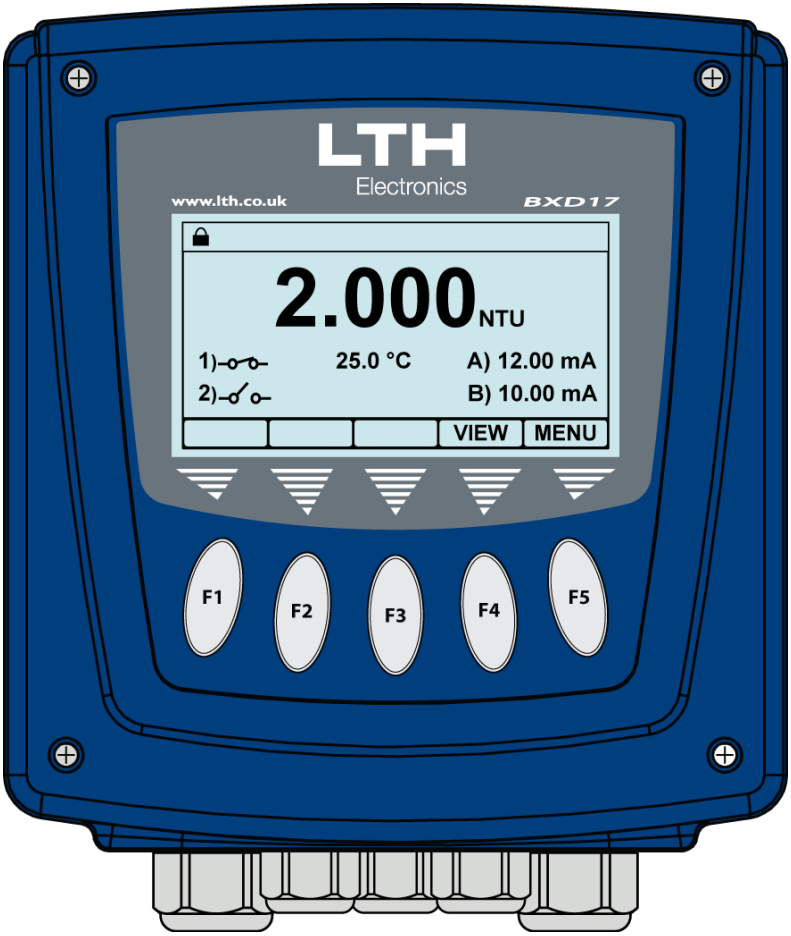
BTD17

Turbidity & Suspended Solids Monitor



Operation Guide

Preface

Product warranty

The BTD17 Turbidity & Suspended Solids Monitor has a warranty against defects in materials and workmanship for three years from the date of shipment. During this period LTH will, at its own discretion, either repair or replace products that prove to be defective. The associated software is provided 'as is' without warranty.

Limitation of warranty

The foregoing warranty does not cover damage caused by accidental misuse, abuse, neglect, misapplication or modification.

No warranty of fitness for a particular purpose is offered. The user assumes the entire risk of using the product. Any liability of LTH is limited exclusively to the replacement of defective materials or workmanship.

Disclaimer

LTH Electronics Ltd reserves the right to make changes to this manual or the instrument without notice, as part of our policy of continued developments and improvements.

All care has been taken to ensure accuracy of information contained in this manual. However, we cannot accept responsibility for any errors or damages resulting from errors or inaccuracies of information herein.

Copyright and trademarks

BTD17 is a trademark of LTH Electronics Ltd

Second edition: August 2024

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Manufacturing Standards

Electromagnetic compatibility

This instrument has been designed to comply with the standards and regulations set down by both the United Kingdom EMC Regulations S.I. 2016/1091 and the European EMC Directive 2014/30/EU using BS EN 61326-1: 2013.

