



TEK-SOUND 4200B

Two Wire Ultrasonic Level Transmitter With Display

Instruction Manual

Document Number: IM-4200B



www.tek-trol.com

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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1 Measurement Principle

1.1 Principle

Ultrasonic pulses generated by the transducer (antenna) system which travel at the speed of sound toward the target medium are reflected by the surface of medium and received by the transducer system again. Due to the fact that the measurable time lapse between pulse emission and reception by antenna is proportional to the distance between antenna and highest level of target medium, the principle of ultrasonic level instrument can be illustrated as the following equation:

$S=CxT / 2$, S: distance, C: velocity of sound, T: time lapse.



2 Product Overview



2.1 Features

- The advanced microprocessor and unique Echo Discovery processing technology, the ultrasonic level instruments can be used under various complex conditions.
- The false echo storage function assures that the instrument can detect the right echo even with the presence of multiple false echoes and present accurate measurement results eventually.
- The built-in temperature sensor inside the transducer can complete temperature compensation for measurement results.
- Ultrasonic transducer has adopted patented sonic matching technology, which helps it strengthen its emission power, enhance the signal intensity and eventually achieve accurate measurement.

3 Mounting Requirement

3.1 Basic Requirement for Installation

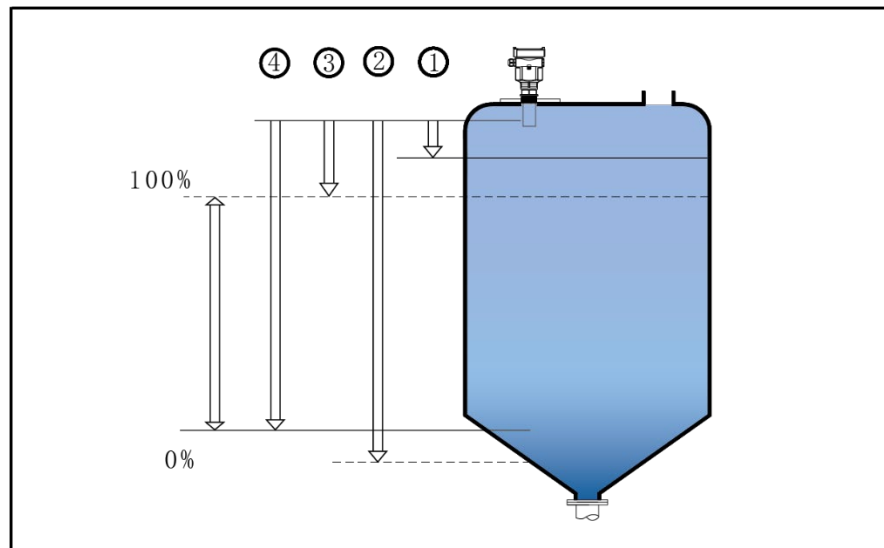
There is a certain existing beam angle while transducer radiating ultrasonic pulses. There should be no barriers between the lower edge of transducer and surface of target medium. Therefore it is highly recommended to avoid facilities inside vessels, such as ladders, limit switches, heating spirals, struts and etc, during the mounting process. A false echo storage must be carried out during the installation in this case. Furthermore, ultrasonic waves must not intersect the filling streams.

Be cautions during the installation when: the highest level of target medium must Not enter into blanking zone; the instrument must keep certain distance to vessel walls; every possible measure needs to be taken to position the instrument so that the direction of transducer emission is perpendicular to the surface of measured medium.

3.1.1 Illustration

The lower edge of the probe is the reference plane for measurement.

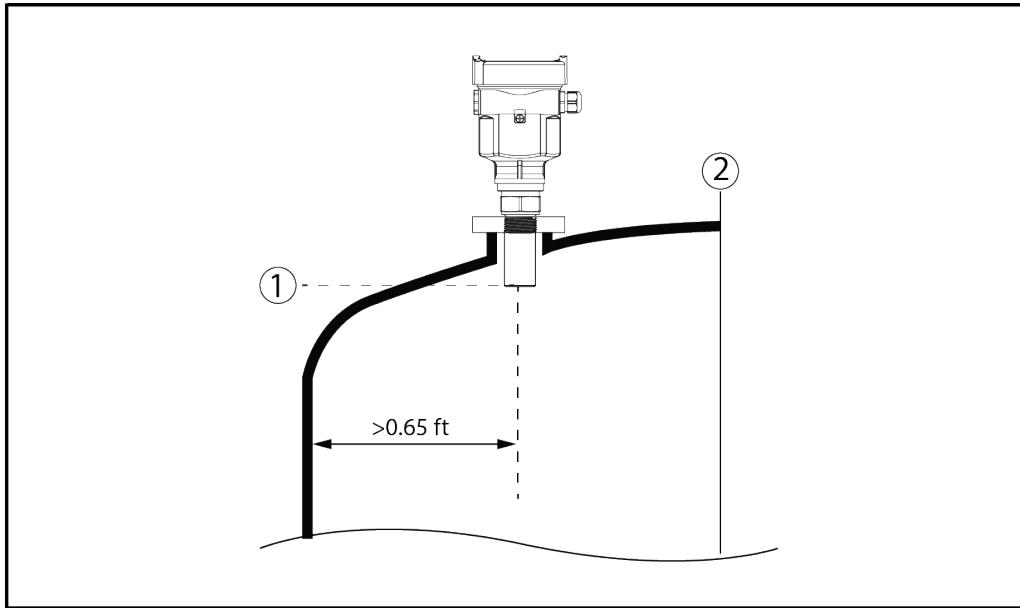
1. Blanking Zone (menu 1 .9)
2. Empty (menu 1 .8)
3. Max. Adjustment (menu 1 .2)
4. Min. Adjustment (menu 1 .1)



