SONIC-4000

ULTRASONIC LEVEL DETECTOR
USER MANUAL

Document Ref: Daytech Sonic-4000 Series User Manual Full - Ultrasonic Level Detector

Current Revision			
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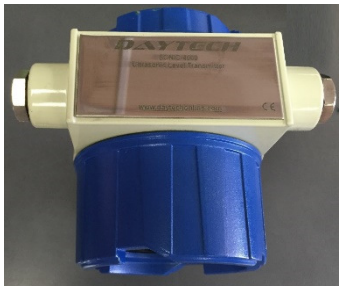
Reviewed By:	JP	**Date: 05/11/2015**	
Approved By:	LJD	**Date: 10/11/2015**	

Contents

1 Introduction

Features & Benefits

- Accuracy of ±0.25 F.S.
- Resolution greater of 3mm or 0.1% F.S.
- Ranges from 0-5m to 0-30m
- Small dead zone (blind zone) 0.25m to 0.7m
- Output types: 4-20mA, 0-5V, 1-5V, RS485
- Optional Programmable Relay Outputs: 1-2
- Power Supply: 2 wire loop powered 24VDC, 3 wire and 4 wire 230VAC, 24VDC or 12VDC. For mains, DC power supply, battery or solar supply.
- Built in advanced digital LCD display.
- Key pad programmable, with simple setup parameters.
- Robust, reliable and easy to operate. Tough powder coated cast aluminium, UV resistant and built to withstand harsh conditions.
- Intelligent signal processing and automatic temperature compensation.
- Process Temp range from -20 to 80°C.
- Process connection: 2Bar, M60 OR 2”BSP (enquire for other options).
- IP66, for indoor or outdoor applications.
- ABS plastic transducer.
- Over current and overvoltage protection.
- CE Certification



Applications

- Continuous Liquid Level measurement
- Water, oil or corrosive liquids
- Can be factory tuned for solids measurement
- Bulk solids, grain, animal feed, pellets, plastics
- Non-contact level or distance measurement
- Tank or silo level monitoring
- Pond or dam level monitoring
- Process industries and mining
- Water and Wastewater treatment, irrigation, agriculture

Description

The DAYTECH SONIC-4000 Series Tough Ultrasonic Level Transmitter is designed for reliable, simple and robust performance. The ultrasonic sensors are ideal for liquids or solids level measurement applications. The series is widely used in pond, dam, well or tank level measurement for water treatment, pumping stations, irrigation, process and environmental applications with proven performance. The transmitter can be factory tuned for measuring bulk solids, presenting a robust solution for silo, hopper or bin level measurement applications.

Standard features include robust cast metal housing, advanced LCD display, automatic temperature compensation, over current and over voltage protection, small blind zone, level or distance measurement. The tough design and mechanical durability of these sensors enables successful operation in harsh environments.

These ultrasonic level sensors have advanced features, however they are remarkably simple to setup and operate. With its intuitive user interface, your level sensing application will be reliably up and running in no time.

Technical Specifications

Parameter	Value				Notes
Measurement Range	0-5m, 0-10m, 0-15m, 0-20m, 0-30m				
Operating Pressure	Process: 2 Bar Display Unit: atmospheric pressure				
Blind Zone	0.25m to 0.7m				
Accuracy	Optional ±0.5%F.S, ±0.25%F.S				
Resolution	Greater of 3mm or 0.1%F.S.				
Ambient Conditions	Temperature: -10℃~60℃ Humidity: ≤90%RH				
Process Temperature	- 20℃~80℃				
Automatic temperature compensation	-10℃~60℃				
LCD Display	Level measurement, distance measurement, transmission value, ambient temperature, echo state, alarm display, algorithm selection.				
IP Rating	IP66				
Media Compatibility	Medium compatible with ABS plastic, refer chemical compatibility chart. Non-corrosive gases. Options: Optional corrosion resistant probe				
Wires	Two-wire	Three -wire		Four-wire	
Output Signal	4-20mA	0/1-5Vdc	0-10Vdc	4-20mA	
Power Supply 230VAC/24VDC supply or 12VDC supply for solar or battery applications	12VDC or 24VDC	12VDC or 24VDC	12VDC or 24VDC	12VDC or 24VDC or 230VAC	
Load resistance	750Ω			250Ω	
Load current	120mA				
Relay /Alarm Output:	Optional 1-2 of AC 250V/ 8A; DC 30V/ 5A; State programmable (optional for 4 wire only).				
Communication	RS232 / RS485 Communications (optional)				
Electrical Connection	2 x M20 IP66 glands for cable connection				
Process Connection	2Bar, M60 OR 2”BSP (enquire for other options)				
Compliance Certification	CE, complies with AUS/NZ standards				
IP Rating	IP66				
Beam Angle	5 degrees for 0-5m and 0-10m 3 degrees for 0-15m, 0-20m, 0-30m				

2 Functional Design Overview

2.1 Time-of-flight method

Daytech's SONIC-4000 Ultrasonic Level Sensor transmits ultrasonic (sound) pulses from the face of the ultrasonic transducer, in the direction of the product's surface. Once the ultrasonic pulses reach the surface, they are reflected back and received by the sensor. The SONIC-4000 Ultrasonic Level Sensor measures the time (t) between pulse transmission and reception, which is a method known as "time of flight" principal. The instrument uses the measured time (t) and the velocity of sound (c) to calculate the distance (D) between the transducer's face and the surface of the medium. The calculation used by the device is below:

D = c ·t/2

As the device has been programmed with the empty distance E when the user sets up the device, it can calculate the level simply. The calculation used by the device is below:

L = E – D

2.2 Temperature Compensation

With built in temperature compensation, the integrated temperature sensor is used to linearise the signal for changes in the velocity of sound caused by temperature changes.

2.3 Sensitivity and Threshold

The Sensitivity parameter of the device, programmable by the user, is used for determining the calculation update speed. Lower sensitivity equates to faster update speed, higher sensitivity equates to lower update speed.

The Threshold parameter of the device, programmable by the user, is used for the signal gain. Lower threshold equates to lower gain and therefore lower response to the reflected signal and lower noise. Higher sensitivity equates to higher gain and therefore higher response to the reflected signal and higher noise.

2.4 Blind distance (Dead Band)

The Blind Zone is the area extending from the face of the transducer that cannot be measured due to excess noise in that zone. This distance is dependent on the size of the transducer and also on the threshold parameter. The operating range of the sensor may not extend into the blind zone. The SONIC-4000 has blind distances from 0.25m (for 5m range) to 0.7m (for 30m range) depending upon the range and the threshold parameter.

2.5 Measuring Range

The measuring range is limited by the selected range of the sensor, due to the limitation of the transducer. The sensor's range is also dependent on the measured medium and your application's operating conditions. To determine the actual range, follow the instructions below.

1. Determine which of the influences shown in the following table are relevant for your application.
2. Add up the corresponding attenuation values, percentages and multiplication factor for reference.
3. Multiply the range by the combined multiplication factor.

Fluid Surface	Signal attenuation	Percentage attenuation	Range Multiplication Factor
Smooth & Calm	0dB	0%	none
Wave Action / Ripples	5…10dB	50 ~ 67%	X 1
Turbulence (i.e. from mixing blades or pumping action)	10…20dB	90%	X 3
With Foam on Surface	-	-	Ask DAYTECH

Solid Material Surface	Signal attenuation	Percentage attenuation	Range Multiplication Factor
Hard, rough (such as granulated rubber or rubble)	40dB	99%	X 10
Soft (such as clinker, cement, fly ash)	40...60dB	99 ~ 99.9%	Not recommended

With dust	Signal attenuation	Percentage attenuation	Range Multiplication Factor
none	0dB	0%	none
Small Amount of Dust	5dB	50%	X 1
Heavy Amount of Dust	5...20dB	50 ~ 90%	X 3

Filling within the Signal Range	Signal attenuation	Percentage attenuation	Range Multiplication Factor
none	0dB	0%	none
Small Amount of Filling	5...10dB	50 ~ 67%	X 1
Heavy Amount of Filling	10...40dB	67 ~ 99%	X 3

With mist	Signal attenuation	Percentage attenuation	Range Multiplication Factor
none	0dB	0%	none
Small Amount of Mist	5...10dB	50 ~ 67%	X 1
Heavy Amount of Mist	10...20dB	67 ~ 90%	X 3