Safety

This instrument has been designed to comply with the standards and regulations set down by both the United Kingdom Equipment Safety Regulations S.I. 2016/1101 and the European Low Voltage Directive 2014/35/EU using BS EN 61010-1: 2010.

Restriction of Hazardous Substances

This instrument has been produced to comply with the standards and regulations set down by both the United Kingdom Equipment Restriction of Hazardous Substances Regulations S.I. 2012/3032 and the European Restriction of Hazardous Substances Directive 2011/65/EU using BS EN IEC 63000 : 2018.

Quality

This instrument has been manufactured under the following quality standard:

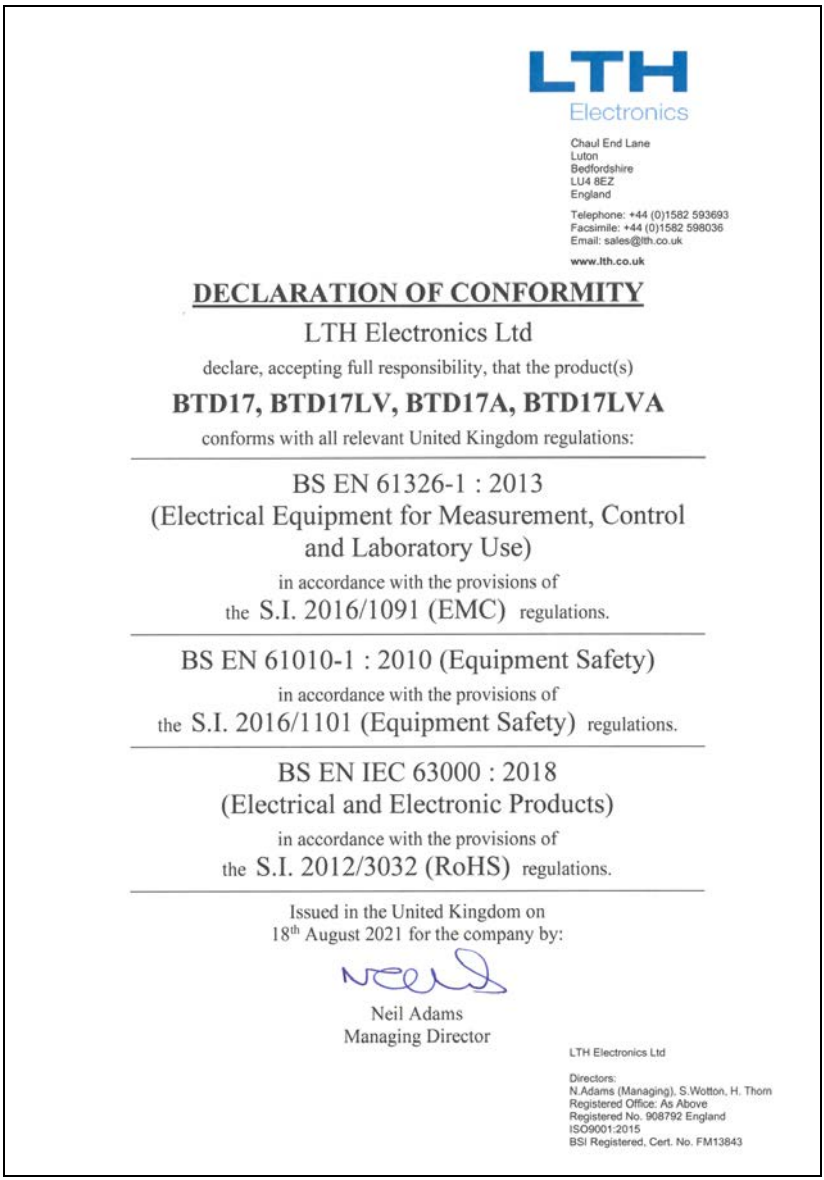
ISO 9001:2015. Certificate No: FM 13843

Note: The standards referred to in the design and construction of LTH products are those prevailing at the time of product launch. As the standards are altered from time to time, we reserve the right to include design modifications that are deemed necessary to comply with the new or revised regulations.