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

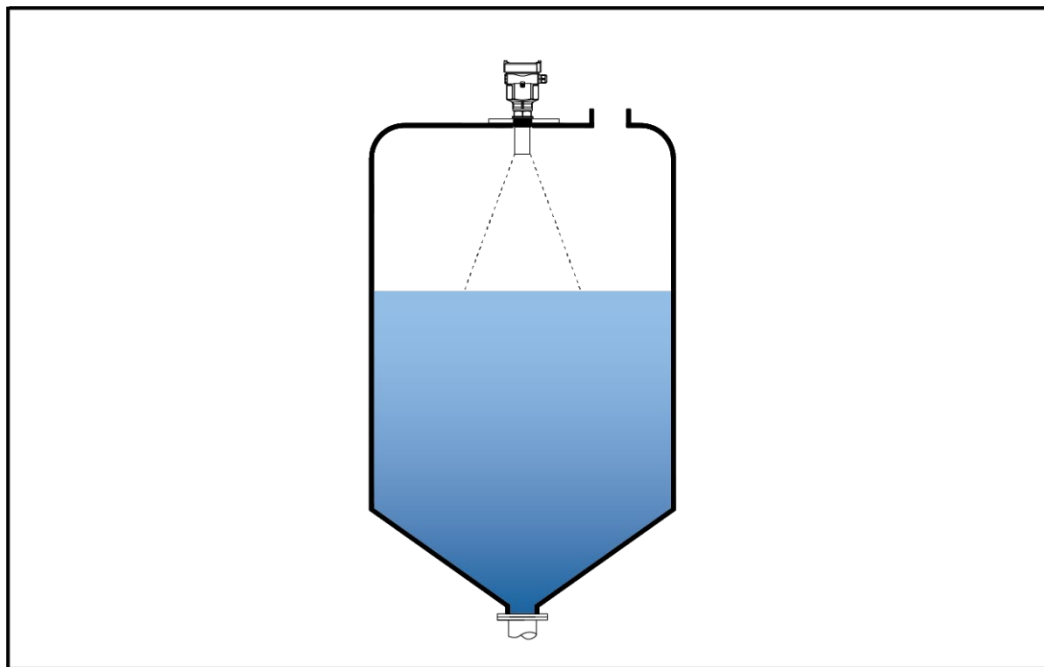
3.1.2 Mounting Position

Minimum distance of 0.65 ft between instrument and vessel wall must be assured while mounting Tek-Sound 4200B-1 or Tek-Sound 4200B-2.



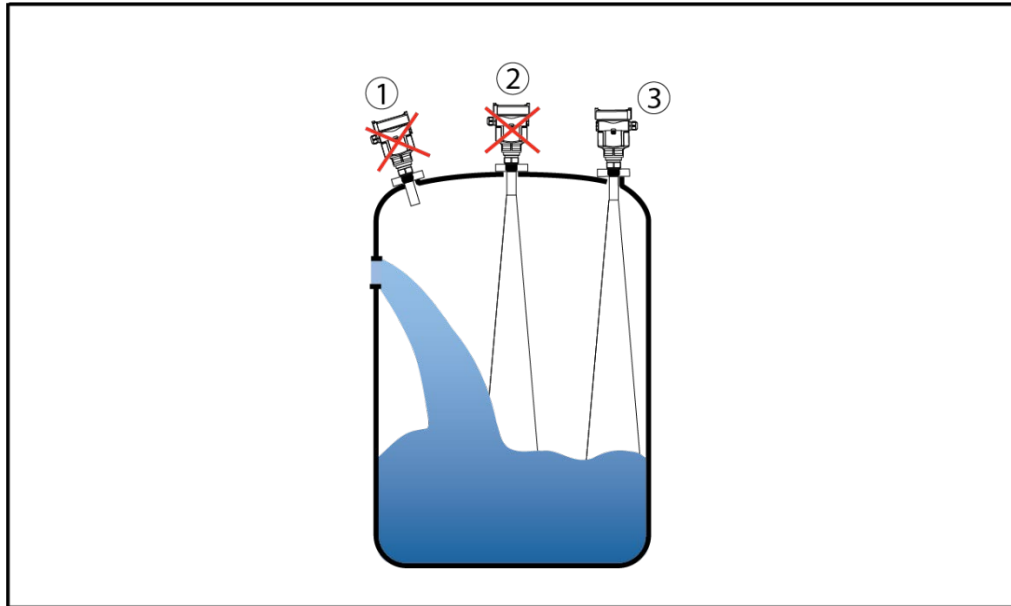
1. Reference Plane
2. Centre of Vessel or Symmetrical Axis

The best mounting position for a conical vessel with flat top is the centre of its top, as the effective measurement can reach the bottom of the vessel.