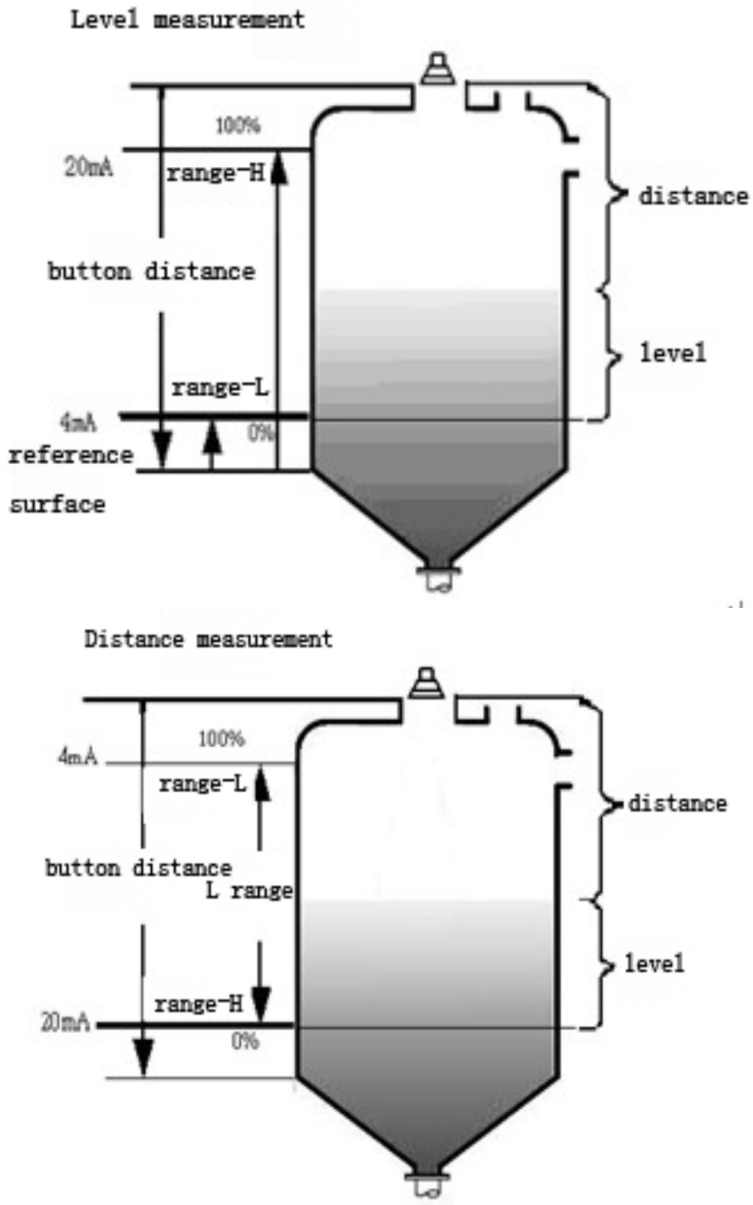
With steam	Signal attenuation	Percentage attenuation	Range Multiplication Factor
none	0dB	0%	none
Small Amount of Steam	5...10dB	50 ~ 67%	X 1
Heavy Amount of Steam	10...20dB	67 ~ 90%	X 3

Temperature difference between probe and medium surface.	Signal attenuation	Percentage attenuation	Range Multiplication Factor
≤20□	0dB	0%	none
≤40℃	5...10dB	50 ~ 67%	X 1
≤80℃	10...20dB	67 ~ 90%	X 3

After calculating the sum of the Signal Attenuation, please ensure the maximum total is less than or equal to 40dB.

2.6 Distance or Level Measurement

The SONIC-4000 can measure Distance and Level, the analogue output can be configured for the desired output. When in Level Mode, the user can scale the sensor within the range with Range-High and Range-Low parameters. A pointing hand symbol on the display indicates the current mode of the sensor.



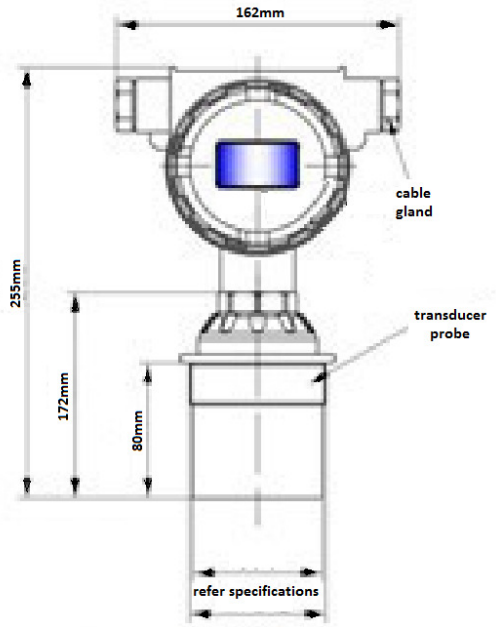
2.7 Beam Angle

The SONIC-4000 emits ultrasonic pulses that radiate from the device in a waveform that has an associated beam angle. The area covered by the beam increases as the distance from the face of the probe increases. The device will receive reflected signals back from objects within the beam area, therefore installation must consider avoidance of obstructions and tank walls to prevent false echoes. The reflected signal strength is greater at closer distances to the probe's face and decrease in effect at greater distances. The following beam angles apply to the different ranges.

- 5 degrees for 0-5m and 0-10m
- 4 degrees for 0-15m, 0-20m, 0-30m

3 Mechanical Installation

3.1 Dimensions



Notes:

1) Refer to the technical specifications section above for the process connection to determine the transducer probe thread dimension.

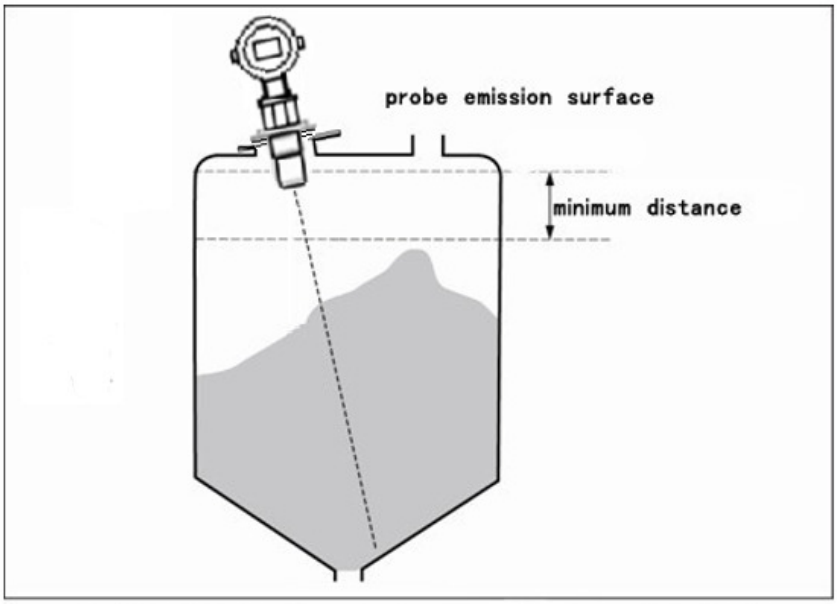
3.2 General Installation

The SONIC-4000 has varying process connection sizes, depending upon the transducer range. Section 1, under Technical Specification above outlines these dimensions. The device comes with a threaded connection, complete with 2 grommets for pressure sealing and a screw adaptor fitting. You can install the sensor using a bracket for measurement of sumps, ponds, dams or open vessels. You can also screw the device into process connections, or holesaw an appropriately sized circular hole for installation into tanks or silos.

Always consider the appropriate transducer range for your application and refer to the sensor's Blind Distance, to ensure your process control requirements are met.