Disposal

As per regulation S.I. 2012/3032 and directive 2012/19/EU, please observe the applicable local or national regulations concerning the disposal of waste electrical and electronic equipment.

Declaration of Conformity



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DECLARATION OF CONFORMITY

LTH Electronics Ltd

declare, accepting full responsibility, that the product(s)

BTD17, BTD17LV, BTD17A, BTD17LVA

conforms with all relevant United Kingdom regulations:

BS EN 61326-1 : 2013
(Electrical Equipment for Measurement, Control and Laboratory Use)

in accordance with the provisions of
the S.I. 2016/1091 (EMC) regulations.

BS EN 61010-1 : 2010 (Equipment Safety)

in accordance with the provisions of
the S.I. 2016/1101 (Equipment Safety) regulations.

BS EN IEC 63000 : 2018
(Electrical and Electronic Products)

in accordance with the provisions of
the S.I. 2012/3032 (RoHS) regulations.

Issued in the United Kingdom on
18th August 2021 for the company by:

Neil Adams
Managing Director

LTH Electronics Ltd

Directors:
N.Adams (Managing), S.Wotton, H. Thorn
Registered Office: As Above
Registered No. 908792 England
ISO9001:2015
BSI Registered, Cert. No. FM13843

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Contents

Introduction

The BTD17 is a microprocessor controlled digital Turbidity & Suspended Solids measurement instrument that can be used with digital sensors TU8325/TU8525 (turbidity) and TU8355/TU8555 (suspended solids) to measure and control a broad spectrum of solution turbidity. To achieve this, the instrument utilises a multifunction LCD to display the primary reading and temperature, show operational status and to provide an intuitive user interface.

As standard the instrument is a simple to install IP66 rated Wall-mount instrument, however with the addition of a suitable mounting kit it can either be installed as a Panel-mount or Pipe-mount instrument.

The instrument has two on-board volt-free normally-open relays with adjustable setpoint value and hysteresis. Either one can be set to activate if the process variable or temperature is above or below the setpoint allowing the instrument to be used in a variety of dosing or bleeding applications. Other setpoint functions include activation on alarm, time and pulse proportion, delayed activation, dose alarm timer, and scheduled cleaning, whilst the status of the relays can be seen via the main screen of the instrument.

Additionally, the instrument features up to two industry standard, isolated, 0/4-20mA current outputs that features adjustable scaling, selectable on-error states and loop fault detection. Either allows the instrument to transmit the primary reading or observed process temperature for remote monitoring purposes.

Also fitted is a single contact input which allows the instrument to be remotely set to either an offline state that forces the relays to deactivate and the current output to a pre-defined state, or to change the whole configuration of the instrument by switching the setup to a preconfigured state.

Depending upon version purchased the instrument is powered by either 85-265V AC or 12-30V DC.

Turbidity & Suspended Solids Input Specification

Measurement Input	TU8325 and TU8525, Digital Turbidity Sensors. TU8355 and TU8555, Digital Suspended Solids Sensors.
Connection Cable	Up to 30 meters.
Ranges of Measurement	TU8325 and TU8525 0-4.000 NTU 0-40.00 NTU 0-400.0 NTU TU8355 and TU8555 0-99.9 FTU 0-999 FTU 0-9999 FTU
Accuracy	<1% of the full scale selected
Operator Adjustment	Zero — TU8325 and TU8525: ±0.400 NTU on all scales TU8355 and TU8555: ±10 FTU on all scales Span — 70 – 130 %
Calibration Methods	Automatic Zero and Span calibration using user entered solution values
Measurement Faults	The sensor can indicate problems that affect the measurement, such as dirt on the optical windows, lack of contact with liquid and external light too high.
Sensor Input Filter	The sensor has a filter with two selectable response time. The user can separately set the response time relative to signals of small or large variation to obtain good reading stability and fast response to the variations of the measurement in the process.
Conversion (TU8355 and TU8555 only)	Conversion between the raw suspended solids reading and scaled value. Uses either the sensors built in Total Suspended Solids (TSS) system, which uses a TSS/FTU factor to produce an equivalent reading, or the instrument's user set 11 point solution curve.
Temperature Sensor	RTD Pt100 (built-in to sensor)
Range of Temperature Measurement	0-50.0 °C