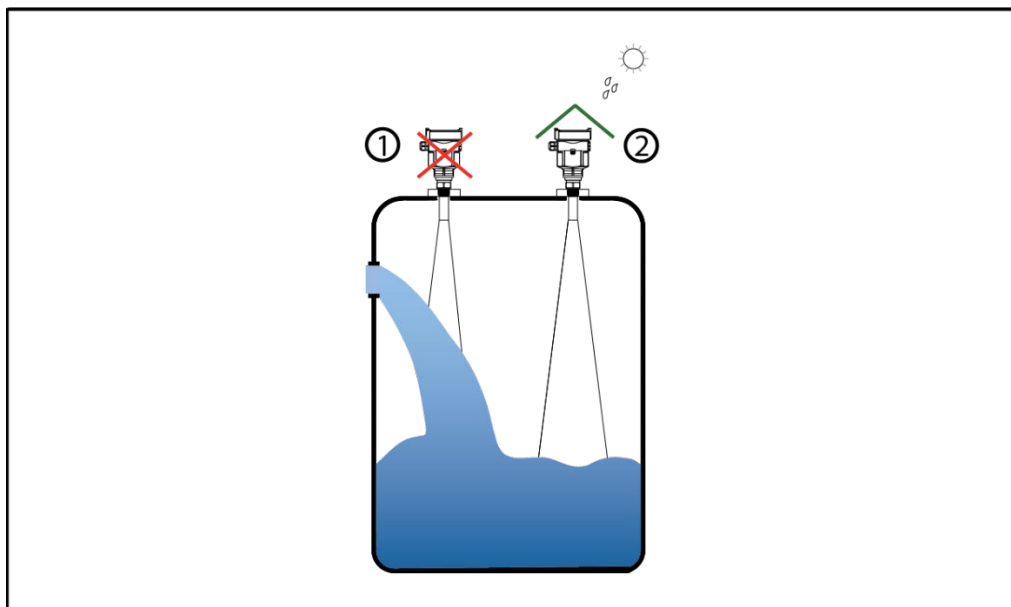
3.1.3 Illustrative Diagram on Installation

- 1) Incorrect: Failure to turn the antenna perpendicular to the surface of the target medium.
- 2) Wrong: Instruments are mounted in the centre of concave or arched vessel tops, which results in multiple echoes.
- 3) Correct



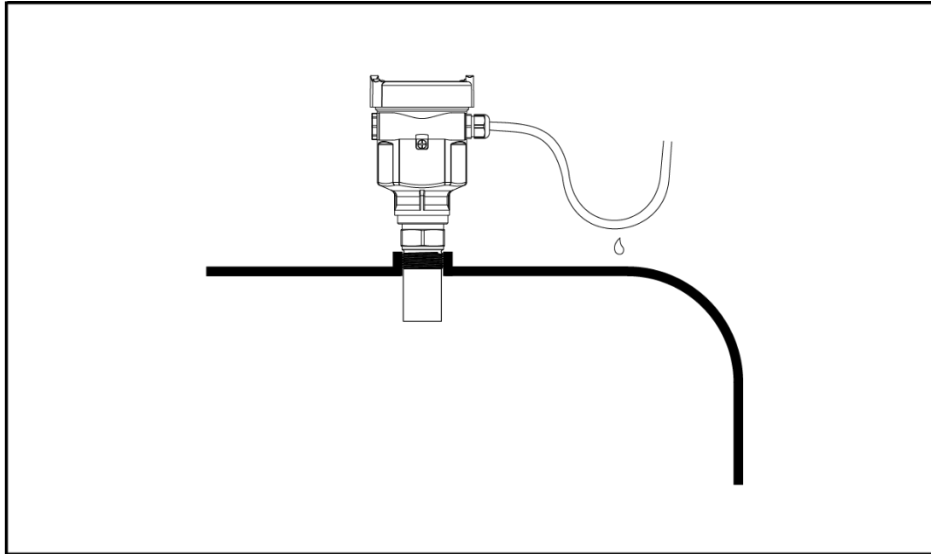
- 1) Incorrect: Mount the instrument in/above filling stream, which results in the measurement of filling stream, not the target medium
- 2) Correct

Note: Sun shield or rain-proof is required for outdoor mounting



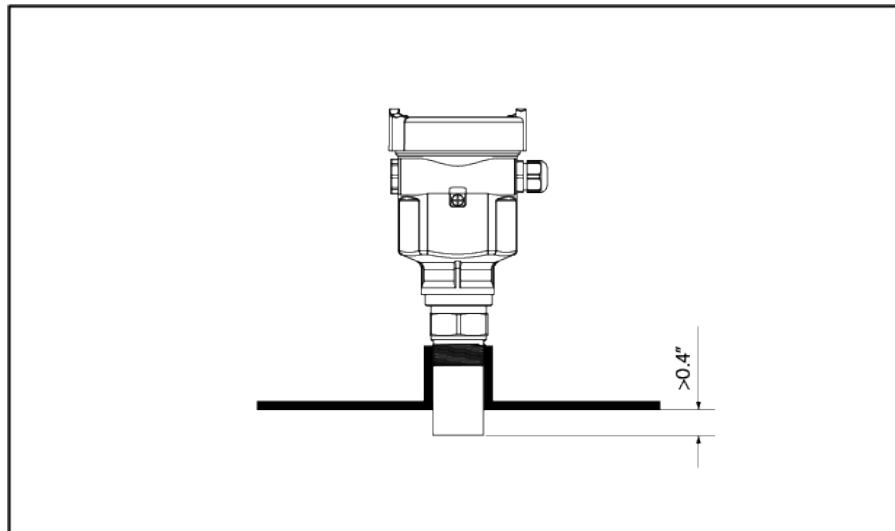
3.1.4 Moisture

In order to avoid Moisture under outdoor or humid indoor conditions or for those instruments mounted on cooling/heating vessels, the seal rings used on cables should be screwed tight. The cable must also be bended downward outside the cable entry, indicated on the diagram below:



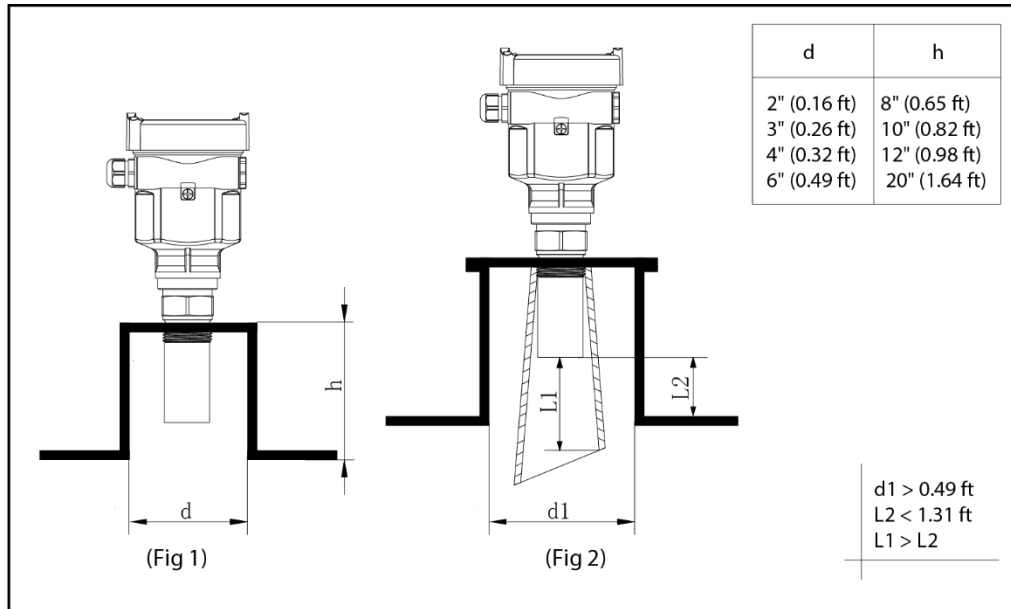
3.1.5 Socket

The transducer end must protrude at least 0.4 inches out of socket.



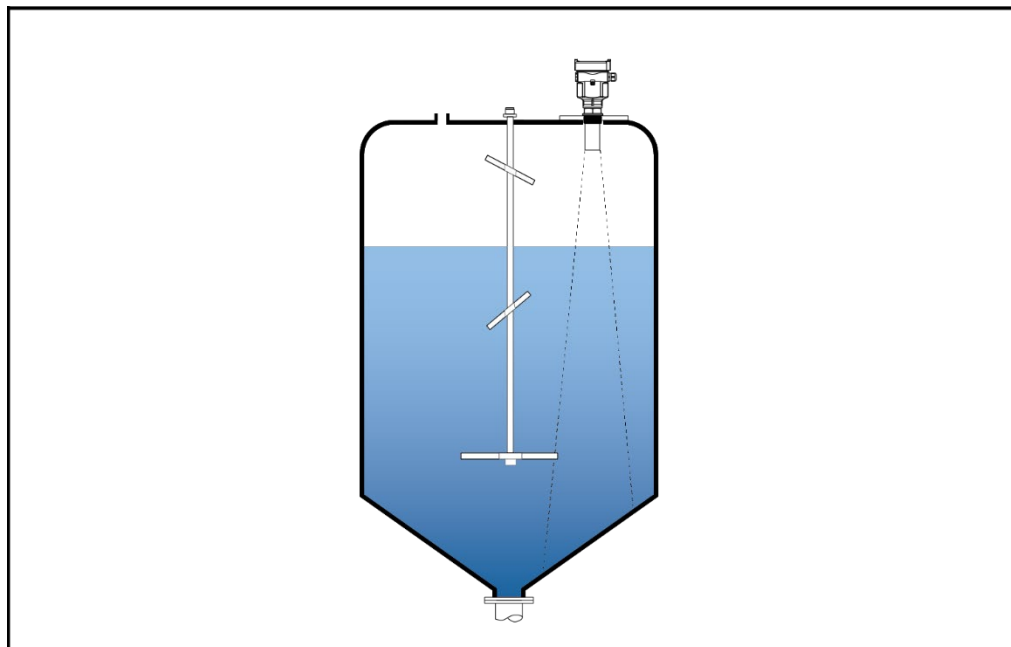
In case of strong reflective properties of target medium (Fig 1) and big socket diameter, you can mount instruments on sockets higher than the antenna length. The recommended values for socket heights are shown in the illustration below. The socket end should be smooth and burr-free, if possible also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

Moreover, false echo storage must be carried out afterwards. On the contrary, if the reflective properties of medium are weak (Fig 2), you are advised to heighten the mounting position of instruments and also use a standpipe(optional) to reduce the influence caused by socket.



