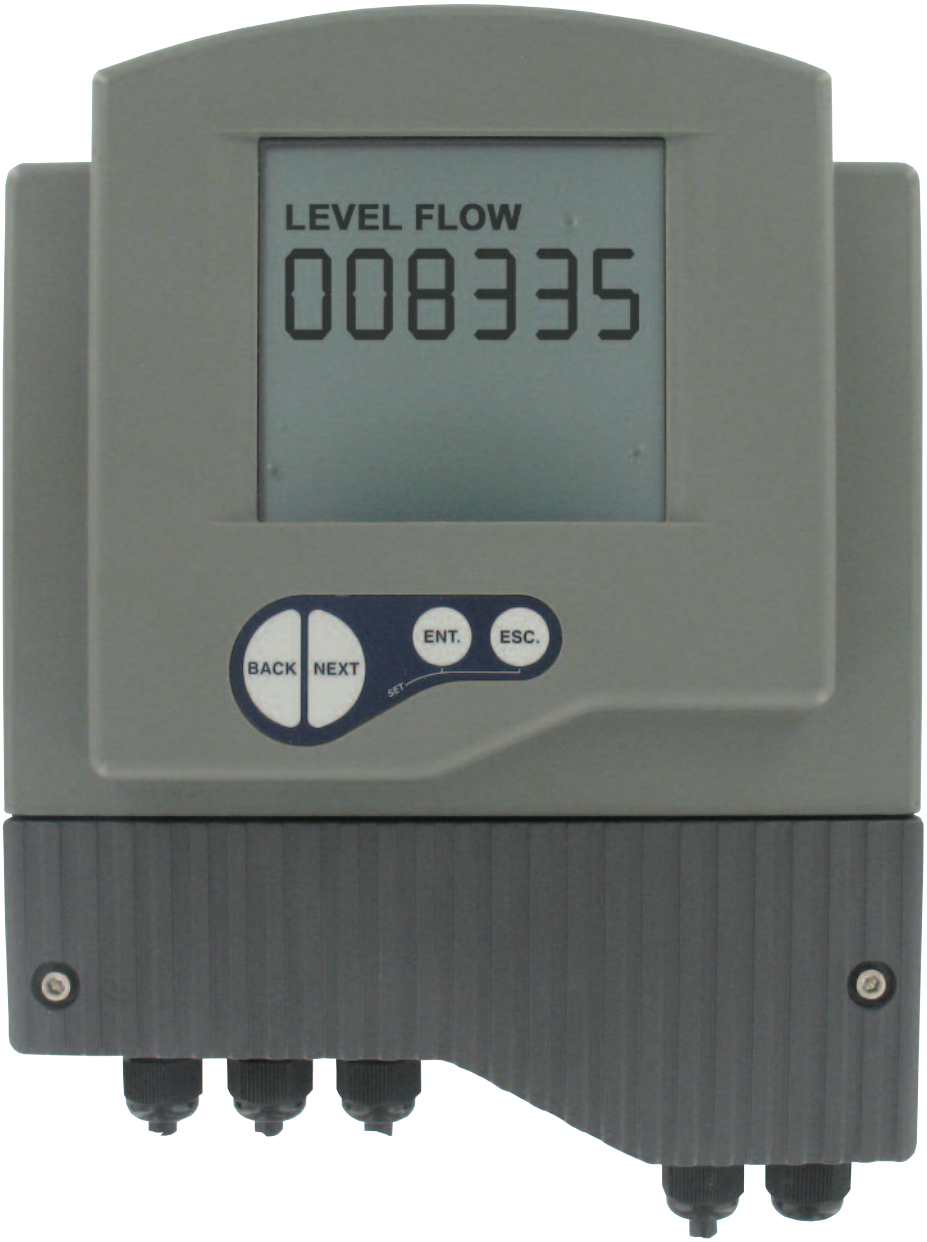
Series UT Transmitters

Specifications - Installation and Operating Instructions



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Chapter 1: Introduction

Series UT is a non contact, ultrasonic, continuous level measurement instrument that is able to provide accurate measurements for liquids, while automatically compensating for changes in temperature and other environmental conditions. Series UT is designed for applications such as process tanks, storage vessels, open air piles, open channels, and so on.

Series UT is a four wire, low voltage device, and is available with a graphic LCD display. Series UT has two major components, the main control unit UTC and the sensor UTS (connected via a cable).

• Main (electronic) control unit: If required, this component can be optionally wall mounted, using a wall mount plate, or panel mounted. To ensure proper operation, the unit must be installed up to 200 m (656 ft) from the sensor.

• Sensor and data cable: The sensor is supplied with the data cable attached.

• The installation procedure and wiring connections for these components are described in Chapter 2, Installing Series UT .

The Series UT product line comprises two families, UTC-1XX-XXX-X or UTS-1XX-XXX-X (25 kHz) and UTC-2XX-XXX-X or UTS-2XX-XXX-X, each with its own models (as listed below). A variety of sensors are available for Series UT, suitable for different ranges.

The following diagrams show the front and side views of UT, and its dimensions:

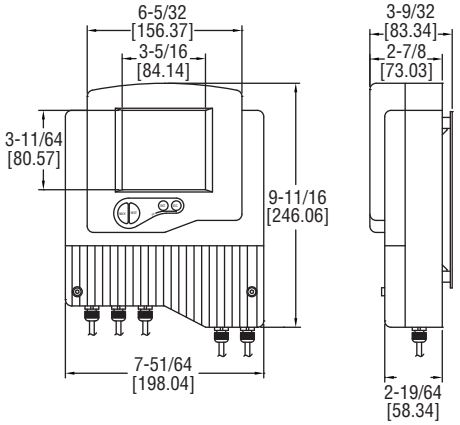


Figure 1 & 2: Front and Side View

The following schematic diagrams show the wall mount and panel mount options, with the dimensions:

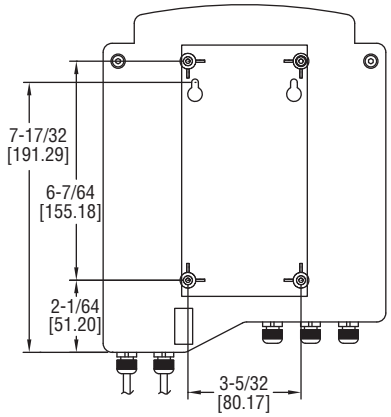


Figure 3 & 4: Back View of Series UT with Wall-Mount Plate

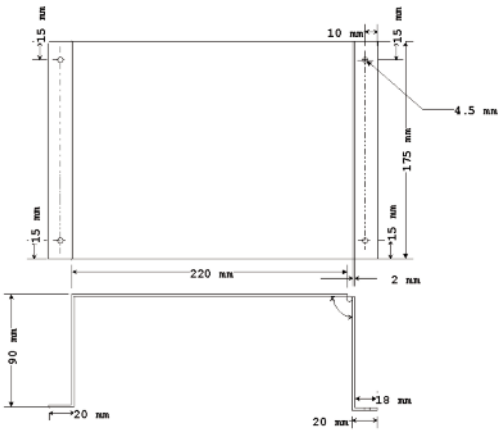
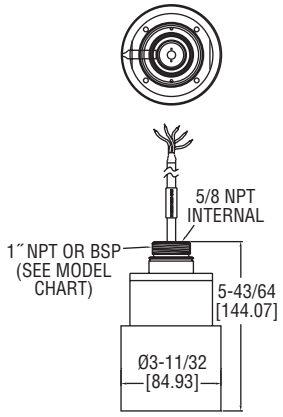
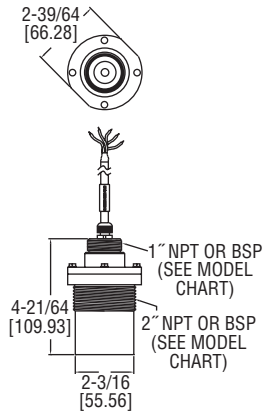


Figure 5: Panel Mount (Contact Factory)

Sensor Dimensions



25 kHz Stand and Range
UTS-12X-XXXX-X



25 kHz Long Range Sensor
UTS-13X-XXXX-X

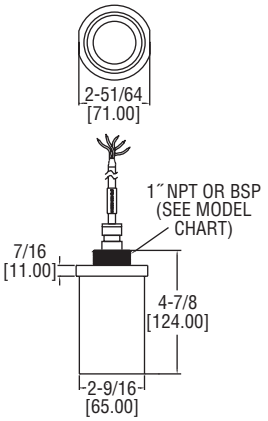


Figure 6: Sensor Dimensions
50 kHz Sensor
UTS-2XX-XXX-X

SPECIFICATIONS

SERIES UTC
Service: Compatible liquids.
Wetted Materials: ECTFE.
Ranges: (Sensor Dependent)
Short Range: 1.3 to 39.4 ft (0.4 to 12 m);
Standard Range: 2 to 82 ft (0.6 to 25 m);
Long Range: 2 to 131 ft (0.6 to 40 m).
Accuracy:
UTC-1XX-XXX-X: 0.25% of max range;
UTC-2XX-XXX-X: 0.2% of max range.
Resolution: 0.04″ (1 mm).
Temperature Limits:
UTC-XX1-XXX-X: -40 to 140°F (-40 to 60°C);
UTC-XX2-XXX-X: -4 to 140°F (-20 to 60°C).
Temperature Compensation: Automatic.
Pressure Limits: Atmospheric.
Power Requirement:
UTC-XX1-XXX-X: 18 to 30 VDC 6 W;
UTC-XX2-XXX-X: 100 to 240 VAC 50/60 Hz.
Output Signal: 4 to 20 mA.
Max. Loop Resistance: 750 Ω @ 24 VDC.
Electrical Connections: Screw terminal.
Conduit Connection: 1/2″ NPT, M20 x 2.5 (optional).
Enclosure Rating: NEMA 4X (IP65).
Mounting Orientation: Vertical.
Memory: Non-volatile.
Display: LCD (6 digit).
Units: m, in, ft, m^3/hr, GPM (interchangable).
Programming: 4 button.
Weight: (3.5 lb) 1.6 kg.