Temperature Compensation Coefficient	Internal table applied to the measurement by the sensor.	
Off-Line Facility	The relays are de-energised and the current output is held at a user defined level.	
Ambient Operating Conditions	Sensor	Temperature -5 to 50°C max, Pressure 0 to 6 bar @ 25°C 0 to 3 bar @ 50°C
	Instrument	Temperature: -20 to +55°C, Rel. Humidity: 5 to 95%, non-condensing.
Display	3¾" 240x128 dot LCD Module	
Display Backlight	Can be set to flash to indicate the instruments alarm status.	
Buttons	5 tactile feedback micro-switched, silicone rubber	
Digital Input	Single contact input for remote activation of user defined operations. Can be configured to operate in either normally open or normally closed modes.	
Current Outputs Specification	Single current output as standard with option of two on advance models, selectable 0-20mA or 4-20mA into 750 ohms max, fully isolated to 2kV. Expandable up to 5% of any operating range and offset anywhere in that range.	
Current Outputs Adjustment	±0.01mA, 3 point 0/4-20 mA for remote monitor calibration.	
Setpoints and Control Relays Specification	2 normally open fully configurable setpoints with volt free contacts for each relay. Rated at 5A @ 30V DC / 5A @ 250V AC.	
Setpoint Modes	High, Low, Band, Latch High, Latch Low, Cleaning, Alarm.	
	On/Off, Time Proportioning, Pulse Proportioning.	
	Delay timer adjustable from 00:00 to 59:59 mm:ss.	
	Hysteresis 0 to 9.99%.	
	Dose alarm timer, with supplementary initial charge function. Both adjustable from 00:00 to 59:59 mm:ss.	
	Adjustable cycle time and proportional band in proportional modes.	
	Cleaning to operate a jet spray wash or rotary electrode cleaning system on a timed cycle. Adjustable Duration, Interval and Recovery.	
	Flash backlight on setpoint trigger.	
MicroSD Card Interface	Enables on site upgrading of instrument software. SD, SDHC and SDXC-FAT32 cards supported.	
EMC	S.I. 2016/1091 & 2014/30/EU using BS EN 61326-1: 2013.	
Safety / Low Voltage Directive	S.I. 2016/1101 & 2014/35/EU using BS EN 61010-1: 2010.	
Instrument Power Supply	Universal 90-265V AC, 9W max.	
	LV Option 12 – 30 V DC, 5W max.	

Housing	Sensor	PVC-C
	Instrument	UL 94-V0 PC/ABS.
Ingress Protection Rating (IEC 60529)	Sensor	IP68
	Instrument	IP66
Weight	Sensor	(TU8525 & TU8555) Body 160 g, cable 640 g (TU8325 & TU8355) Body 420 g, cable 640 g
	Instrument	Maximum 800 grams
Dimensions	Sensor	(TU8525 & TU8555) 143 x 40 mm (L, Dia.) (TU8325 & TU8355) 165 x 60 mm (L, Dia.)
	Instrument	175 x 150 x 119 mm (H, W, D)

Installation – Safety & EMC

This chapter describes how to install the instrument and how to connect the unit to a power source and auxiliary equipment.

Although today's electronic components are very reliable, it should be anticipated in any system design that a component could fail and it is therefore desirable to make sure a system will **fail safe**. This could include the provision of an additional monitoring device, depending upon the particular application and any consequences of an instrument or sensor failure.