3.1.6 Agitator

If there are agitators in vessels, instrument must be mounted as far away from agitators as possible. Once installation completed, a false echo storage should be carried out while agitators in motion to eliminate negative influence caused by false echo of agitators. You are advised to opt for installation with standpipe if foam or wave is generated due to the action of agitators.



3.1.7 Foam

Due to the action of filling, stirring or other processes inside vessels, dense foams are formed on the surface of some liquid medium, which could attenuate emitting signals considerably. You are advised

to mount the instrument inside a standpipe or opt for a radar level instrument if the generation of foam incurs measurement errors. Guided wave radar level instrument is the best option for similar applications thanks to the fact that it is unaffected by foam generation.

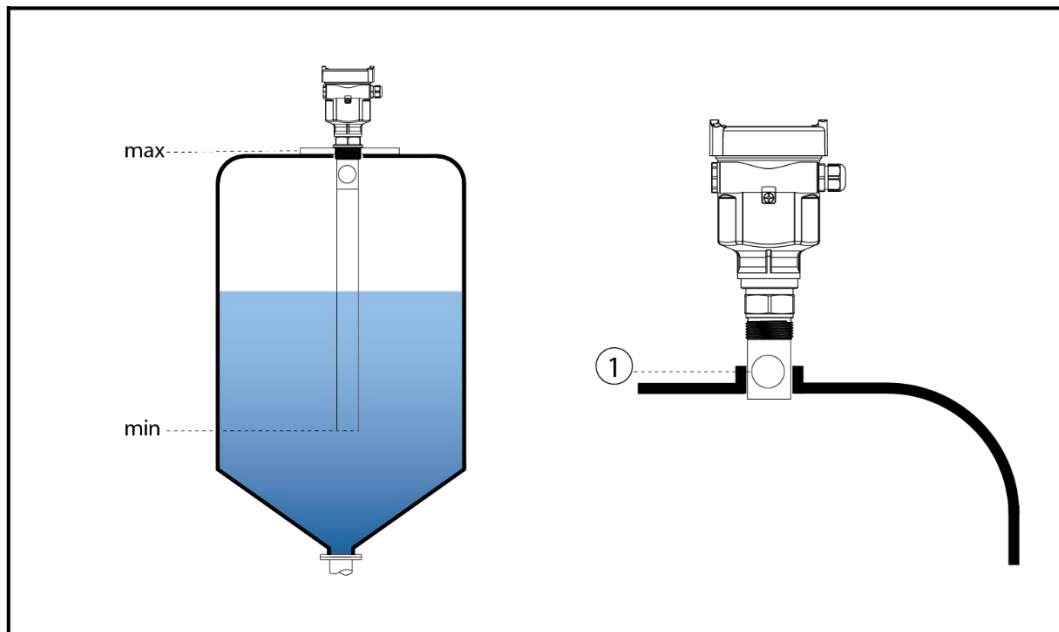
3.1.8 Airflow

You are advised to mount the instrument inside a standpipe or opt for a low frequency radar level instrument or radar level instrument with guided microwaves in the event of strong airflow presence in vessels, e.g., outdoor installation with gusty wind or presence of vortex inside vessels.

3.1.9 Installation with Standpipe

1 Vent hole of diameter (0.19" to 0.39")

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 Tek-Sound 4200B 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 as well in this case.



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

4 Electrical Connections

4.1 Power Supply

4.1.1 20 mA/HART (2-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.

4.2 Cable Connection

4.2.1 4-20mA/HART

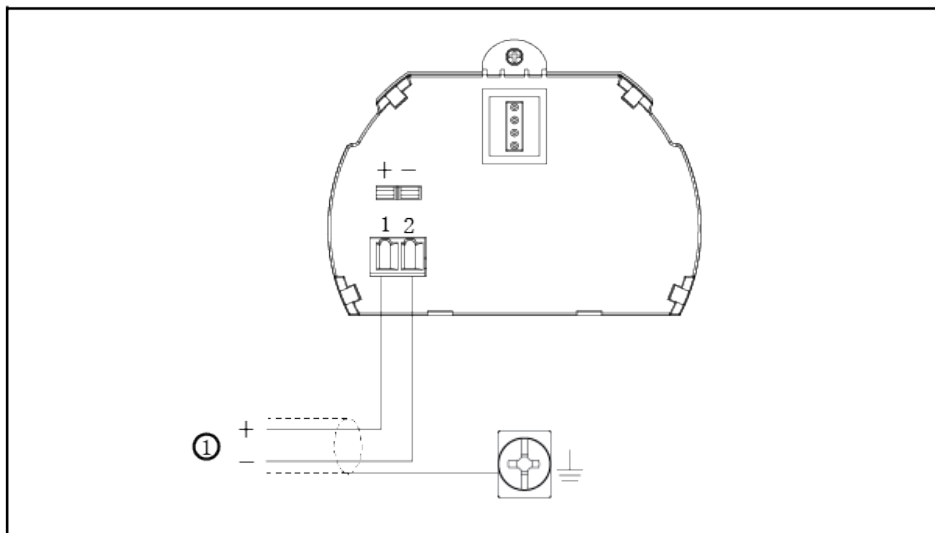
Standard 2-wire cable, 18 to 22 Awg which assures the seal effect of cable entry, can be used as feeder cable. You are recommended to use screened cables in the event of electromagnetic Connection cable with special earth wire can be used as feeder cable.