3.3 Install at Right Angle to Medium

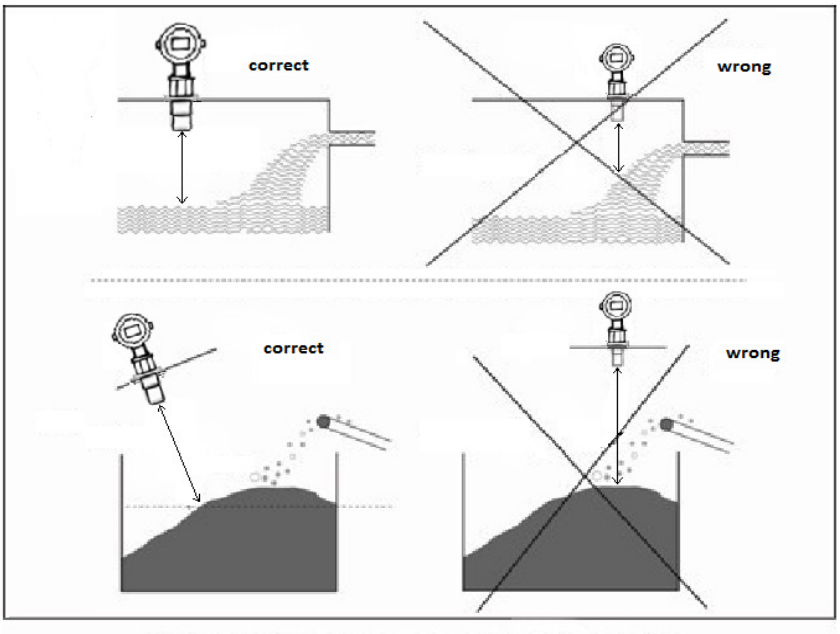
Install the SONIC-4000 sensor so it is perpendicular to the surface of the medium being measured (angle of repose). This ensures the best reflected signal and least signal attenuation. With liquids, this will be at right angle to the surface of the liquid. With solids, this will be at right angle to the solid's angle of repose, which will require inspection to determine the optimum angle.



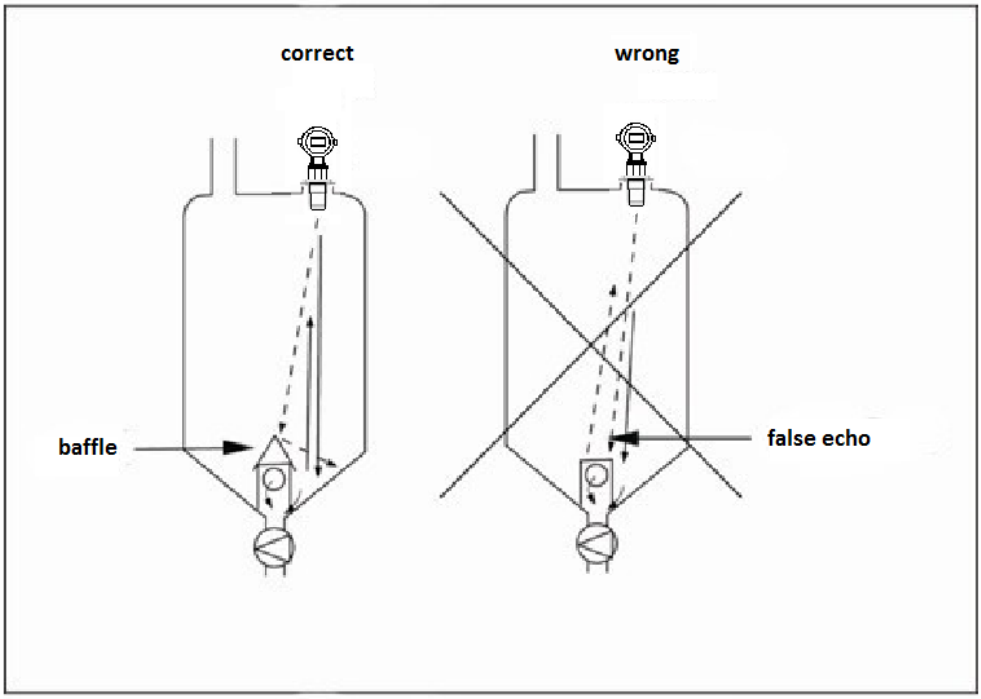
3.3.1 Avoid Process Disturbances

Process disturbances should be avoided with installing the SONIC-4000. Process Disturbances include:

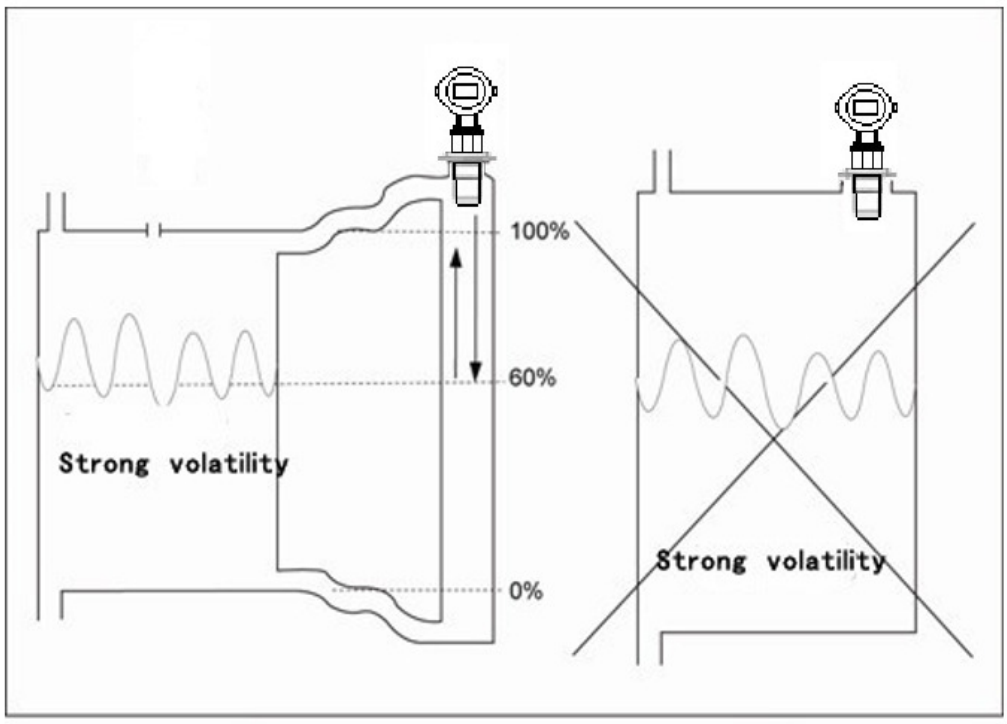
- Filling Curtain: The "filling curtain" is the term used for the entry point of the fluid or solid stream into the vessel.



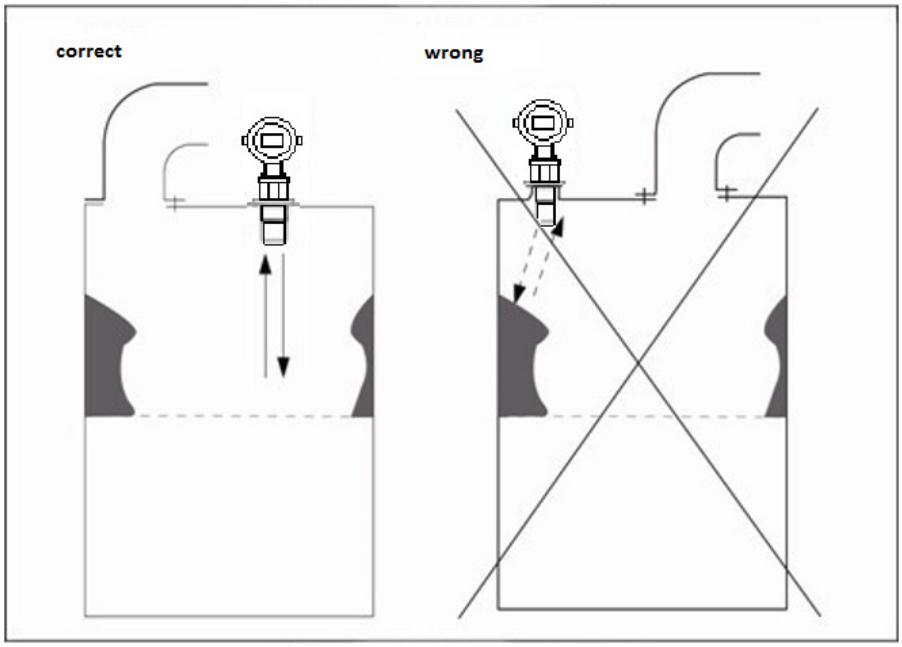
- Mechanical disturbances: these include mixers, pumps, ladders or any other object than can cause a false echo. It is possible to install a baffle (flat plate of plastic or metal) which can guide the echo and reduce the effects of process disturbances.



- Strong Wave Action: this can be caused by powerful mixers. It is possible to install a stilling tube, which will cancel out the effects of wave action.



- Avoid tank or silo walls by installing the ultrasonic far enough away from the wall so that the beam does not hit the wall. Where there is adhesion of the media to the wall, this is especially important. Adhesion and build up can happen with thick liquids and solid mixtures such as concrete, mud or asphalt.