SERIES UTS
Service: Compatible liquids.
Wetted Materials:
UTS-XX1-XXX-X: Polypropylene;
UTS-XX2-XXX-X: PVDF;
UTS-XX3-XXX-X: PVDF/glass epoxy;
UTS-XX4-XXX-X: Fully coated PVDF.
Ranges:
Short Range: 1.3 to 39.4 ft (0.4 to 12 m);
Standard Range: 2 to 82 ft (0.6 to 25 m);
Long Range: 2 to 131 ft (0.6 to 40 m).
Blind Zone:
Short Range: 1.3 ft (0.4 m);
Standard Range: 2 ft (0.6 m);
Long Range: 2 ft (0.6 m).
Beam Width: 3″ (7.6 cm) diameter.
Beam Angle: 5° @ 3 db point.
Temperature Limits: -40 to 176°F (-40 to 80°C).
Temperature Compensation: Automatic.
Pressure Limits: Atmospheric.
Transducer:
UTS-1XX-XXX-X: 25 kHz;
UTS-2XX-XXX-X: 50 kHz.
Process Connection: 2″ NPT, 2″ BSP (optional).
Electrical Connection: 16.4′ (5 m) 5 cond. 0.75 mm^2 cable.
Enclosure Rating:
UTS-XXX-1XX-X: NEMA 4X (IP65);
UTS-XXX-2XX-X: NEMA 6X (IP68).
Weight: (3.5 lb) 1.6 kg.

Sensor Recommendations

UTS-1XX-XXX-X:
25 kHz Sensor Recommendations

Material	Description
Coated Aluminum (ECTFE)	Designed for complex environments with problematic echoes, such as non-conductive vapors and liquids. Good performance in problematic applications.
	Usable in highly acidic or alcoholic environments. High sensitivity to echoes.

*Consult factory

UTS-2XX-XXX-X:
50 kHz Sensor Recommendations

Material	Description
Glass reinforced epoxy	For liquid applications (not recommended for dusty environments). High resistance in highly acidic and alcoholic environments. Used for rapid response.

Sensor Cable Lengths
All sensors are supplied with either pre cut cable or with flexible cable.
Sensor cable specifications: 4 wires, 0.75 mm^2 overall shielded.

NOTE:
It is recommended to use a connector when cutting/adding sensor cables (both precut and flexible sensors).

Pre Cut Cable (Non Hazardous)
Pre cut sensor cables can be modified to fit longer and shorten length than the one that was ordered. For example, if you ordered a sensor for the UTS-1X-XXX-X with a 5 m/16.4 ft cable, you will be able to modify it to a range between 5 m/16.4 ft to 50 m/164 ft, or if you ordered a sensor for the UTS-1X-XXX-X with 35 m/114 ft cable, you will be able to modify it to fit a range between 5 m/16.4 ft to 100 m/328 ft. The modifications in the cable length can be made according to following tables:

NOTES:
Sensor cable should not be cut below a minimum of 5 meters (16.4 ft) length.

UTS-1XX-XXX-X
(25 kHz) Sensor Cable

25 kHz sensor pre cut cable length (ft/m)	Can be changed to a range of (ft/m)
16.4 ft/5 m	16.4 ft/5 m to 164 ft/50 m
49.21 ft/15 m	16.4 ft/5 m to 164 ft/50 m
82 ft/25 m	16.4 ft/5 m to 164 ft/50 m
114 ft/35 m	16.4 ft/5 m to 164 ft/50 m
164 ft/50 m	16.4 ft/5 m to 164 ft/50 m
246 ft/75 m	164 ft/50 m to 328 ft/100 m
328 ft/100 m	164 ft/ 50 m to 328 ft/100 m
410 ft/125 m	328 ft/100 m to 492 ft/150 m
492 ft/150 m	328 ft/100 m to 492 ft/150 m
574 ft/175 m	492 ft/150 m to 656 ft/200 m
656 ft/200 m	492 ft/150 m to 656 ft/200 m

UTS-2XX-XXX-X
(50 kHz) Sensor Cable

50 kHz sensor pre cut cable length (ft/m)	Can be changed to a range of (ft/m)
16.4 ft/5 m	16.4 ft/5 m to 164 ft/50 m
49.21 ft/15 m	16.4 ft/5 m to 164 ft/50 m
82 ft/25 m	16.4 ft/5 m to 164 ft/50 m
114 ft/35 m	16.4 ft/5 m to 164 ft/50 m
164 ft/50 m	16.4 ft/5 m to 164 ft/50 m
246 ft/75 m	164 ft/50 m to 328 ft/100 m
328 ft/100 m	164 ft/ 50 m to 328 ft/100 m
410 ft/125 m	328 ft/100 m to 492 ft/150 m
492 ft/150 m	328 ft/100 m to 492 ft/150 m
574 ft/175 m	492 ft/150 m to 656 ft/200 m
656 ft/200 m	492 ft/150 m to 656 ft/200 m

Flexible Cable

Flexible sensor cables are supplied with 16.4 ft/5 m loose-end cable. However, they can be modified to fit longer length than 16.4 ft/5 m. The modifications in the cable length can be made according to following tables:

UTS-1XX-XXX-X

25 kHz Sensor Cable Length (ft/m)
16.4 to 164 ft/5 to 50 m
49.21 to 328 ft/50 to 100 m
328 to 492 ft/100 to 150 m
492 to 656 ft/150 to 200 m

UTS-2XX-XXX-X

50 kHz Sensor Cable Length (ft/m)
16.4 ft/5 m to 328 ft/100 m
328 ft/100 m to 656 ft/200 m

NOTES:

Any cable length beyond 328 ft/100 m, may affect the measuring range by reducing the range.

Chapter 2: Installing Series UT

Precautions

- Ensure that the Series UT components are mounted in an area that meets the stated temperature, pressure and technical specifications.
- Ensure that high-voltage sources or cables are at least 3.28 ft/1 m away from the sensor and its cable.
- Use round cables with minimum diameter of 6 to 7 mm to ensure that the unit remains sealed to enclosure rating listed (IP65/67).
- Ensure that cables are routed correctly and tightened along walls or pipes.
- Ensure that all cables are overall shielded (sensor cable, interface cable, power cable and current cable).
- Installation and operation of this product should be performed according to the Installation and Operating Instructions; otherwise, the use of this product is prohibited.

Installing the Series UT Sensor (UTS)

The following procedures describe sensor installation using 1″ or 2″ threading and a correlating locking nut. The installation procedure is the same whether the sensor is mounted directly on the tank or mounted on a pipe.

NOTES:

If applicable, you can also install the sensor by screwing it directly into the tank or pipe threading. Ensure that the tank/pipe threading matches the sensor threads.

To Install the Sensor Using 1″ Threading:

1. Open the required tank (or pipe).
2. Feed the free end of the sensor cable from the inside of the tank through the aperture at the top of the tank until the sensor is pulled taut against the ceiling. The threaded end of the sensor should protrude from the top of the tank.
3. Spread silicon grease around the threading to seal against leakage (you can also use a FEP band).
4. Thread the free end of the sensor cable through a 1″ locking nut (not supplied with the Series UT unit). Bolt the sensor into place by securing the nut to the sensor thread protruding from the top of the tank.

NOTES:

Tighten the nut by hand only. When tightening the nut, hold the lower part of the sensor.

5. Wire the sensor cable to the main Series UT unit, as described on page 5.

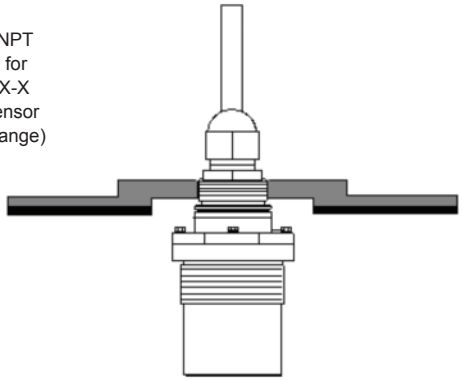
To Install the Sensor Using 2″ Threading (UTS-1XX-XXX-X (25 kHz) Standard Range Sensor):

- Follow the procedure described on the previous page for 1″ threading, using a 2″ locking nut with the 2″ BSP/NPT sensor threading.

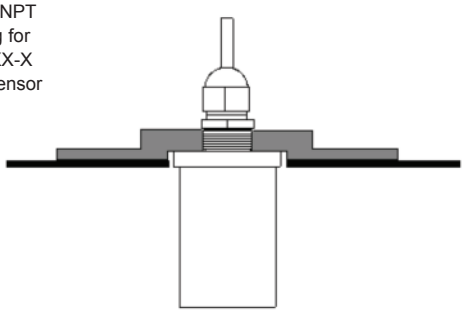
Threading Options

Series UT sensors are available in BSP or NPT thread types. The UTS-2XX-XXX-X (50 kHz) sensor can be installed using 1″ threading. The UTS-1XX-XXX-X (25 kHz) sensors can be installed using 1 or 2″ threading. (Refer to Figure 6: Series UT Sensor Dimensions in Chapter 1: Introduction.)