4.2.2 Shielding & Grounding

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. $1 \mu F$ 1500V) in order to dampen the low

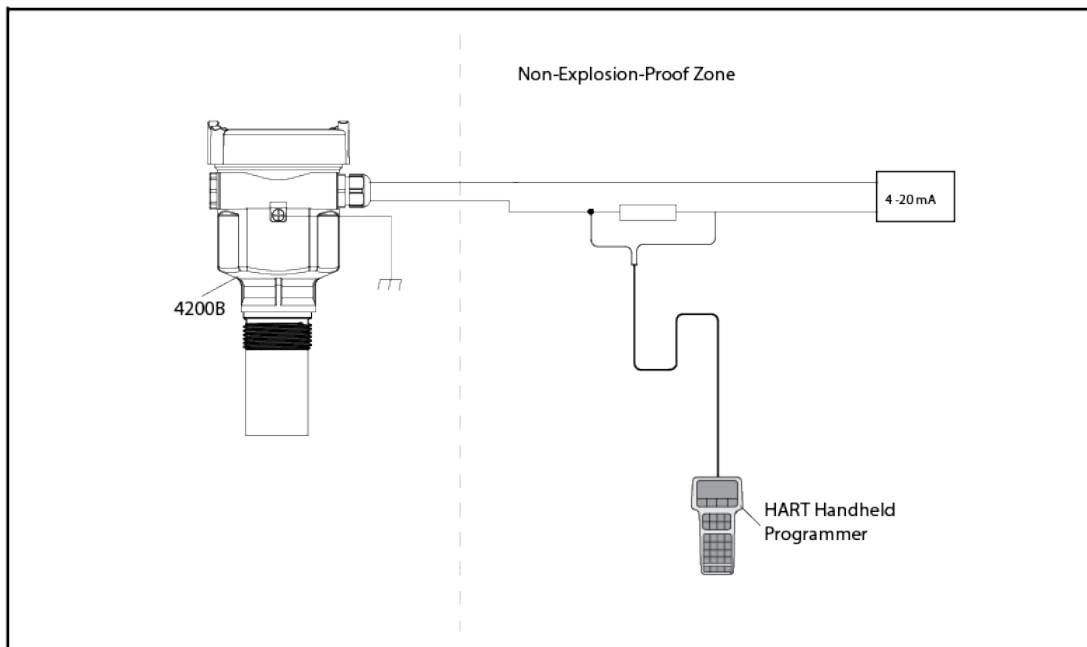
4.3 Wiring Diagram

4.3.1 2-wire



1) Power Supply and Signal Output

Adjust with HART handheld programmer



5 Adjustment Instructions

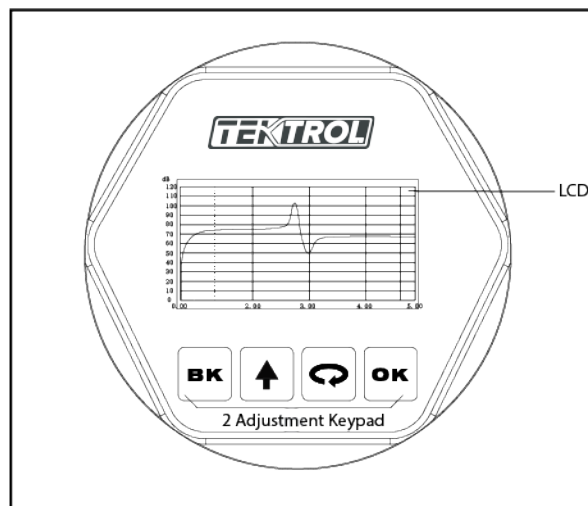
5.1 Adjustment Method

Three methods are available for Tek-Sound 4200B:

- Display/adjustment module
- Adjustment software
- HART handheld programmer

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.

5.1.1 Display/Adjustment Module



[OK] Keypad

- Enter programming mode;
- Confirm programming options;
- Confirm modifications to parameters

[↻] Keypad

- Choose programming options;
- Choose the digit of parameters to edit;
- Display the contents of parameters