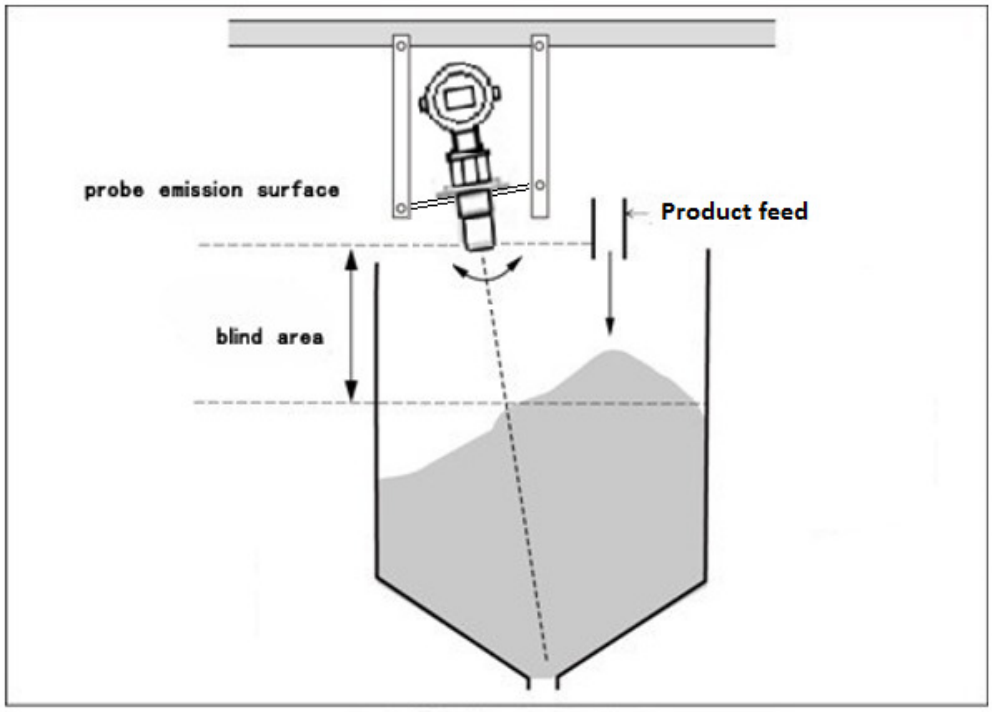


- Avoid bubbles or foam in liquid applications, which are likely to cause a measurement error due to density differences between the surface of the liquid and the foam.
- Do not install the ultrasonic sensor directly in the middle of a closed tank, silo or vessel. False echoes may occur due to harmonics, as the sound waves bounce off the walls and add up. This phenomenon is not applicable to open top vessels or pond or hopper type installations.

A degree of parameter tuning can filter out some of the false signals, however it is important to install the sensor so the ultrasonic pulse signal area does not come into contact with process disturbances. This can be calculated using the beam angle, or using 10% of the sensor's range as a rule of thumb.

3.3.2 Bracket Installation

The SONIC-4000 can be installed over a sump, dam, pond, hopper or open vessel using a user made bracket. With this installation method, ensure the sensor is installed with sufficient clearance from walls of the vessel and any process obstructions such as the product feed (filling curtain) ladders or pumps. You can calculate the clearance required with the beam angle (5 degrees or 4 degrees, refer specifications) plus a 5% allowance. A rule of thumb for clearance is 10% of the distance (i.e. for 5m range, install 0.5m away from the walls and obstructions).

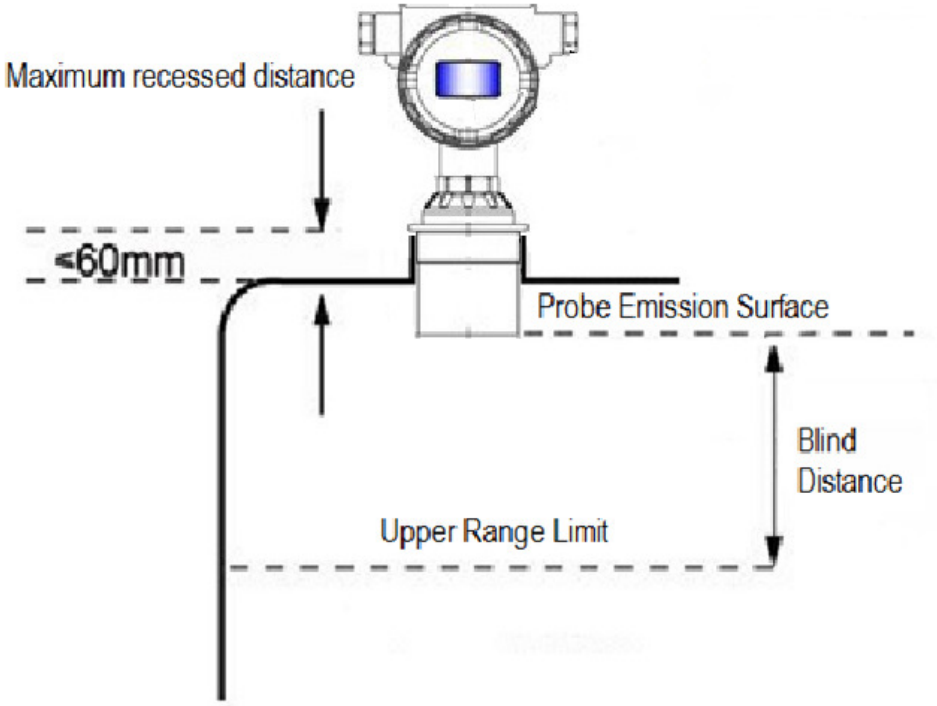


3.3.3 Tank Installation

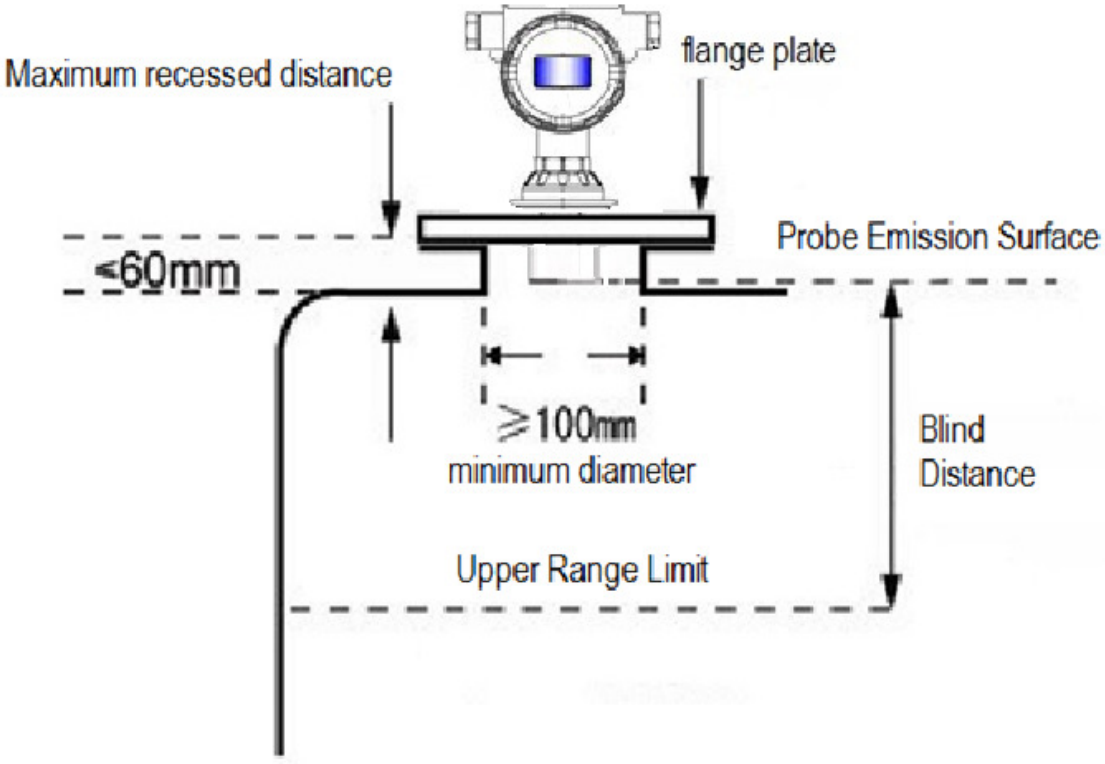
The SONIC-4000 can be installed into closed vessels using flanges, process connections or penetrations made with an appropriate hole saw. With this installation method, ensure the sensor is installed with sufficient clearance from walls of the vessel and any process obstructions such as ladders or pumps. You can calculate the clearance required with the beam angle (5 degrees or 4 degrees, refer specifications) plus a 5% allowance. A rule of thumb for clearance is 10% of the distance (i.e. for 5m range, install 0.5m away from the walls and obstructions).