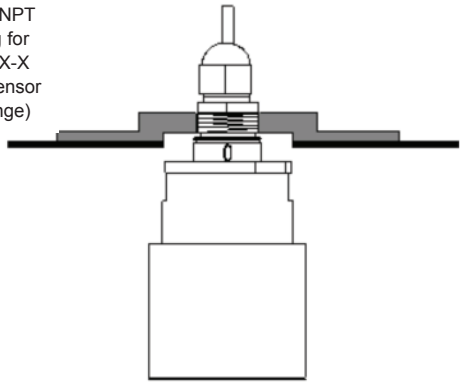
1″ BSP/1″ NPT Threading for UTS-1XX-XXX-X (25 kHz) Sensor (Standard Range)



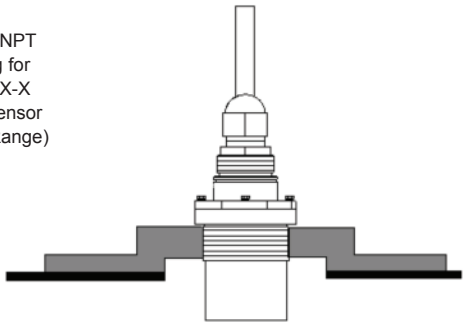
1″ BSP/1″ NPT Threading for UTS-1XX-XXX-X (50 kHz) Sensor



1″ BSP/1″ NPT Threading for UTS-1XX-2XX-X (25 kHz) Sensor (Long Range)



2″ BSP/2″ NPT Threading for UTS-1XX-1XX-X (25 kHz) Sensor (Standard Range)

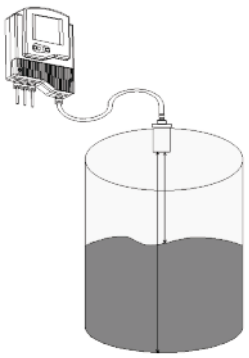


NOTES:

When installing a thread free flange mounted unit, you will need a 1″ or 2″ locking nut (depending on the thread type used) to secure the sensor to the tank. The nut can be purchased separately. When installing a threaded flange, ensure that it matches the Series UT threads.

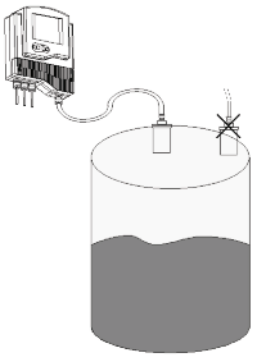
Sensor Positioning
When installing the sensor, ensure that it is:

• Mounted above the dead-zone area (Blind Zone) (blocking distance).

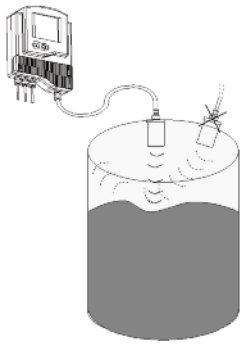


NOTES:
If the device enters the dead zone, it will not measure correctly.

• Positioned at least 0.5 m (1.64 ft) away from the tank walls.

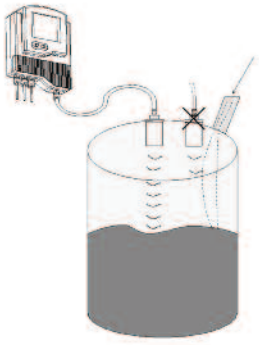


• Perpendicular to the surface of the target.



NOTES:
Even the slightest difference in angle may affect echo quality.

• Install the sensor as far as possible from noisy areas, such as a filling inlet.



Installing the Sensor via an Extension Pipe
If the level of the measured surface falls within the dead-zone area, you should use an extension pipe to mount the sensor.

When using an extension pipe, ensure that:
- The sensor is positioned in the center of the pipe.
- The pipe extension is parallel to the side/tank walls.
- The tank should be empty to allow tracking of false echoes.
- The internal pipe diameter is at least 3″ and 4″ wide.

When installing the sensor with an extension pipe, follow these specifications:

Pipe Length	Internal Pipe Diameter
1.64 ft (0.50 m)	3 or 4″

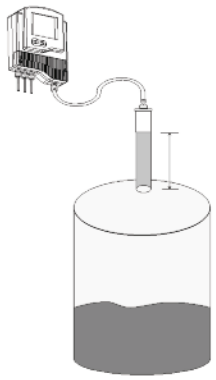


Figure 10:
Extension Pipe Installation

NOTES:
We advise you to consult with your local distributor prior to the installation. It is essential to run scan distance function during the installation process. It is recommended to use pipes made of PVC/plastic and not stainless steel.

Wiring the Series UT Unit
The lower part of the Series UT unit consists of the electrical unit, which contains the wiring terminals for the sensor cable and the power cable. The electrical unit also contains optional connectors for monitoring of digital and analog outputs, as well as five optional relay connectors.

NOTES:
Remove the rubber sealing from the gland before wiring the connectors.

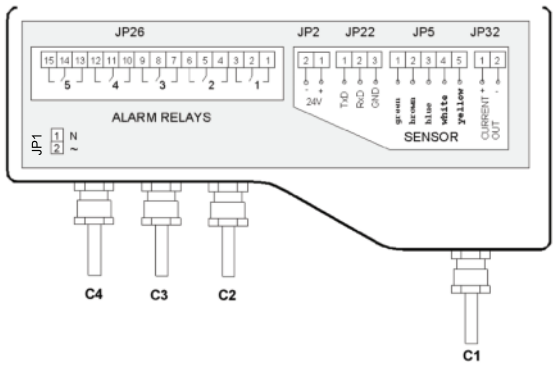


Figure 11: Electrial Unit Using Glands/Conduits

In order to make a wiring connection, remove the ribbed faceplate covering the electrical unit using a 3 mm allen wrench. Ensure that the cover is replaced securely after all wiring connections are completed.

To Wire and Install the Series UT:
1. Install the sensor, as described in Installing the Series UT Sensor, page 4.
2. Route the sensor's cable (C1) from the sensor to the main unit location. Choose a route without electromagnetic interference (electrical engines, pumps or high voltage.
3. Wire the sensor's cable (C1) to the main unit, as described in Wiring for the Sensor Cable, below.
4. Make any optional monitoring or relay cable connections to the main unit, as described in the instruction manual.
5. Connect the power cable to the main unit.
6. If required, mount the main unit on the wall using the optional wall mount plate.

Wiring the Sensor Cable
Sensor cable specifications: 5 wires, 0.75 mm^2 overall shielded.
After the sensor is installed on the tank, the free end of the sensor cable is connected to the electrical unit using terminal JP5.

To Wire the Sensor Cable to JP5:

NOTES:
Ensure that the power is switched off before wiring the sensor cable.

7. Thread the sensor cable through aperture (C1), located on the right side of the Series UT electrical unit's base.

8. Connect each colored wire in the cable to the appropriate screw down termination post at terminal JP5, according to the color coding given in the table below (if the extension cable wires are black, follow the coding given in brackets).

JP5 Post	Color
1	Green (Black 1)
2	Brown (Black 2)
3	Blue
4	White (Black 3)
5	Yellow

NOTES:
Close the glands and conceal any openings to ensure sealing. Do not exceed 250-inch pounds torque on installation of conduit. The O-ring is suitable for one use only.

Wiring the Monitoring Cables
Series UT data can be monitored on a PC via an RS 485 or RS 232 connection to terminal JP22. You can also connect Series UT to an analog output meter set between 4 mA and 20 mA using terminal JP32. (Setting the 4 mA and 20 mA values is described in Chapter 3, Basic Setup.)

To Wire the Digital Interface Cable to JP22:
1. Thread the required cable through the wiring apertures (C2) located at the base of the electrical unit.
2. Connect each wire in the cable to the appropriate screw down termination post at terminal JP22, wiring for RS-485 or RS-232, as required:

RS-485		RS-232	
JP22 Post	Wire	JP22 Post	Wire
1	B	1	TxD
2	A	2	RxD
3	Ground	3	Ground

To Wire the 4 to 20 mA Cable to JP32:
1. Thread the required cable through the wiring apertures located at the base of the electrical unit.
2. Connect the wires in the cable to the screw down termination posts at terminal JP32. Connect the positive wire to post 1 and the negative wire to post 2.

NOTES:
Close all glands to ensure sealing. Do not exceed 250-inch pounds torque on installation of conduit. The O-ring is suitable for one use only.

Wiring the Relays Cable
Series UT's electrical unit provides connectors at terminal JP26 for up to five independently programmable relays. The relays can be used to initiate certain actions, such as controlling pumps, triggering an alarm or sending a warning message, or when a defined value is reached. (Defining values for the relays is described in Chapter 3, Basic Setup.)

To Wire the Relays Cable to JP26 Using VDC Power:
1. Thread the required cable through apertures (C2/C3) located at the base of the electrical unit.
2. Connect the relay cable wires to the appropriate posts, as shown in Figure 11: Electrical Unit, page 5.

NOTES:
Close the glands to ensure sealing. The O-ring is suitable for one use only. If your unit is equipped with conduits instead of glands, aperture C3 is not available. Use aperture C4 instead. Do not exceed 250-inch pounds torque on installation of conduit.

Wiring the VDC Power Cable
The free end of Series UT's (UTC-XXX-1XX-X) power cable is connected to the electrical unit using terminal JP2 when working in VDC.

To Wire the Power Cable to JP2:
1. Thread the required cable through C2 aperture at the base of the electrical unit.
2. Connect the wires in the cable to the appropriate screw down termination posts at terminal JP2. Connect the negative wire to post 2 and the positive wire to post 1.

Wiring the VAC Power Cable
The free end of Series UT's (UTC-XXX-2XX-X) power cable is connected to the electrical unit using terminal JP1 when working in VAC.

To Wire the Power Cable to JP1:
1. Thread the required cable through C4 aperture at the base of the electrical unit.
2. Connect the wires in the cable to the appropriate screw down termination posts at terminal JP1. Connect the zero wire to post 1 and the phase wire to post 2.

