cover : Silicone ViewPoint Window on Housing: Polycarbonate Ground Terminal: Stainless Steel	Weight LM-USL-551/552: 1.8…3.0kg (Depend on process connections and housings) LM-USL-553: 2.7…5.0kg (Depend on process connections and housings) Process Connection Process Connection LM-USL-551: Thread G11/2A Process Connection LM-USL-552: Thread G2A Process Connection LM-USL-553: Swivelling holder or flange, stainless steel 316L
Power	2- Wire LM-USL-551/552 Standard Version: 15…36V DC Intrinsic Safety Version: 15…30V DC 2- Wire LM-USL-553: 20…36 V DC Power Consumption: Max. 22.5mA Ripple Allowance: <100Hz USS < 1V < 100-100KHz USS < 10mV	4-Wire Voltage: 24V DC±10% Power consumption: Max. 4VA, 2.1W
Output	Output signal: 4…20mA/HART Resolution: 1.6μ Default signal: constant current output: 20.5mA; 22mA; 3.8mA 2-Wire load resistance: see diagram below 4-Wire load resistance: Max. 500ohm Integration time: 0…99sec, adjustable	

2-Wire Load Resistance Diagram



Ultrasonic Level Measurements (Compact)

Characteristic Parameters

Blanking Distance	
LM-USL-551	0.25m
LM-USL-552	0.4m
LM-USL-553	0.5m
Max. Measurement Distance	Liquids
LM-USL-551	4m
LM-USL-552	8m
LM-USL-553	15m
Ultrasonic Frequency	
LM-USL-551	46KHz
LM-USL-552	35KHz
LM-USL-553	35KHz
Measurement Interval	>2sec (Depend on parameter settings)
Adjustment Time	>3sec (Depend on parameter settings)
Beam Angle	
LM-USL-551/552	5.5°
LM-USL-553	3°
Resolution of Display	1mm
Reproducibility	3mm
Accuracy	0.2%-0.5%(Full measurement range)
Temperature for Storage/ Transport	-40...+70℃
Process Temperature(Probe)	-40...+70℃
Relative Humidity	< 95%
Pressure	Max.1bar
Vibration Proof	Mechanical vibration 10m/s2, 10…150Hz

7 Selection & Ordering Information

LM-USL-551	LM-USL-552	LM-USL-553
Explosion Proof Approval	Explosion Proof Approval	Explosion Proof Approval
P Standard (Without Approval) I Intrinsically Safe (Ex ia ⅡB T6) Material/Process Temperature/Protection A PU/PC/-40...+70℃/IP66 B PVDF/-40...+70℃/IP67	P Standard (Without Approval) I Intrinsically Safe (Ex ia ⅡB T6) Material/Process Temperature/Protection A PU/PC/-40...+70℃/IP66 B PVDF/-40...+70℃/IP67	P Standard (Without Approval) I Intrinsically Safe (Ex ia ⅡB T6) Material/Process Temperature/Protection A PU/PC/-40...+70℃/IP66 Process Connection FL Flange DJ Swivelling Holder
Electronic	Electronic	Electronic
A 4…20mA 2-Wire B 4…20mA /24V DC±10% 4-Wire C 4…20mA HART (2-Wire) D 4…20mA /24V DC±10%/HART (4-Wire)	A 4…20mA 2-Wire B 4…20mA /24V DC±10% 4-Wire C 4…20mA HART (2-Wire) D 4…20mA /24V DC±10%/HART (4-Wire)	A 4…20mA 2-Wire B 4…20mA /24V DC±10% 4-Wire C 4…20mA HART (2-Wire) D 4…20mA /24V DC±10%/HART (4-Wire)
Housing/Protection	Housing/Protection	Housing/Protection
S Plastic/IP66 A Aluminium/IP67	S Plastic/IP66 A Aluminium/IP67	S Plastic/IP66 A Aluminium/IP67
Cable Entry	Cable Entry	Cable Entry
M M20x1.5 N 1/2NPT	M M20x1.5 N 1/2NPT	M M20x1.5 N 1/2NPT
Display/Programming	Display/Programming	Display/Programming
A Yes X No	A Yes X No	A Yes X No
Note: Version I product must be matched with housing A and electronic components A & C. Example: LM-USL-551PAAAMA	Note: Version I product must be matched with housing A and electronic components A & C. Example: LM-USL-552PAAAMA	Note: Version I product must be matched with housing A and electronic components A & C. Example: LM-USL-553PAFLAANA