For arched, dome or conical roofed vessels, do not install the sensor in the middle of the tank, this is due to false harmonic echoes that are produced in this scenario. As a rule of thumb, it is recommended to install 1/3 of the way across the vessel, whilst ensuring the sensor is not within minimum distance from the walls.

With process connection installation, depicted below, it is recommended that the maximum recessed distance is 60mm. Ensure minimum 20mm protrusion of the probe's emission surface (transducer face).



With flange installation, follow the below diagram. Ensure the probe's face is not recessed more than 30mm, maximum flange depth is 60mm. Ensure the diameter of the flange is greater than 100mm.



3.3.4 Custom Probe Lengths and Materials

DAYTECH can custom manufacture longer transducer probes to meet the needs of applications with larger recessed flanges or process connection sockets.

We can also manufacture custom probes using plastics that are resistant to corrosives.

3.3.5 Guidance Tube

For applications where process obstructions are within the reflected signal area and cannot be avoided, you can install a Guidance Tube. A Guidance Tube is essentially a short pipe, made from media compatible plastic such as ABS or PVC and installed to guide the ultrasonic signal when transmitting and collecting plus concentrating reflected signals. Guidance Tubes are only applicable for non-viscous liquid measurement applications.

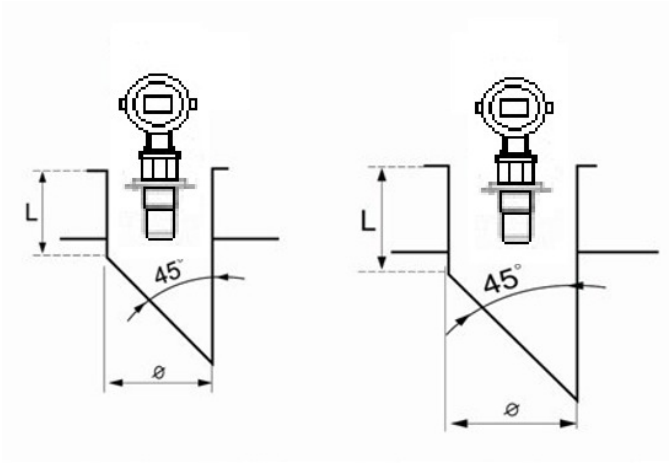
A stilling well will increase the accuracy of the sensor, due to reduced noise and process disturbances.

Cut a 45 degree angle on the end of the stilling well, polish from the inside to the outside and ensure the pipe is finished smoothly with no burrs.

The Guidance Tube's length should be 25% less than the pipe diameter, i.e. for a 200mm inner pipe diameter, the pipe length should be 150mm.'

Ensure the following minimum inner diameters are observed for your Guidance Tube:

Sensor Range	Min Inner Diameter	Sensor Range	Min Inner Diameter
5m	100mm	15m	200mm
10m	150mm	20m	200mm

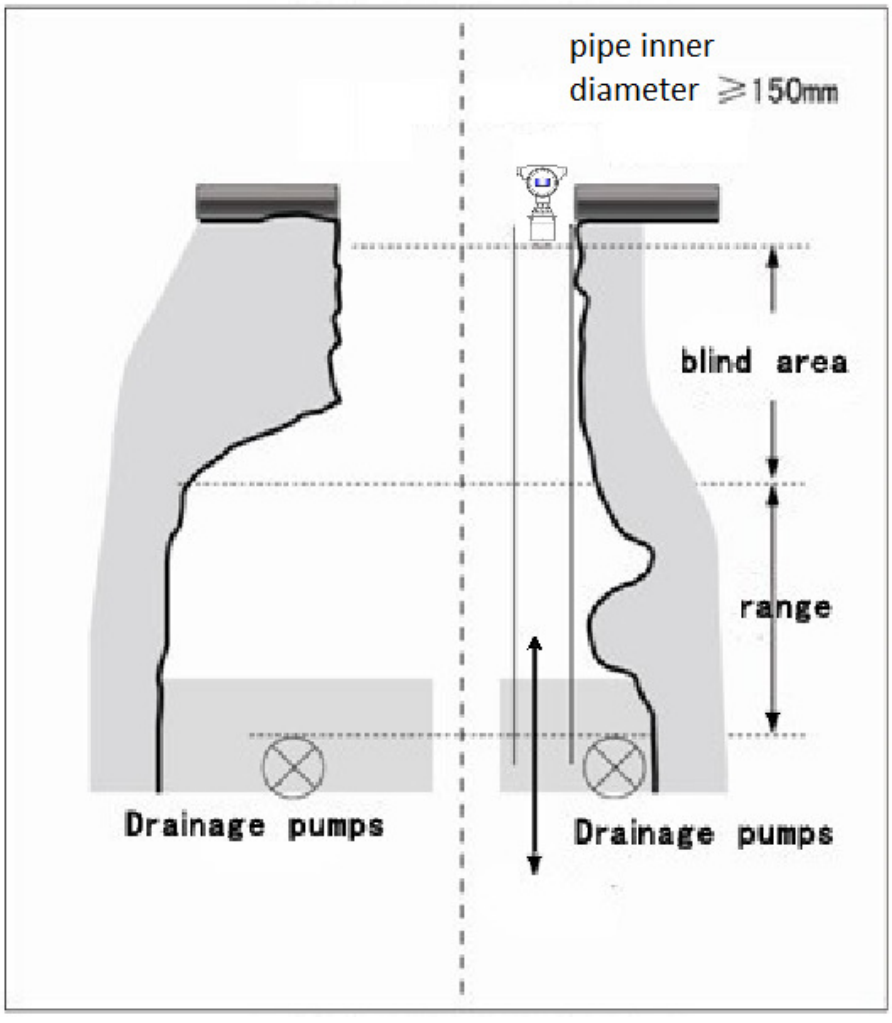


3.3.6 Stilling Well

For applications where process obstructions are within the reflected signal area and cannot be avoided or there is strong mixing or wave action, you can install a Stilling Well. A Stilling Well is essentially a long pipe, made from media compatible plastic such as ABS or PVC and installed to guide the ultrasonic signal within the pipe to the surface of the medium. Stilling wells are only applicable for non-viscous liquid measurement applications.

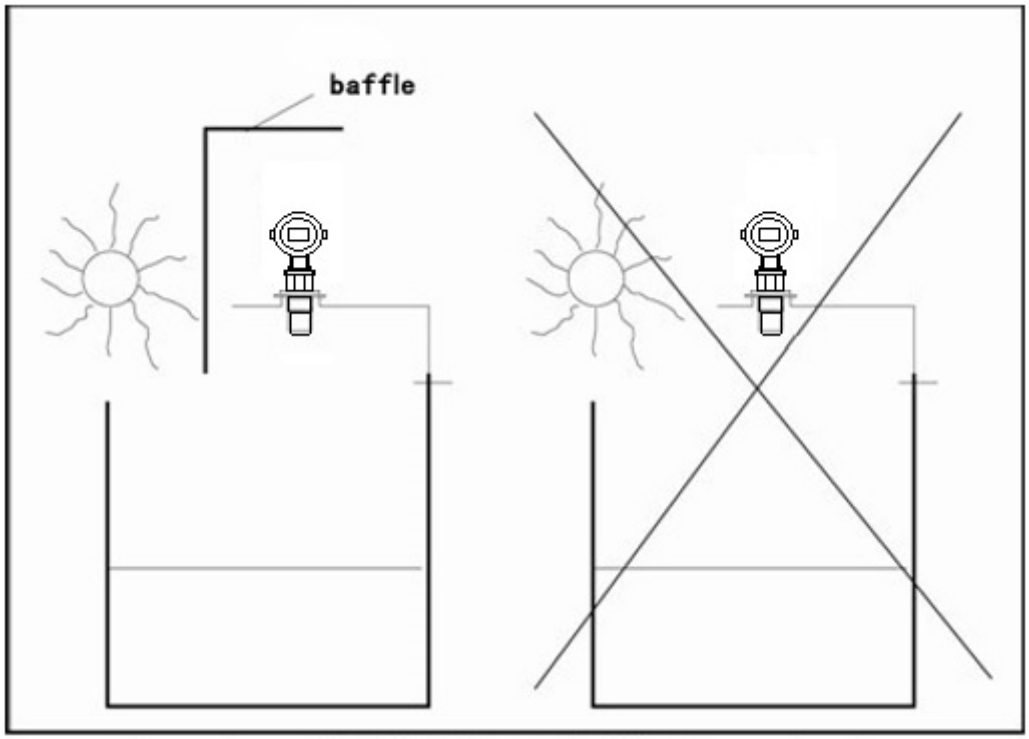
A stilling well will increase the accuracy of the sensor, due to reduced noise and process disturbances. The stilling well will reduce signal attenuation, providing a stronger echo and therefore the blind distance will also increase by approximately 50-75%. Please ensure to test and verify the blind distance in your application, when installing a stilling well.