⚠ CAUTION HIGH VOLTAGE IN JP1!

NOTES:
Close all glands to ensure sealing. The O-ring is suitable for one use only.

Chapter 3: Basic Setup

This chapter describes how to set up and calibrate Series UT for accurate measurement monitoring using the basic menu options.

Series UT is supplied with preprogrammed default settings, making it ready for immediate operation. Measurement readings are displayed on the default screen as soon as the unit is powered on, as described in Default Screen, page 7.

It is recommended that you replace the default tank height value with the actual tank height, as described in Setting the Tank Height, page 11. When using Series UT, the tank height is calculated as the distance from the surface of the sensor to the bottom of the tank. You should enter this value whenever tank height is required. (For flow measurement, enter the precise flume height.)

The Series UT main menu (shown on page 7) enables you to access the primary functions for Series UT operation, so that you can change the default settings and calibrate Series UT, as required. You can define further specialized function options for Series UT from the additional menu, as described in Chapter 5, Additional Features.

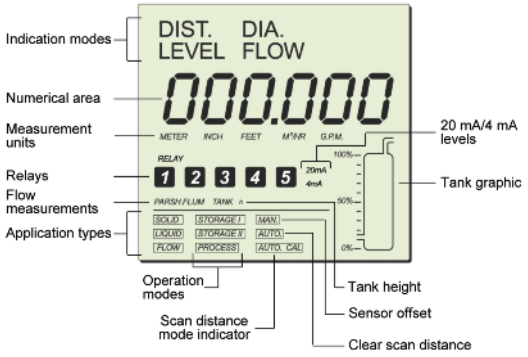


Figure 12: Series UT Main Menu Screen

NOTES:
The options displayed in the main menu depend on the Series UT model so you may not necessarily view all the options shown in the above example.

Using the Series UT Function Buttons

The function buttons are used to perform various operations, summarized in the following table.

Button	Uses Include:
ENT.	• Accessing the menus (when pressed simultaneously with ESC.). • Accessing a function within a menu, enabling you to make modifications. • Moving from left to right between displayed digits in the numerical area (refer to Modifying Numerical Values, below). • Saving changes to data.
ESC.	• Accessing the menus (when pressed simultaneously with ENT.). • Moving from right to left between displayed digits in the numerical area (refer to Modifying Numerical Values, below). • Taking you back to the previous function step (without saving changes) or back to the default screen.
BACK or NEXT	• Moving to the next/previous function within a menu. • Scrolling through available data/numerical values within functions. • NEXT button only: Saving interfering signals (For more details, see page 12).

Modifying Numerical Values

Within some functions, the value displayed in the numerical area can be modified. The digit currently available for modification is displayed flashing (flashing digits are shown in gray in the illustrations, for example, 00 1000). The value is modified by using the ENT. and ESC. buttons to move between the digits, and by using the BACK and NEXT buttons to scroll through the possible number values for the flashing digit. If you press ESC. on the far left digit, you will revert either to the previous step of the function or to the main menu, without saving. If you press ENT. on the far right digit, the new value is saved.

Menu and Version Selection

Series UT has two menus, the main menu and the additional menu. To access each of these, you must select the appropriate digit in the numerical area of the display screen. After selecting the required digit (by pressing the ENT button), the corresponding number icon flashes in the LCD, indicating that Series UT is entering the selected version mode or menu.

Digit	Number Icon	Version Mode/Menu Option
1	1	Option to enter setup mode
3	3	Option to enter the main menu
4	4	Option to enter the additional menu

The complete procedure for accessing each version mode or menu is described in the relevant chapters of this manual.

NOTES:

The number icons also have other functions in Series UT. These include identifying the active relay(s) for the relay function in the unit.

Accessing the Main Menu

This chapter describes access and setup for Series UTS and UTC.
The Series UT main menu screen is accessed from the default screen, using the function buttons located under the LCD.

Press/Action	Display	Explanation
Press ENT. and ESC. simultaneously.	CO-000	Displays the password window.
ESC. or ENT. BACK or NEXT		Use to enter the password code (**716**) in place of the last three digits (**000**). (Function button use is described using the Series UT function buttons.)
ENT.	1	Required option to enter setup mode.
ENT.	1 flashes for approximately 5 seconds, then 3 is displayed.	Required option to access the main menu.
ENT.	3 flashes for approximately 5 seconds, then the main menu screen is displayed.	A representation of the main menu screen is shown on page 6.

NOTES:

You can return to the default screen by pressing the ESC button.

Using the Main Menu

The **BACK** and **NEXT** buttons are used to move through the various main menu options, with the current option indicated by a flashing display. You can access and modify the main menu functions in any order, but you should remember that a change to the data for one function might affect the data for another function. For example, changing the tank height value will also change the default value for **20 mA**. There are permitted minimum and maximum values for many of the functions; refer to Appendix A, Series UT Ranges.

The level of the tank graphic displayed in the main menu screen moves up from 0 to 100% when you save an option or when Series UT is processing. After saving an option, the main menu is displayed with the next option flashing.

Default Screen

As soon as Series UT is fully installed and powered on, the LCD displays the default screen. The default screen provides continuously updated measurement readings and displays the current settings for some functions (either the default settings or the settings selected from the main menu). The relay number is displayed for each activated relay. You can toggle between display indication types, such as: level, distance, volume and others, by using the Series UT function buttons (Series UT) For more details, see page 8.

Figure 13: Series UT Default Screen

The tank graphic in the default screen gives an approximate visual indication of the current level of the tank contents, while the numerical area gives the exact reading. If the level enters the dead zone, the numerical area displays FF FFF ; if the tank is empty, the numerical area displays the tank height. 000000 may be displayed

temporarily while Series UT is taking a reading.

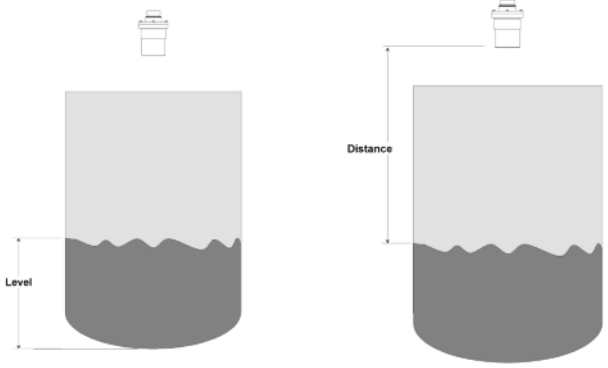
You can refresh the reading by pressing the **ENT** and **BACK** buttons simultaneously.

NOTES:
By default, the displayed value is in meters and gives the distance measurement, meaning from the sensor to the level of the liquid/solid. The measurement indication mode and measurement unit can be changed, as described in Setting the Indication Mode, page 8, and Setting the Measurement Unit, page 8.

Setting Main Menu Options
The following functions are available in the Series UT main menu.

NOTES:
Some functions are only relevant for particular Series UT models.
You can leave the main menu and return to the default screen by pressing the **ESC** button.

Setting the Indication Mode
The first function in the main menu is the indication mode. The following indication options are available, depending on the Series UT model:
- **DIST:** (Default setting) The displayed reading represents the distance from the sensor to the surface of the tank contents.
- **DIA:** The displayed reading represents the diameter of the measured material.
- **LEVEL:** The displayed reading represents the level of the contents, measured from the bottom of the tank.



- **FLOW:** The screen displays temporary flow passing through the configured flume/weir. If required, you can select this option to label the reading when working in flow mode.

Setting an indication mode enables you to toggle between other indications types as well, using **BACK** or **NEXT** buttons, as described in the table below*:
* Toggling between indication types is available in UTC-2XX-XXX-X only.

Indication	Indication Toggle Option
Distance/Level	Distance/Level
Flow	**Flow**/Level/Distance/ Totalization (High)/Totalization (Low)
Totalization	**Totalization**/Distance/Flow
Volume	**Volume**/Level/Distance

To Set the Indication Mode:

Press/Action	Display	Explanation
BACK or NEXT	DIST. DIA. LEVEL FLOW	Use to move between the available options.
Press ENT to save the selected option.	For example, LEVEL	Displays the selected option for a few seconds and then redisplays the main menu.

For example, if the unit is configured for flow, you can toggle between flow/level/distance indications using the **NEXT** button.

Setting the Measurement Unit
Series UT enables you to set the measurement unit used for the displayed readings, according to your requirements and the measurement function. The following measurement options are available:
- **METER** (default unit), **INCH** or **FEET**: Select one of these options for distance measurements.
- **M³/HR** or **G.P.M.**: Select one of these options for flow measurements.

After setting the measurement unit, the selected unit flashes on the display whenever you enter numerical values during the setup procedure. The values for functions such as relay will be displayed in the selected measurement unit.

To Set the Measurement Unit:

Press/Action	Display	Explanation
BACK or NEXT	METER INCH FEET M³/HR G.P.M.	Use to move between the available options.
Press ENT to save the selected option.	For example, FEET	Displays the selected option for a few seconds and then redisplays the main menu.

NOTES:
If you select **METER**, any relevant flow measurements will be in metric units, meaning **M³/HR**. The opposite also applies, so that if you select **M³/HR**, any relevant distance or level measurements will be in meters.
If you select **INCH** or **FEET**, any relevant flow measurements will be in **G.P.M.** If you select **G.P.M.**, any relevant distance or level measurements will be in inches.

In case you select **METER** when using a **FLOW** model configured to show **G.P.M.**, the **METER** sign will flash rapidly for few seconds. If you approve the selection by pressing **ENT**, the flow measurement units will be in **M³**; otherwise, the measurement units will stay in **G.P.M.** and vise versa.