[▲] Keypad

- Modify parameter values

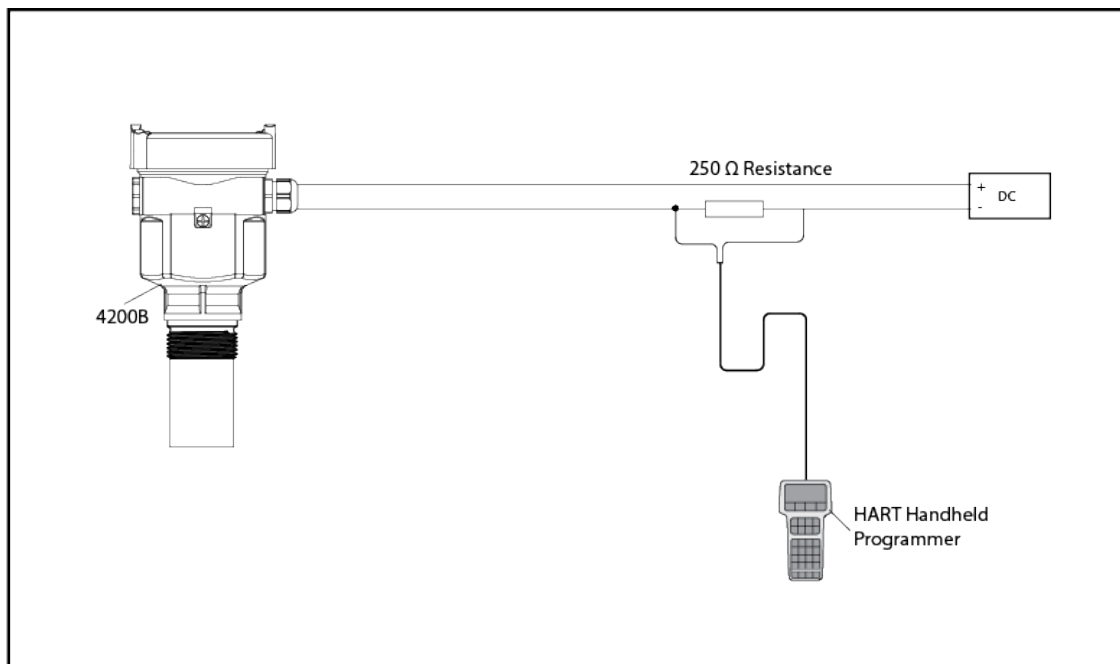
[BK] Keypad

- Programming mode exit
- Return to higher menu level

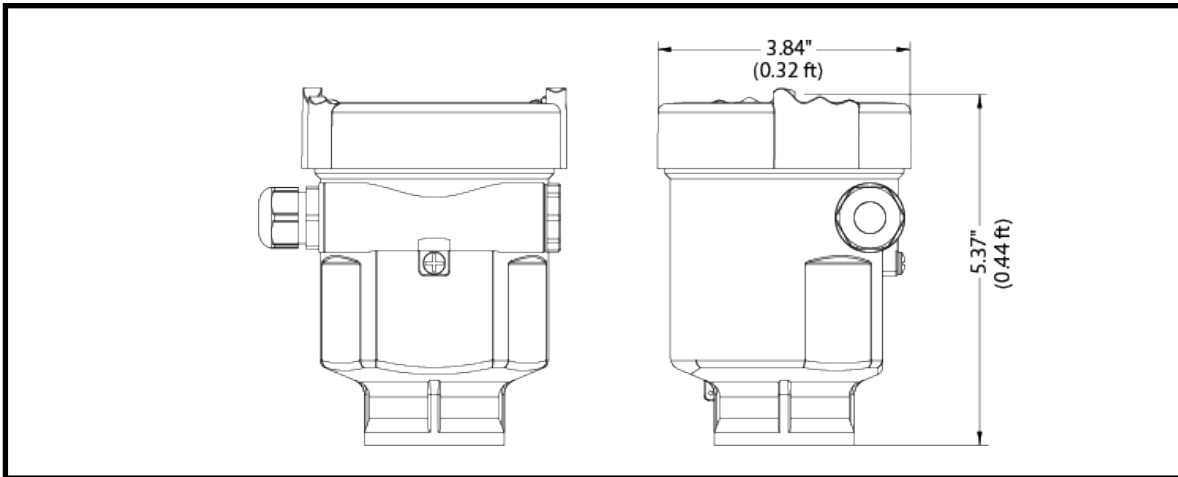
Shortcut

[B K] Display Echo wave

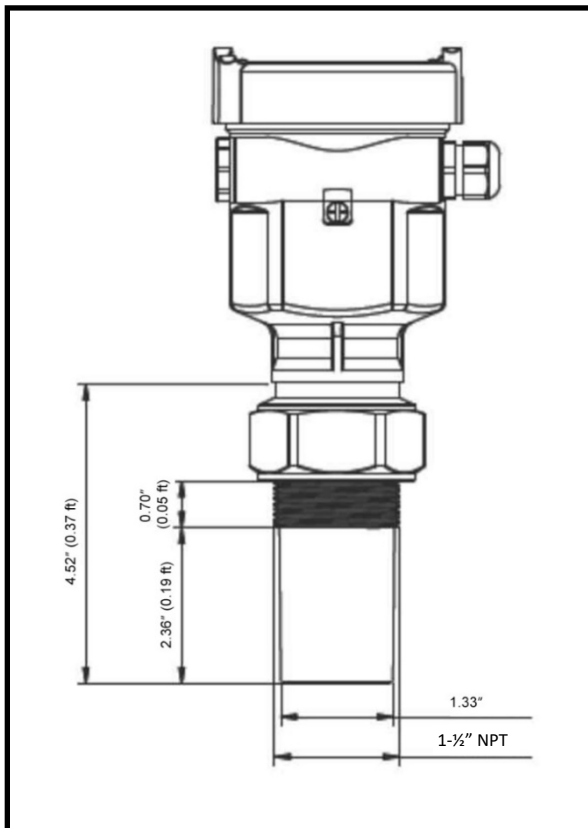
5.1.2 HART Handheld Programmer
Adjust Tek-Sound 4200B with HART Handheld Programmer