Minimum recommended pipe inner diameter for a stilling well is 150mm.



3.3.7 Sun Shade (baffle)

Due to the effects of high levels of ambient temperature, if the sensor is exposed to direct sun, it is recommended to install a sun shade (baffle), to protect the sensor from direct sun.



A sun shade or baffle, can be made from either sheet metal or plastic, customised for your application requirements. This can be fabricated by the customer or supplied by DAYTECH. Please contact DAYTECH if you would like custom sun shades manufactured.

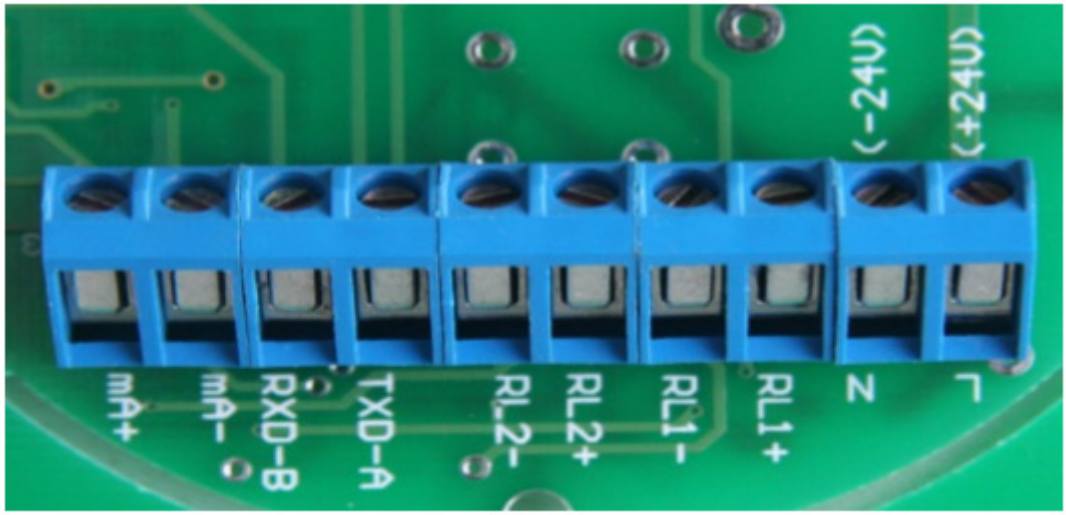
4 Electrical Installation

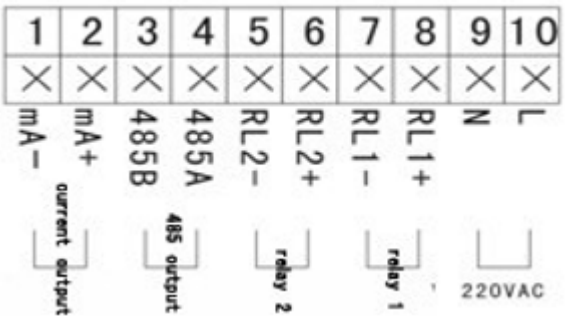
4.1 Licenced Electrical Workers

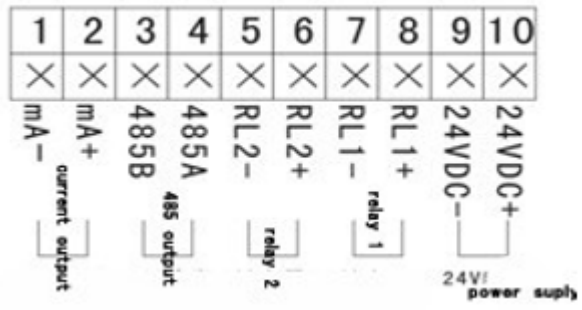
Ensure all work is carried out by a suitably qualified and licenced electrical worker.

4.2 Electrical Wiring 4-Wire Version

- Electrical terminations are made to the terminal block located inside the top cover of the sensor.
- Run shielded twisted pair cable.
- Strip the cable to the right length, crimp with bootlace pins and thread through the gland into the terminal area.
- Terminate per below wiring diagram. Install circuit protection at the supply side.
- Ensure the Instrument Ground is separate from the general earth at the control panel. It can cause noise otherwise.
- Ensure power cabling segregation is observed to prevent interference and signal noise.

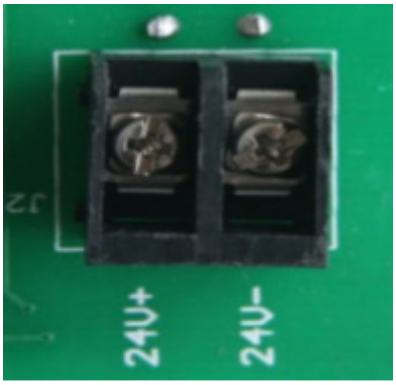


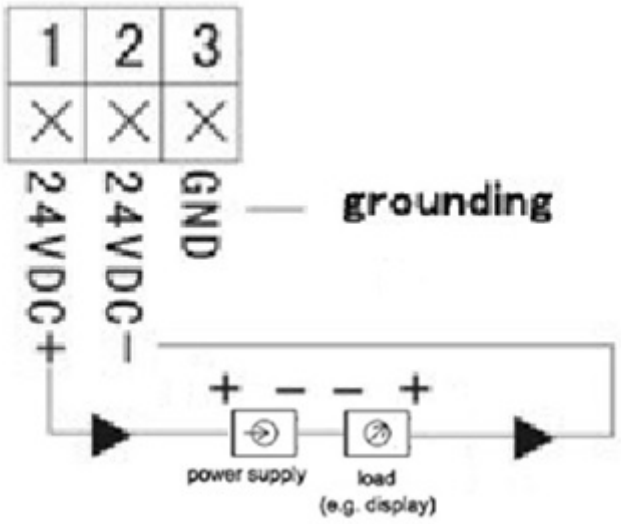




4.3 Electrical Wiring 2-Wire Version

- Electrical terminations are made to the terminal block located inside the top cover of the sensor.
- Run shielded twisted pair cable.
- Strip the cable to the right length, crimp with bootlace pins and thread through the gland into the terminal area.
- Terminate per below wiring diagram. Install circuit protection at the supply side.
- Ensure the Instrument Ground is separate from the general earth at the control panel. It can cause noise otherwise.
- Ensure power cabling segregation is observed to prevent interference and signal noise.

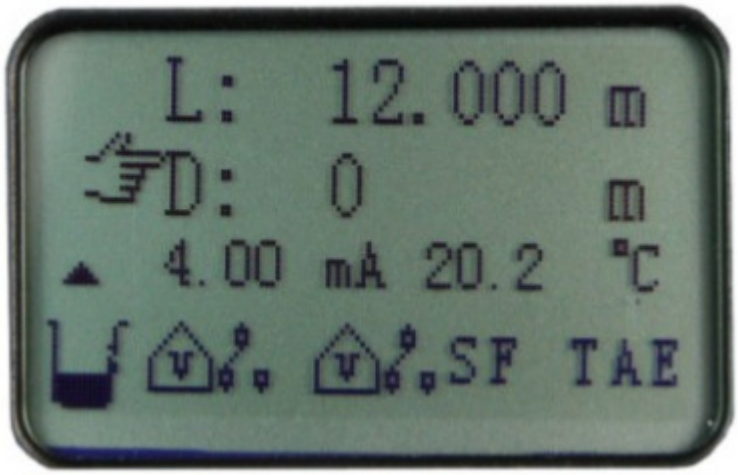




5 Display and Set Up

5.1 Display & Set Up Features and Benefits

- Simple set up by programming using push buttons.
- Tuning parameters are intuitive and easy to use, including analogue output scaling, distance or level measurement, ultrasonic pulse damping, sample speed, sensitivity and threshold. Simply follow the manual.
- Digital display shows the Level or Distance.
- Display shows status of the optional 2 relay outputs.
- Display shows the status of the sonic signal.
- User can scroll through the sensor status readings, Distance/Level, 4-20mA.
- Can be password protected for locking the configuration.