Setting the Series UTC Relay Values

You can set the relays to five different configuration modes: **Level**, **Distance** and **Flow** (where applicable), **Volume** and **Totalization** (the last two modes should be configured only after Volume/Totalization options were enabled in the Chapter 5, Additional Features). Use **NEXT** or **BACK** buttons to toggle between modes and **ENT** to select the mode. After selecting an indication mode, move on to set the first relay parameters.

	Non Flow Application		Flow Application	
Indication Mode	Dist. Level	Vol.	Flow	Total.
Relay Mode	Dist., Level	Vol.	Flow, Dist., Level	Flow, Total.

Relays Setup Options

For example, if the Series UT is set to flow indication mode, the relay can be set to flow/distance or level values. In any other unit or SW version, the relay configuration is done for level or volume values.

Each of the five relays in the Series UT allows you to define open and close values for the switch, enabling its use for functions such as triggering an alarm or controlling pumps.

In addition, relay four (4) can be configured to report error messages and relay five (5) for flow totalization pulse setup (see detailed configuration instructions on page 10).

The relay values function as follows:

- **Open value:** (Default = 0) The relay opens if the level measured in the tank is higher than the entered open value.
- **Close value:** (Default = 0) The relay closes if the level measured in the tank is lower than the entered close value.

NOTES:

The indication mode default state is Level. The chosen mode will be applicable for all five relays. The close value must be lower than the open value for each relay, otherwise an Err. 3 message is displayed. An Err. 1 message is displayed if a relay value is greater than the tank height value.

In case of no measurement (caused by electronic problem or acoustic interference) relays will switch to Close state.

For safety reasons relays parameters will reset when the following parameters will be modified: Tank height, relays indication mode (Level/ Distance/Flow), measurement mode (except when changing from Level to Distance and vise versa) Flume/Weir type, measurement units, strapping table.

To Set the Relay Values for Level or Distance:

Press/Action	Display	Explanation
ENT. to enter relay setup.	RELAY	With the **RELAY** icon flashing.
ENT. to assign an indication mode for the relays.	dISt LEUEL	Choose the desired relay configuration mode: **Level, Distance, Flow, Totalization** or **Volume**. Use the **NEXT** button to toggle between indication modes and **ENT** to select the mode.
ENT. to enter open mode.	OPE.n and 1	Enters the open values mode of the relay setup. The appropriate relay number flashes throughout the process of defining values for that relay.
ESC. or ENT. BACK NEXT or	000.000	Displays 0 or the previously entered relay value.
ENT. to enter values for the relay.	002.000	Use to enter the relay value.
Press ENT. at the end of entering a value for relay 1, to enter close value parameters.	CLO.SE and 1	Enters close values mode of the relay setup. Enter and save the close values in the same way as described above for the open values.
Press on the far right digit to save the value.	OPE.n and 2	Repeat the previous steps to set an open/close values for each relay to be used. (If you do not want to set a value for every relay, use the **Esc** button to exit the relays set-up mode.)

NOTES:

In DISTANCE mode, the **OPEN** value entered for a relay should be greater than the **CLOSE** value entered for the relay, otherwise ar Err. 10 is displayed.
Relay **OPEN** and **CLOSE** values in DISTANCE mode should be different by a resolution of more than 3 cm.

Relay values can be configured in two separate screens when set to flow, volume or totalization (after setting the Series UT was set to of these indications).

Press/Action	Display	Explanation
ENT. to enter relay setup.	RELAY	With the **RELAY** icon flashing.
ENT. to assign an indication mode.	FLOuu	Choose FLOW from the optional modes, and press ENT.
BACK NEXT or	For example, 1 and OPE.n	Select the relay number you wish to configure, using NEXT and BACK buttons and press ENT. Select OPEN and press ENT.
ENT.	H00001	This screen allows you to enter up to four digits of high numbers of flow values.
ENT.	For example, L20.000	Use this screen to enter low numbers of up to five digits of flow values.
ENT.	CLO.SE	Enter relay values for Close mode, as described above for Open mode.

As shown in the above example, relay values were configured in the following way: 000001 was entered in the high numbers H=1, and 20,000 was entered in the low numbers L=20,000, which mean a total value of 120,000 gallons.

NOTES:
The same configuration applies when selecting volume mode for the relays. Relays OPEN and CLOSE values should differ when working in **FLOW** or **TOTALIZATION** mode.

Setting Relay 4 to Report Errors

This mode enables you to use the relay as a trigger to set on an alarm or siren in case the unit produces inaccurate measurement results due to an electrical failure or acoustic problem. You can configure relay 4 to report errors or to remain in normal set-up mode. Once the error mode is enabled and one of the situations described below appears, the relay will be closed and an error message will show on the unit display. These error messages will describe the following situations:

- EE EEE - In case of lost echo or when measurement result is higher than tank height.
- FF FFF - Near dead zone.

The relay will remain in Open mode as long as the unit displays proper measurement values.

To Set Relay 4 for Error Report:

Press/Action	Display	Explanation
BACK or NEXT	OPE.n	Move to relay 4 using NEXT or BACK buttons and ENT. to enter the relay mode.
ENT.	Err En Err dS	Choose Err En to enable error alert or Err dS to disable.

Setting relay 5 for Flow Totalization Pulse Indication

You can choose to set relay number five (5) for flow totalization pulse indication or to remain in normal set-up mode. This option enables you to reserve the accumulated value gathered by the unit by using an external counter. In this way, the total value will be reserved even if the unit will be replaced. Once set for this option, the relay will generate a pulse per Xm³ or Gallons of flow, depending on the value that you have selected from the following list (you can define the X value): 1, 10, 100, 1000, 10000, 100000. An electrical pulse will be generated whenever the relay total flow value will be larger than the value selected from the list. You can also choose a pulse width between 20 to 2000 milliseconds with a resolution of 10 milliseconds to match your equipment requirements. For example, the relay will generate a pulse with a duration of 1000 ms, and each time the value of flow will reach 10,000 M³ (provided that this value was selected from the optional list of values).

NOTES:
Prior to setting relay 5 for pulse indication, you should configure the Series UTC for Totalization (see Chapter 5, Additional Features). To configure relay 4 and 5 to work in a normal setup, select Open or Close mode and enter the required parameters. When configure relay 5 as tOt En, the active options are tOt En and tOt dS. To go back to normal work press tOt dS. The result of the totalization amount is updated every 30 seconds.

To Set Relay 5 for Pulse Indication:

Press/Action	Display	Explanation
ESC. or ENT. BACK or NEXT	OPE.n CLO.SE	Move to relay 5 using NEXT or BACK buttons and ENT to enter the desired operation mode.
ENT. to select enable or disable mode.	tOt En tOt dS	Choose tot En to enable pulse indication option or tot-ds to disable this option.
ENT. to select a pulse value from the list.	010 000 For example, 10,000 m³.	Select a pulse value from the list of optional values using NEXT button and ENT to save your selection. Optional values are between 1 to 100,000.
ENT. to enter a pulse width value (as specified in your equipment).	PL1 000 For example, 10,000 m³.	Enter a pulse width value between 20 milliseconds and 2000 milliseconds (the resolution of 10 milliseconds).

Following the above configuration example, a pulse with duration of 1000 ms will occur each time the total value of flow will reach 10,000 m³.

Setting the Series UTC-1XX-XXX-X Relay Values

You can set up to five relay switches for Series UTS. Each relay enables you to define open and close values for the switch, for functions such as triggering an alarm.

The relay values function as follows:

- **Open value:** (Default = 0) The relay opens if the level measured in the tank is higher than the entered open value.
- **Close value:** (Default = 0) The relay closes if the level measured in the tank is lower than the entered close value.

NOTES:
The close value must be lower than the open value for each relay, otherwise an Err. 3 message is displayed. An Err. 1 message is displayed if a relay value is greater than the tank height value. In case of no measurement (caused by electronic problem or acoustic interference) relays will switch to Close state. For safety reasons, relays parameters will reset when the following parameters will be modified: Tank height, relays indication mode (Level/ Distance/Flow), measurement mode (except when changing from Level to Distance and vise versa) Flume/Weir type, measurement units, strapping table.

To Set the Relay Values for Level or Distance:

Press/Action	Display	Explanation
ENT. to enter relay setup.	RELAY	With the **RELAY** icon flashing.
ENT. to enter open mode.	OPE.n and 1	Enters the open values mode of the relay setup. The relay number flashes throughout the process of defining its values.
ESC. or ENT. BACK NEXT or	000.000	Displays 0 or the previously entered relay value.
Press ENT. on the far-right digit to save the value.	OPE.n and 2	Repeat the previous steps to set an open/ close values for each relay to be used.

Setting the 20 mA/4 mA Levels

Series UT enables you to set height, volume or flow values to be used as 20 mA and 4 mA marks. These values can be used for remote monitoring of tank level, volume or flow using an analog meter. The analog output indicates the current depth in the tank, or the current flow level, as a point on the meter range between 4 mA and 20 mA. The default value for 20 mA is the tank height (or the maximal volume value), and for 4 mA the default value is 0 (or the minimum volume value).

NOTES:

The values for 20 mA and 4 mA must be different, otherwise an Err. 4 message is displayed. Both must also be less than the tank height value, otherwise an Err. 7 message is displayed.

In both distance and level measurement modes, the dead zone area affects the maximum values that can be used for 20 mA/4 mA levels. For UTS-X1X-XXX-X models, the maximum 20 mA/4 mA value is tank height minus 0.6 m/1.9 ft. For UTS-X2X-XXX-X and UTS-X3X-XXX-X models, the maximum 20 mA/4 mA value is tank height minus 0.4 m/1.3 ft.