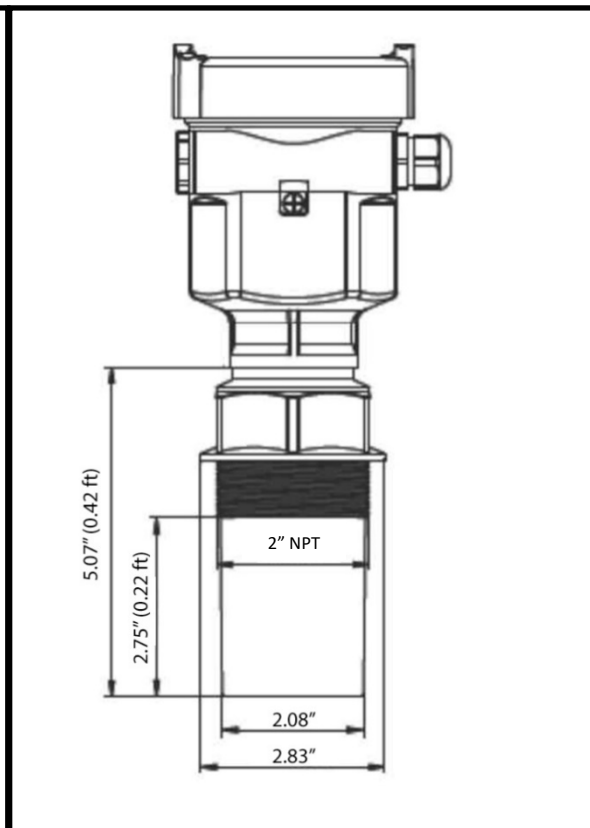
6 Dimensions



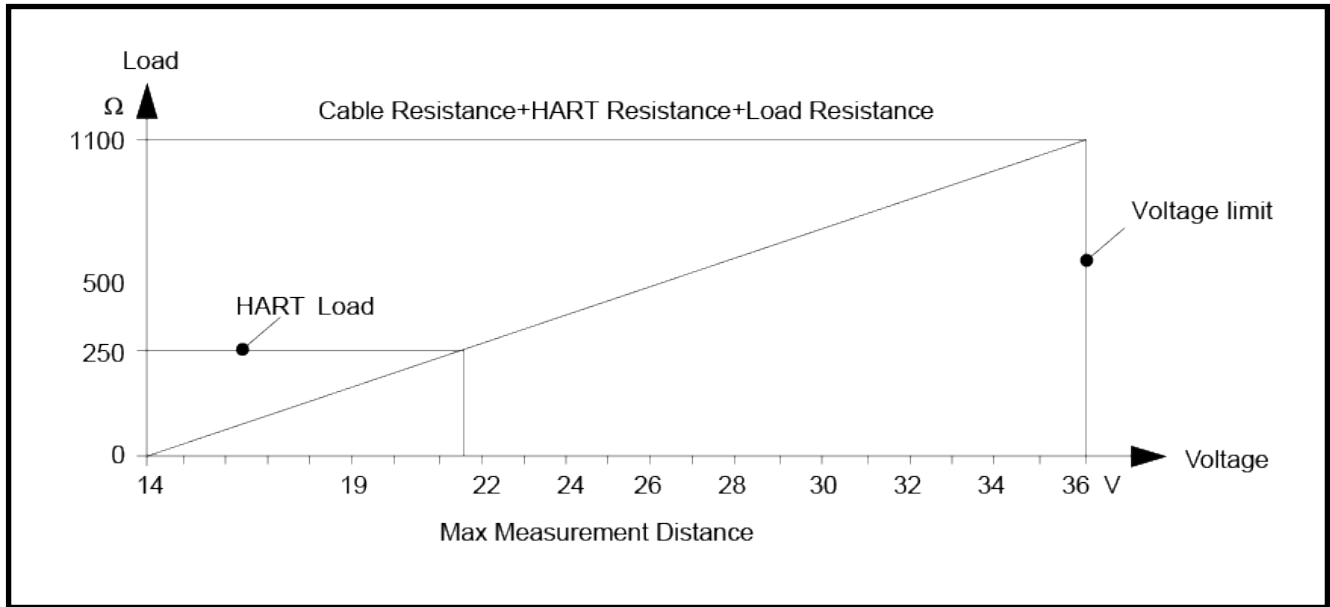
Tek-Sound 4200B-1



Tek-Sound 4200B-2



6.1 2-Wire Load Resistance Diagram



7 Model Chart

Example	Tek-Sound 4200B	P	B	B	A	N	A	1	Tek-Sound 4200B-P-B-B-A-N-A-1
Series	Tek-Sound 4200B								Two Wire Ultrasonic Level Transmitter with Display
Approval		P							Standard (Without approval)
Material			B						Pu/Pc
Electronic				B					4-20 mA with HART 2-Wire
Housing/Protection					A				Aluminum IP66
Cable Entry						N			two, ½" NPT
Display/Programming							A		LCD, 6 Digit
Range								1	0.5' to 13' range, 1.5" NPT Process Connection
								2	1' to 25' range, 2" NPT Process Connection

7.1 Popular Model

Model	Description
4200B-P-B-B-A-N-A-1	0.5' to 13' range, 1.5" NPT Process connector
4200B-P-B-B-A-N-A-1	1' to 25' range, 2" NPT Process connector



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