5.2 Setting Up and Commissioning the SONIC-4000

For simple applications, once the equipment is installed, the commissioning technician or engineer only needs to set several parameters for operation.

There are three keys on the panel, through them we can set up and debug the instrument.

When the SET key is pressed for 2 seconds, the sensor will enter Configuration Mode and the sensor's operating mode will stop for the duration of the set up.

SET key

◇ Access to menu items

◇ Confirm menu item

◇ Parameters Set

◇ Confirm Parameter Set

▼ ▲ key

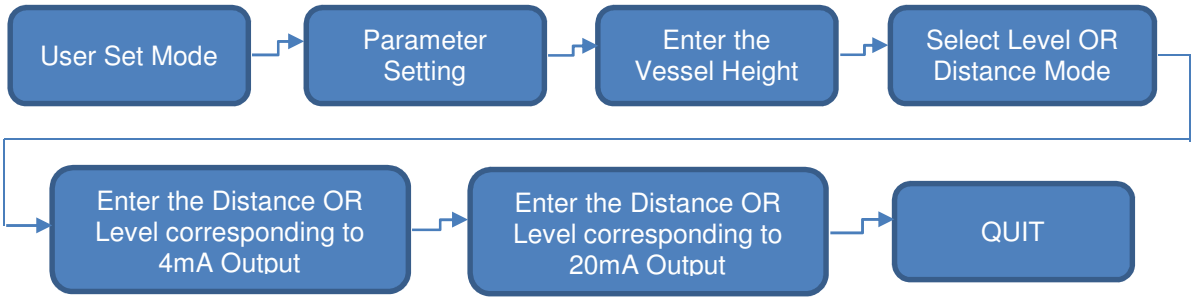
◇ Move the cursor

◇ Select menu item

- After powering up the instrument and checking the display for power, press the “Set” key for two seconds to enter the first level menu.
- Menu Modes Available: Factory Set and User Set.
- The User Set contains the basic parameters required for simple applications.
- The Factory Set Contains more advanced parameters, than can be used for further tuning or for more advanced applications.

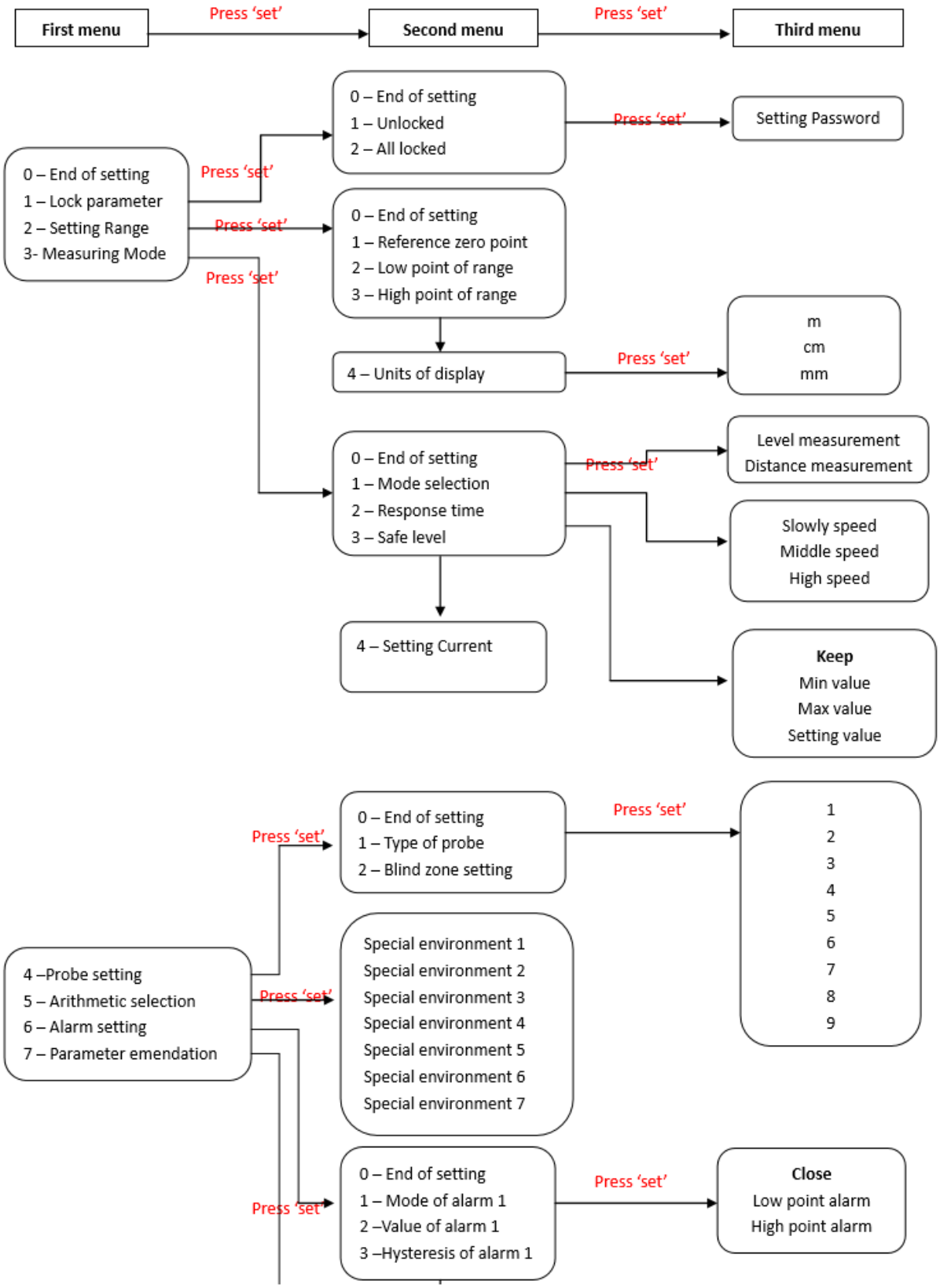
5.2.1 User Set Menu

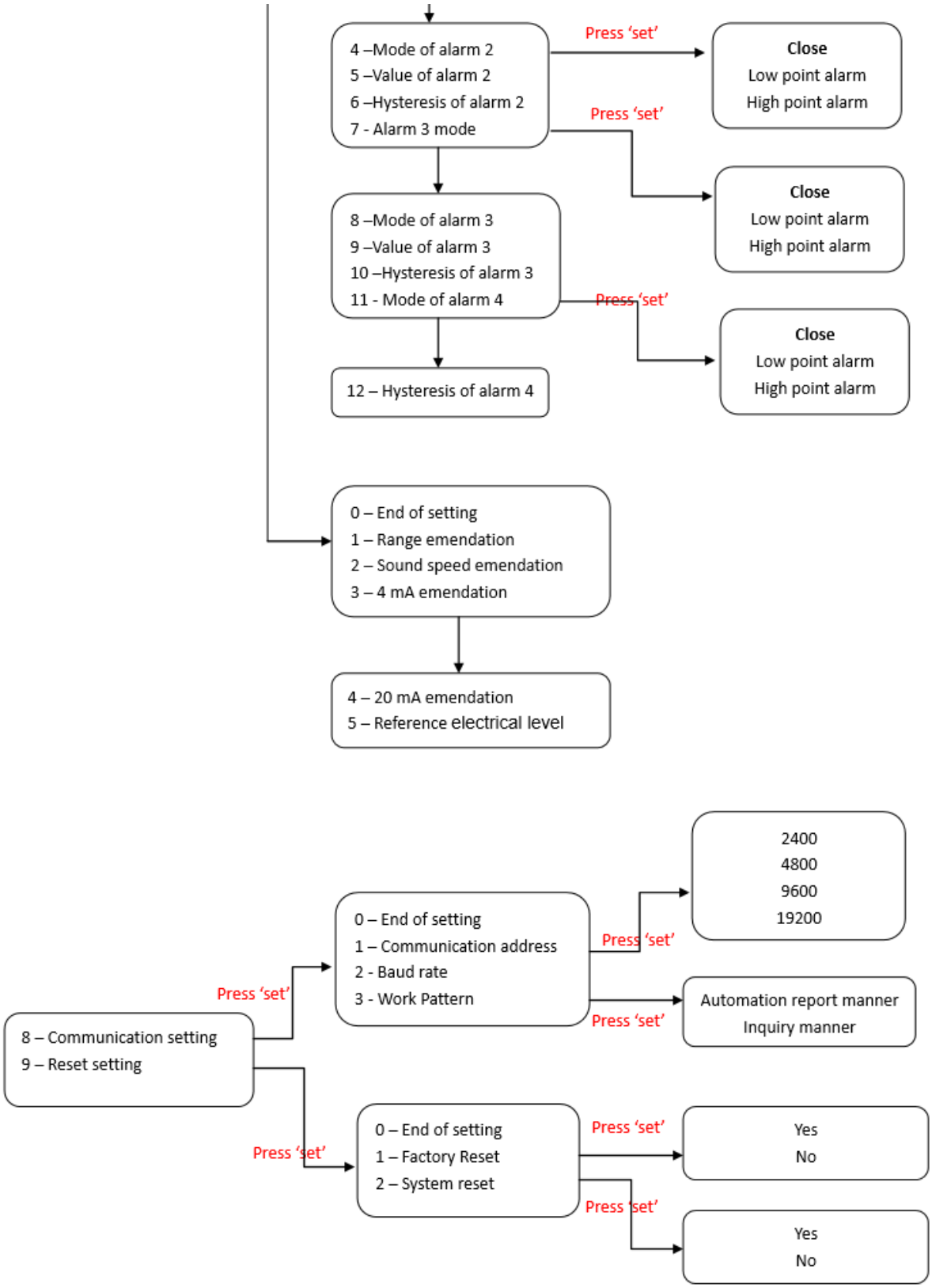
- Initially upon energisation, select “User Set”.
- Follow the Menu flow diagram for the User Set, see below table:



5.2.2 Factory Set Menu

- For more advanced requirements, follow the Menu flow diagram for the Factory Set, see below table:


First menu
Press 'set'
Second menu
Press 'set'
Third menu
0 – End of setting
1 – Lock parameter
2 – Setting Range
3- Measuring Mode
Press 'set'
0 – End of setting
1 – Unlocked
2 – All locked
Press 'set'
Setting Password
Press 'set'
0 – End of setting
1 – Reference zero point
2 – Low point of range
3 – High point of range
Press 'set'
4 – Units of display
Press 'set'
m
cm
mm
Press 'set'
0 – End of setting
1 – Mode selection
2 – Response time
3 – Safe level
Press 'set'
Level measurement
Distance measurement
Slowly speed
Middle speed
High speed
4 – Setting Current
Keep
Min value
Max value
Setting value
4 –Probe setting
5 – Arithmetic selection
6 – Alarm setting
7 – Parameter emendation
Press 'set'
0 – End of setting
1 – Type of probe
2 – Blind zone setting
Press 'set'
1
2
3
4
5
6
7
8
9
Press 'set'
Special environment 1
Special environment 2
Special environment 3
Special environment 4
Special environment 5
Special environment 6
Special environment 7
Press 'set'
0 – End of setting
1 – Mode of alarm 1
2 –Value of alarm 1
3 –Hysteresis of alarm 1
Press 'set'
Close
Low point alarm
High point alarm


4 –Mode of alarm 2
5 –Value of alarm 2
6 –Hysteresis of alarm 2
7 - Alarm 3 mode
Press 'set'
Close
Low point alarm
High point alarm
Press 'set'
8 –Mode of alarm 3
9 –Value of alarm 3
10 –Hysteresis of alarm 3
11 - Mode of alarm 4
Close
Low point alarm
High point alarm
Press 'set'
12 – Hysteresis of alarm 4
Close
Low point alarm
High point alarm
0 – End of setting
1 – Range emendation
2 – Sound speed emendation
3 – 4 mA emendation
4 – 20 mA emendation
5 – Reference electrical level
2400
4800
9600
19200
0 – End of setting
1 – Communication address
2 - Baud rate
3 - Work Pattern
Press 'set'
Automation report manner
Inquiry manner
Press 'set'
Press 'set'
8 – Communication setting
9 – Reset setting
Press 'set'
0 – End of setting
1 – Factory Reset
2 – System reset
Press 'set'
Yes
No
Press 'set'
Yes
No

5.2.3 Measurement type and Range Selection:

- The measurement types available are distance measurement and level measurement.
- The Factory set default as level measurement.
- Select the height value of transducer into “bottom distance”. The distance from the face of the transducer to the bottom of the vessel is the bottom distance.
- In distance measurement mode, setting of the bottom distance has no significance, select positions of **range-H, range-L.**
- In level measurement mode, configure the **bottom distance, range-H and range-L**.
- **Range-L**: Distance from reference surface to lower range limit. The value is positive when range-L is higher than reference surface, and negative when it below reference surface. The output current is 4mA when level is on the position.
- **Range-H**: Distance from reference surface to upper range limit. The value is positive when range-H is higher than reference surface, and negative when it below reference surface. The output current is 20mA when level is on the position.

5.2.4 Alarm / Control Relays:

- The relay outputs can be used for either alarming or for process control.
- Configure the **Alarm Relays**: enter into the alarm settings, set three parameters:
    - Alarm mode: high alarm, low alarm, close optional.
        - Alarm value: high alarm: when level is higher than alarm value
        - Low alarm: when level is lower than alarm value
    - Difference: Is used to prevent switch point error which can lead to the alarm output repeatedly turning ON and OFF around the set point.
        - High alarm state: when level is lower than (alarm value - difference) removing alarm.
        - Low alarm state: when level is higher than (alarm value + difference) removing alarm.

5.2.5 Unit Selection

Users can select the engineering units that they require. These are distance measurements: **m** / **cm** / **mm**.

Factory Default is **m**.

5.2.6 Safe Level

This is the output action the sensor takes when a lost signal or fault occurs. There are four options provided: hold, minimum, maximum, setting value.

Hold: Display and Analogue Output values are the last measured

Minimum: Display and Analogue Output values change to 4mA

Maximum: Display and Analogue Output values change to 20mA

Setting value: Display value is the last measured value, analogue output value changes to the setting value.

Factory set default as hold.

5.2.7 Communications

The SONIC-4000 has on-board RS485 communications, allowing a sensor network to be created and to connect directly to a PLC or PC.

Communication Address： Choose the communication address, the default value is 1.

Baud Rate： Choose the frequency of communication, 2400, 4800, 9600, 19200 optional, the default is 9600.

Working Mode： Choose the method of communication, “automatic report mode” and “inquire mode” are the 2 functional options, the default is “automatic report mode”.

5.2.8 Advanced Parameters

Setting of these three parameters is not recommended without contact DAYTECH: Transducer Select, Parameter Calibration, Algorithm Select.

5.2.9 Parameter Lock

If required, you can lock the menu. After completion of setting up all parameters, enter the Parameter Lock setting. The level meter’s initial password is 25, users can modify this to setup your own password. Note: Ensure you write down and remember the password that you have set, if you forget, you will need to return the sensor to DAYTECH.

Unlock Mode： In this mode, all menus can be modify at will.

Lock Mode： In this mode, you must input the password first to access the menu.

5.2.10 Reset Selection

The Reset Selection parameter provides a factory reset function, which returns the sensor to the factory default state.

6 Errors & Faults

If the SONIC-4000 loses it's echo, the unit will display a small symbol "▲". This is indicating that the signal is not being received with adequate dB to process into a level or distance measurement. This could be due to process obstructions, noise or interference.

If an error in the instrument or signal occurs, first check that all wiring is correct and the ground is at 0 volts potential and separate to the main earth.

Error	Cause	Solution
No display showing	Faulty connection	Check cabling and terminations
Sensor is working and displays a small symbol "▲" on the display.	This is due to a lost echo signal. The sensor is not processing the reflected signal due to either process conditions, noise or interference. A list of causes is per below: 1) Actual distance is greater than the sensor's range; 2) The process medium has strong turbulence, vibration or dust. 3) Foam or bubbles on the surface of the measured medium. 4) Electrical interference such as inverted, electric motors, AC cabling etc. 5) Transducer is not aligned at right angle to the medium. 6) Process obstructions are causing interference, such as metal structures, ladders, process equipment, mixers etc. 7) Measured medium has entered the Blind Zone of the sensor.	1) Change to larger range sensor; 2) Either change the sensor's location or wait until the process conditions change if possible. Signal damping can be tuned. 3) Applications with foam or bubbles are not recommended for the SONIC-4000. 4) Locate the interference, segregate the cabling or equipment. 5) Change the installation of the sensor so that it aligns at a perpendicular angle to the medium. 6) Consider changing the sensor's location, other solutions include installing a stilling well or Guiding Tube. 7) Raise the installation position of the sensor if possible. Other considerations include scaling the range of the sensor to a closer match with the vessel and changing the "threshold" parameter.

For any further technical difficulties or troubleshooting, contact the engineers at DAYTECH.