To Set the 20 mA/4 mA Levels:

Press/Action	Display	Explanation
ENT. to enter 20 mA or 4 mA setup.	20mA 4mA 000.000	With the required option flashing in the main menu. Displays the default value or the previously entered 20 mA or 4 mA value.
ESC. or ENT. BACK NEXT or		Use to enter the new value. (Function button use is described on page 6.)

The values of 4 to 20 mA are application dependable. For example, when measuring distance, the value will be in distance (same for level).

NOTES:

VOLUME values in 4 to 20 mA are represented by six digits (the same applies for FLOW values). TOTALIZATION values are represented by large numbers and therefore require two separate screens for high (H) and low (L) numbers (as explained on page 10).

Setting the Flow Measurements

The PARSH.FLUM function enables you to set flume/weir types and measurements for Series UT open channel models. Refer to Chapter 4, Series UT Open Channels, for further information.

Setting the Tank Height

You can enter the height of your tank using the TANK h function. The default value is the maximum value in the relevant measurement range for your Series UT (refer to the range table in Appendix A, Series UT Ranges). If you enter a value that exceeds this maximum value, an Err. 8 error message is displayed.

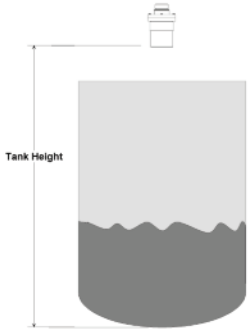


Figure 14: Tank Height

Setting the tank height will not influence the measuring range or the accuracy of the device, which is calculated from the measuring range. Refer to the specifications tables in Chapter 1, Introducing Series UT.

NOTES:

Whenever the tank height is required, you should enter the distance from the surface of the sensor to the bottom of the tank. In order to obtain accurate measurement results, it is most recommended to perform this operation when the tank is empty. For flow measurement, enter the precise flume height.

If the entered tank height value is less than a value previously entered for the **4 mA, 20 mA** or **Relay** functions, the value for that function will automatically revert to the default value.

To Set the Tank Height Value:

Press/Action	Display	Explanation
BACK NEXT or	DIST. DIA. LEVEL FLOW	Select the desired measurement method from the indication modes: DIST, LEVEL, DIA. Using NEXT or BACK buttons.
ENT. to save the selected option.	DIST. for example.	Displays the selected option for a few seconds and a flashing tank graphic.
NEXT and ENT.	METER INCH FEET	Move on with the NEXT button to select measurement units: METER, INCH, FEET. Press ENT to save your selection.
BACK NEXT or	TANK h	Move with NEXT or BACK button to **tank h**.
ENT.	For example 0 12000 meters.	Displays the last saved tank height or the default value.
ESC. or ENT.		Use to enter the new value.

Setting the Application Type

The Series UT main menu displays (by default) **LIQUID** for models intended for liquid. Series UT model intended for diameter displays **SOLID, LIQUID, STORAGE I, II** and **PROCESS** (refer to Chapter 6, Diameter Mode Setup).

When Series UT unit is configured as either **LIQUID** or **FLOW** (open channel) model, selecting **FLOW** option from the indication mode automatically selects the **FLOW** option in the application types menu. This should be done before entering values for other functions, so that all values are automatically adjusted for flow.

To Set the Application Type:

Press/Action	Display	Explanation
	LIQUID / FLOW	With the required option flashing, depending on the type of model in use.
ENT.	For example. LIQUID	Displays the selected option for a few seconds, and then re-displays the main menu.

Setting the Operation Modes

The operation modes function enables you to set Series UT to compensate for environmental conditions that affect the measurement readings.

(For diameter applications, available only for Series UTC model, refer to Chapter 6, Diameter Mode Setup).

The modes settings are defined by making a selection from the **STORAGE I, STORAGE II** and **PROCESS** options in the main menu; in some cases in combination with the selection of the **LIQUID** application. The mode functions and setup are described in the following sections.

NOTES:

The operation modes are not relevant for flow applications. If one of the **STORAGE I, STORAGE II** or **PROCESS** options is selected when Series UT is in **FLOW** application mode, an Ar.S. warning message is displayed and Series UT reverts to distance mode. You must then reset the unit to flow mode.

Liquid Modes

Three modes are available for Series UT liquid application models. Each mode is recommended for use as follows:

- STORAGE I : Recommended in the following conditions:
  - Wavy surfaces
  - Slow filling/emptying rate
  - Applications where the sensor is installed near the tank wall
- STORAGE II : (Twice as fast as **STORAGE I**.) Recommended in the following conditions:
  - Reasonable surface conditions
  - Applications requiring fast readings

NOTES:

STORAGE I and STORAGE II liquid modes are not suitable for measuring surfaces with foam, since these modes cannot perform signal processing.

- PROCESS : This mode is suitable for applications where a fast reading is more important than precision. A reading will be displayed within a short time, even if the signal processing procedure was not completed. Recommended in the following conditions:
  - Foamy top surface
  - Presence of agitation
  - Presence of vapor
  - Applications requiring very fast readings

Setting the Sensor Offset

Series UT takes measurements from the tip of the sensor. However, when the sensor is located at a point that is above or below the true height of the tank, you can use the **MAN** function to enter the difference. This may be required, for example, if the sensor is installed at the top of an external pipe, or at the base of an internal pipe in the tank.

When the sensor is located above the tank height, the difference must be subtracted from the actual measurements, so the offset distance is entered as a negative value and vise versa. The maximum permitted offset value is 2.0 m, and the minimum permitted value is -2.0 m. Values can be entered in meter units only.

To Set the Sensor Offset Value:

Press/Action	Display	Explanation
	MAN.	With the required option flashing.
ENT.	000.000	Default value.
BACK or NEXT	-00.000 or 000.000	Use to toggle the first digit between a negative (-) or positive (0) value.
ESC. or ENT. / BACK or NEXT		Continue to enter new values for the remaining five digits.

Setting the Scan Distance Values

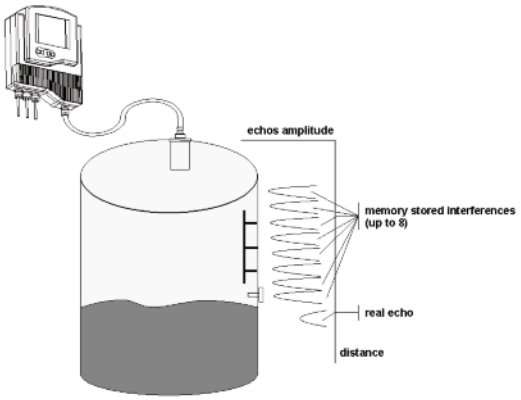


Figure 15: Scan Distance Process

Up to eight interfering signals (false echoes) can be located by Series UT and stored in its memory. The false echoes, which may be caused by obstructions such as a tank agitator or a side wall, can generate false readings and so interfere with the true scanning of the tank contents. Defining interfering signals is done while the tank is empty.

Each scan distance reading is stored as an interfering signal until a reading is achieved that indicates the true echo. If eight interfering signals are already stored and a ninth reading is received, the first value stored is deleted and the new one saved.

The scan distance function is accessed from the default screen. **AUTO. CAL** is displayed at the base of the display screen during the scan distance operation, indicating that you are working in scan distance mode.

NOTES:
The reading of the actual target height may not be exact; for example, a target height of 6 m may give a reading of 5.998.

To Set Scan Distances:

Press/Action	Display	Explanation
From the default screen, press ENT. and NEXT simultaneously.	SEARCh and AUTO. CAL	Displayed temporarily while Series UT searches for an interfering signal.

NOTES:
Do not press any key while the SEARCH message is displayed.

Press/Action	Display	Explanation
(Wait a few seconds.)	For example, 3.227	Displays the depth of the interfering signal.
NEXT	SEARCh	Saves the interfering signal, then searches again and displays the next reading. Continue this process to save up to eight interference readings.
NEXT	For example, 12000	Actual target height reading indicates that there are no more interfering signals.
ENT.		Saves the true echo value and completes the scan distance operation.

NOTES:
Pressing the NEXT button saves identified interferences. Pressing the ENT button exits the function while saving the true echo value.

Clearing the Scan Distance Values

The **AUTO** function enables you to clear all saved scan distance values. (Refer to Setting the Scan Distance Values, page 12, for a description of how to set the scan distance values.)

To Clear Scan Distance Values:

Press/Action	Display	Explanation
BACK or NEXT	AUTO.	Select AUTO function using Next or Back buttons.
ENT.	AUTO.	With the required option flashing.

NOTES:
If the AUTO. indication at the base of the default display screen is lit, it might be a sign of acoustic interferences in the application. It is likely that Series UT will overcome these interferences (i.e. display a correct value), by using a different transmission sequence.

Viewing Processor Information

You can view the version number and absolute address for each of the three processors contained in Series UT, as follows:

- **Screen processor**, indicated by **S** before the code
- **Main processor**, indicated by **h** before the code
- **Co processor**, indicated by **C** before the code

To View Processor Information:

Press/Action	Display	Explanation
In the main menu display, press BACK and NEXT simultaneously.	000.000	
ESC. or ENT. BACK or NEXT	000.003	Use to enter the value **000.003**.
Press ENT. on the far right digit.	For example, S 5.020	The version number of the screen processor is displayed.
BACK or NEXT	For example, S b2E0	Use to scroll through the version number and absolute address for each processor.
ESC.		Press at any time to return to the main menu.

Chapter 4: Series UT Open Channels

This chapter describes how to set flow measurement parameters for open channels using Series UT models, and explains the flume/weir codes methodology used when setting up flow measurements.

NOTES:
Refer to Chapter 3, Basic Setup, for an explanation of accessing and using the Series UT main menu and function buttons.

Selecting the Flow Measurement Settings

The **PARSH.FLUM** function in the main menu enables you to select one of the preset flumes/weirs settings for flow measurements.

When setting flow measurement parameters, the flume/weir type value (**X**) is entered first, followed by the letter (**U**) or (**E**) as an indication for American or European open channel flow standard, and followed by the code value (**YY**) that represents the appropriate flume/weir dimensions, in the following format: XE.YY. The default is European standard. The open channel types and codes are described in Open Channels Flow Measurements, page 14.

If you wish to insert custom flume measurements, you must enter **.001** for this function. This entry will automatically initiate an additional menu function (**Pr 1**), enabling manual insertion of custom flume values in an accordance table, as described in Chapter 5, Additional Features.

To Select the Flow Measurement Settings:

Press/Action	Display	Explanation
	PARSH.FLUM	With the required option flashing in the main menu.
ENT.	.001	Displays the last saved flow measurement setting or default value.
BACK or NEXT		Use to select a new type value (X).
ENT.	.001	The last two digits of the display flash.
BACK or NEXT		Use to select a new flume/weir length code (YY), that corresponds to the type (X) previously selected. (The two digits are modified as one unit.)
ESC.		The selected values are saved.

Open Channels Flow Measurements

The flume/weir type code methodology used when setting up open channels is based on three digits: **X E/U YY**

Where:

X refers to the particular flume/weir type
E/U refers to European or American standard
YY refers to the specific flume/weir dimensions

Flume/Weir Types

This is the first value (X) entered for the **PARSH.FLUME** function. The following flume/weir types are available both in European and American standard:

Type (X)	European Standard Pages 14-16	American Standard Pages 16-18
1	Rectangular Suppressed Sharp-Crested Weir, Page 14	Rectangular Suppressed Sharp-Crested Weir, Page 16
2	Rectangular Contracted Sharp-Crested Weir, Page 14	Rectangular Contracted Sharp-Crested Weir, Page 16
3	Trapezoidal (Cipolletti) Sharp-Crested Weir, Page 14	Trapezoidal (Cipolletti) Sharp-Crested Weir, Page 16
4	V-notch (Triangular) Sharp-Crested Weir, Page 15	V-notch (Triangular) Sharp-Crested Weir, Page 17
5	Khafagi-Venturi Flume, Page 15	Parshall Flume, Page 17
6	Parshall Flume, Page 15	Palmer Bowlus Flume Trapezoidal Throat Cross-Selection, Page 17
7	Palmer Bowlus Flume Trapezoidal Throat Cross-Selection, Page 15	H Flume, Page 17
8	H Flume, Page 16	Leopold-Lagco Flume, Page 18
9	Neyrpic Venturi Flume/Long-Base Weir, Page 16	

Flumes/Weirs - European Standard

Rectangular Suppressed Sharp-Crested Weir (Type 1)

Code (YY)	Crest Length (cm)
01	20
02	40
03	60
04	80
05	100
06	150
07	200
08	300

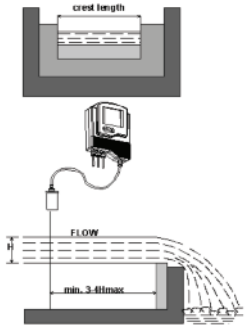


Figure 11: Rectangular Suppressed Sharp-Crested Weir

Rectangular Contracted Sharp-Crested Weir (Type 2)

Code (YY)	Crest Length (cm)
01	20
02	30
03	40
04	50
05	60
06	80
07	100
08	150
09	200
10	300

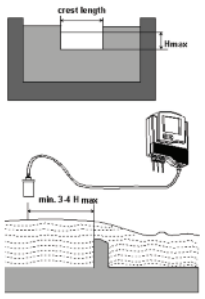


Figure 12: Rectangular Contracted Sharp-Crested Weir

Trapezoidal (Cipolletti) Sharp-Crested Weir (Type 3)

Code (YY)	Crest Length (cm)
01	30
02	45
03	60
04	80
05	100
06	150
07	200
08	300

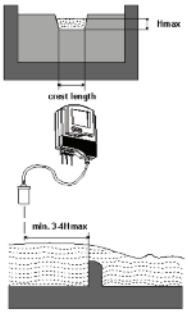


Figure 13: Trapezoidal (Cipolletti) Sharp-Crested Weir

Trapezoidal (Cipolletti) Sharp-Crested Weir (Type 3)

Code (YY)	V-Notch Angle (°)
01	90
02	60
03	53.8
04	45
05	30
06	28.4
07	22.5
British Standard	
08	90
09	45
10	22.5

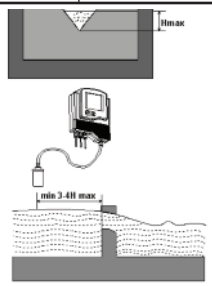


Figure 14: V-Notch (Triangular) Sharp-Crested Weir

Khafagi-Venturi Flume (Type 5)

Code (YY)	Flume Type	b0 (cm)
01	QV 302	12
02	QV 303	30
03	QV 304	40
04	QV 305	50
05	QV 306	60
06	QV 308	80
07	QV 310	100
08	QV 313	130
09	QV 316	160

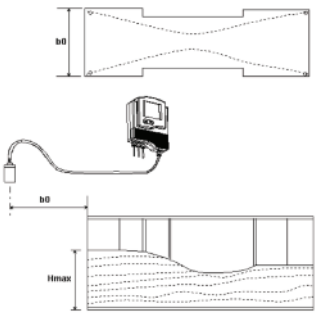


Figure 15: Khafagi-Venturi Flume

Parshall Flume (Type 6)

Code (YY)	Throat Width (in)
01	1
02	2
03	3
04	6
05	9
06	12
07	18
08	24
09	36
10	48
11	60
12	72
13	96
14	120
15	144

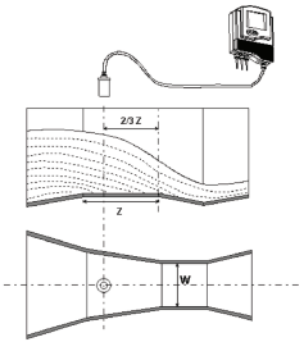


Figure 16: Parshall Flume

Palmer Bowlus Flume Trapezoidal Throat Cross-Selection (Type 7)

Code (YY)	Conduit Diameter (in) D
01	6
02	8
03	10
04	12
05	15
06	18
07	21
08	24
09	27
10	30

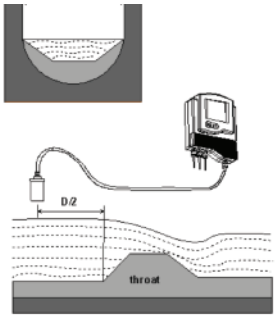


Figure 17: Palmer Bowlus Flume Trapezoidal Throat Cross-Selection

H Flume (Type 8)

Code (YY)	Flume Size (ft)	Measurement Point (cm)
01	0.5	5
02	0.75	7
03	1	9
04	1.5	14
05	2	18
06	2.5	23
07	3	28
08	4.5	41

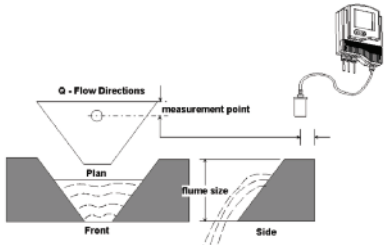


Figure 18: H Flume

Neyrpic Venturi Flume/Long-Base Weir (Type 9)

Code (YY)	Venturi Flume Type
01	1253AX
02	1253AY
03	1253AZ
04	1253A
05	1253B
06	1253C
07	1253D
08	1253E
09	1253F

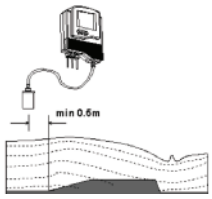


Figure 19: Neyrpic Venturi Flume

Long-Base Weir

Code (YY)	Long Base Weir Type
10	1245A
11	1245B
12	1245C
13	1245D

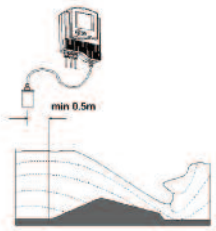


Figure 20: Long-Base Weir

Flumes/Weirs - American Standard
Rectangular Suppressed Sharp-Crested Weir (Type 1)

Code (YY)	Crest Length (in
01	12.00
02	18.00
03	24.00
04	30.00
05	36.00
06	48.00
07	60.00
08	72.00
09	96.00

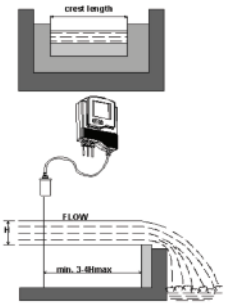


Figure 21: Rectangular Suppressed Sharp-Crested Weir

Rectangular Contracted Sharp-Crested Weir (Type 2)

Code (YY)	Crest Length (in)
01	12.00
02	18.00
03	24.00
04	30.00
05	36.00
06	48.00
07	60.00
08	72.00
09	96.00

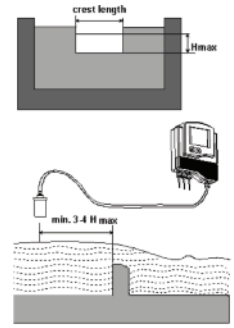


Figure 22: Rectangular Contracted Sharp-Crested Weir

Trapezoidal (Cipolletti) Sharp-Crested Weir (Type 3)

Code (YY)	Crest Length (in)
01	12.00
02	18.00
03	24.00
04	30.00
05	36.00
06	48.00
07	60.00
08	72.00
09	96.00

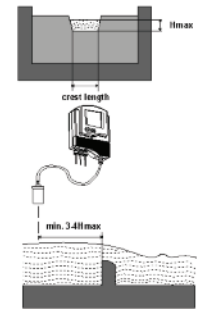


Figure 23: Trapezoidal (Cipolletti) Sharp-Crested Weir

V-Notch (Triangular) Sharp-Crested Weir (Type 4)

Code (YY)	V-Notch Angle (°)
01	90
02	60
03	45
04	30
05	22.5

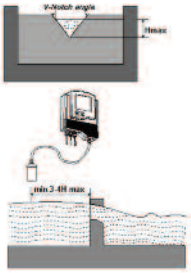


Figure 24: V-Notch (Triangular) Sharp-Crested Weir

Parshall Flume (Type 5)

Code (YY)	Throat Width (in)
01	1
02	2
03	3
04	6
05	9
06	12
07	18
08	24
09	30
10	36
11	48
12	60
13	72
14	96
15	120
16	144

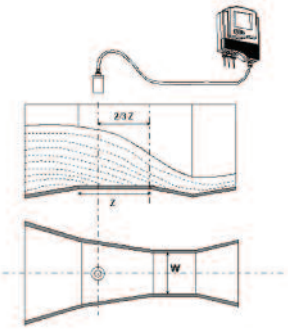


Figure 25: Parshall Flume

Palmer Bowlus Flume Trapezoidal Throat Cross-Selection (Type 6)

Code (YY)	Conduit Diameter (in) D
01	4
02	6
03	8
04	10
05	12
06	15
07	18
08	21
09	24
10	27
11	30
12	36
13	42
14	48
15	60
16	72

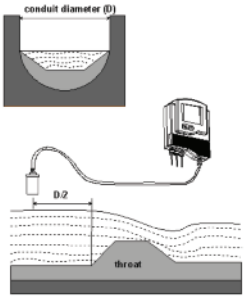


Figure 26: Palmer Bowlus Flume Trapezoidal Throat Cross-Selection

H Flume (Type 7)

Code (YY)	Flume Size (in)	Measurement Point (in)
01	6	1.96
02	9	2.75
03	12	3.54
04	18	5.51
05	24	7.08
06	30	9.05
07	36	11.02
08	54	16.14

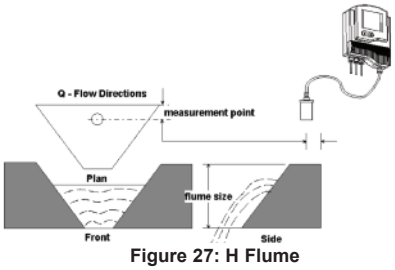


Figure 27: H Flume

Leopold-Lagco Flume (Type 8)

Code (YY)	Crest Length (in)
01	4
02	6
03	8
04	10
05	12
06	15
07	18
08	21
09	24
10	30
11	36
12	42
13	48
14	54
15	60
16	66
17	72

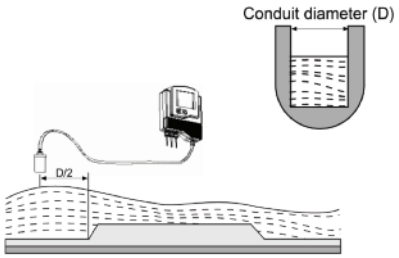


Figure 28: Leopold-Lagco Flume

Chapter 5: Additional Features

This chapter describes the functions available in Series UT's additional menu. The additional menu functions enable you to calibrate UT to perform the following tasks:

- Present scanning results in volume format
- Present scanning results as a total accumulative value for flow
- Present scanning results as an accumulative sum for diameter
- Calculate volume for different tank types
- Calculate flow measurements for custom flumes
- Calculate results in alternative measurement units
- Adjust results when there is interference from a conical tank ending
- Allow compensation of different types of gas.

NOTES:
The additional menu functions are available via the Series UT display.

To Access the Additional Menus:

Press/Action	Display	Explanation
ENT. (after entering the password code)	1	Required option to enter setup mode.
ENT.	1 flashes for approximately 5 seconds, then 3 is displayed.	
Use BACK or NEXT to change the display to 4, then press ENT. .	4 flashes for approximately 5 seconds, then Pr 0 is displayed.	Use BACK or NEXT to scroll through the additional menu options.

NOTES:
For Series UTS models: Press once on the ESC. button to return to the main menu, and twice to return to the default screen. For Series UTC models: Press once on the ESC. button to return to the default screen.

Chapter 6: Troubleshooting Series UT

This chapter describes the error messages displayed when an illegal value is entered for a Series UT function, or when an option is selected that is not applicable for the specific Series UT model you are using. If an illegal value is entered, the appropriate error message is displayed flashing while the level of the tank graphic on the bottom right of the screen moves up from 0 to 100%. The numerical area then displays 000.000 , enabling you to enter a new value for the function. If an illegal option is selected, an error message is displayed while the tank graphic fills, and the display then reverts to the menu selection.

The possible error messages are as follows:

Error	Description
Err. 1	The value entered is greater than the maximum permitted value.
Err. 2	The value entered is less than the minimum permitted value.
Err. 3	The **Close** value entered for a relay is greater than the **Open** value entered for the relay.
Err. 4	The value entered for **4 mA** is equal to the value entered for **20 mA**.
Err. 5	The selected function/option is not applicable for the Series UT model in use.
Err. 7	The value entered for the **20 mA**, **4 mA** or **Relay** function is greater than the tank height.
Err. 8	The value entered for the tank height is greater than the maximum value supported by the Series UT model in use.
Err. 9	The measurement unit selected is not applicable for the Series UT model in use.
Err. 10	The **Open** value entered for the relay is greater than the **Close** value entered for the relay (in **Distance** mode).
Err. 11	A strapping table was not entered under volume mode or a flume/weir type was not entered under flow mode.
AUTO.	The value entered for the tank height is smaller than the actual height, as measured by Series UT. If displayed at the base of the display screen, this indicates a problem with the current procedure, for example, acoustic interference.

22 mA/3.7 mA Signal Error Messages

The following list of messages will appear on the display and coincides with a 22 mA or 3.7 mA (depends on your set-up) analog current error output signal (the default is set to 22 mA):

Error	Description
EE EEE	Tank is empty or echo is lost
FF FFF	The sensor is located near the dead zone

Appendix A: Series UT Ranges

This appendix provides the maximum and minimum permitted values for the main menu functions in the Series UTS and Series UTC units.

Function	Permitted Values for Series UTC	Permitted Values for Series UTS	
		Solid, Liquid and Flow Applications	Paper Roll and Surface Measurement Applications
Tank height (maximum) **Liquids, flow**	**Standard Range:** 20 m/65 ft 25 m /82 ft **Long Range:** 30m/98ft 40 m/131 ft	**Liquid and Flow:** 12 m/39 ft	3 m/9.8 ft
Tank height (minimum)	0.6 m/1.9 ft	0.4 m/1.3 ft	0.5 m/1.3 ft
Relay	From 0 up to maximum tank height	From 0 up to maximum tank height	From 0 up to maximum tank height
4 mA level	From 0 up to maximum tank height	From 0 up to maximum tank height	From 0 up to maximum tank height
20 mA level	From 0 up to maximum tank height	From 0 up to maximum tank height	From 0 up to maximum tank height
4 mA level for flow measurement	From 0 up to 55,500 m^3/h (244,200 G.P.M.)	From 0 up to 55,500 m^3/h (244,200 G.P.M.)	Not applicable for this application
20 mA level for flow measurement	From 0 up to 55,500 m^3/h (244,200 G.P.M.)	From 0 up to 55,500 m^3/h (244,200 G.P.M.)	Not applicable for this application
Manual	From -2 m up to 2 m	From -2 m up to 2 m	From -2 m up to 2 m

MAINTENANCE/REPAIR

Upon final installation of the Series UT, no routine maintenance is required. The Series UT is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty).

WARRANTY/RETURN

Refer to “Terms and Conditions of Sale” in our catalog or on our website. Contact customer service to receive a Return Goods Authorization number before shipping your product back for repair. Be sure to include a brief description of the problem plus any relevant application notes.

Appendix B: Gas Factor Table

This following table contains 33 different types of gas and their factor for compensating sound velocity. Entering the desired factor (refer to Chapter 5, Additional Features for more details) will immediately change the measurement results to fit your application requirements.

Factor	Symbol	Gas
0.62	$C_2h_4o_2$	Acetic Acid
0.63	C_3h_6o	Acetone
0.74	C_2h_4o	Acetaldehyde
0.54	$C_2h_3c_1o$	Acetyl Chloride
0.99	C_2h_2	Acetylene
1.26	H_3n	Ammonia
0.92	Ar	Argon
0.53	C_6H_6	Benzene
0.41	Br_2	Bromine
0.37	$Cbrclf_2$	Bromochlorodifluoromrthane
0.56	$CH_3COCH_2CH_3$	Butanone
0.77	CO_2	Carbon Dioxide
1.01	CO	Carbon Monoxide
0.38	CCl_4	Carbon Tetrachloride
0.68	Cl_2	Chlorine
0.71	C_2h_6o	Dimethyl Ether
0.90	C_2h_6	Ethane
0.71	C_2h_6o	Ethanol
0.95	C_2h_4	Ethylene
2.93	He	Helium
3.79	H_2	Hydrogen
0.89	H_2S	Hydrogen Sulfide
0.62	C_3h_8o	Isopropyl Alcohol
1.29	CH_4	Methane
0.71	Ch_6n_2	Methyl Hydrazine
1.30	Ne	Neon
1.01	N_2	Nitrogen
0.63	CH_3NO_2	Nitromethane
1.02	O_2	Oxygen
0.72	C_3H_8	Propane
0.61	C_3H_8O	Propanol
0.57	C_4H_8O	Tetrahydrofuran

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