Wiring Installation

The specified performance of the instrument is entirely dependent on correct installation. For this reason, the installer should thoroughly read the following instructions before attempting to make any electrical connections to the unit.

CAUTION ! : ALWAYS REMOVE THE MAIN POWER FROM THE SYSTEM BEFORE ATTEMPTING ANY ALTERATIONS TO THE WIRING. ENSURE THAT BOTH POWER INPUT LINES ARE ISOLATED. MAKE SURE THAT THE POWER CANNOT BE SWITCHED ON BY ACCIDENT WHILST THE UNIT IS BEING CONNECTED. FOR SAFETY REASONS AN EARTH CONNECTION MUST BE MADE TO THE EARTH TERMINAL OF THIS INSTRUMENT.

LOCAL WIRING AND SAFETY REGULATIONS SHOULD BE STRICTLY ADHERED TO WHEN INSTALLING THIS UNIT. SHOULD THESE REGULATIONS CONFLICT WITH THE FOLLOWING INSTRUCTIONS, CONTACT LTH ELECTRONICS OR AN AUTHORISED LOCAL DISTRIBUTOR FOR ADVICE.

To maintain the specified levels of Electro Magnetic Compatibility (EMC, susceptibility to and emission of electrical noise, transients and radio frequency signals) it is essential that the types of cables recommended within these instructions be used. If the installation instructions are followed carefully and precisely, the instrument will achieve and maintain the levels of EMC protection stated in the specification. Any equipment to which this unit is connected must also have the same or similar EMC control to prevent undue interference to the system.

❖ Terminations at the connectors should have any excess wire cut back so that a minimal amount of wire is left free to radiate electrical pick-up inside or close to the instrument housing.

N.B. The use of CE marked equipment to build a system does not necessarily mean that the completed system will comply with the European requirements for EMC.

Noise suppression

In common with other electronic circuitry, the instrument may be affected by high level, short duration noise spikes arising from electromagnetic interference (EMI) or radio frequency interference (RFI). To minimise the possibility of such problems occurring, the following recommendations should be followed when installing the unit in an environment where such interference could potentially occur.
The following noise generating sources can affect the instrument through capacitive or inductive coupling.

- Relay coils
- Solenoids
- AC power wires, particularly at or above 100V AC
- Current carrying cables
- Thyristor field exciters
- Radio frequency transmissions
- Contactors
- Motor starters
- Business and industrial machines
- Power tools
- High intensity discharge lights
- Silicon control rectifiers that are phase angle fired

The instrument is designed with a high degree of noise rejection built in to minimise the potential for interference from these sources, but it is recommended that you apply the following wiring practices as an added precaution. Cables transmitting low level signals should not be routed near contactors, motors, generators, radio transmitters, or wires carrying large currents.

If noise sources are so severe that the instrument's operation is impaired, or even halted, the following external modifications should be made, as appropriate:

- Fit arc suppressors across active relay or contactor contacts in the vicinity.
- Run signal cables inside steel tubing as much as is practical.
- Use the internal relays to switch external slave relays or contactors when switching heavy or reactive loads.
- Fit an in-line mains filter close to the power terminals of the instrument.

Enclosure

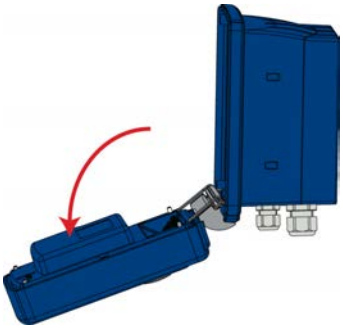
The BTD17 as standard is designed to be mounted on a wall or surface via the two holes located in the rear half of the enclosure. Alternatively, it can be mounted to a panel or a pipe using optional mounting kits.

BTD17 Overall Dimensions

The enclosure should be opened as following.

Undo four captive screws as highlighted

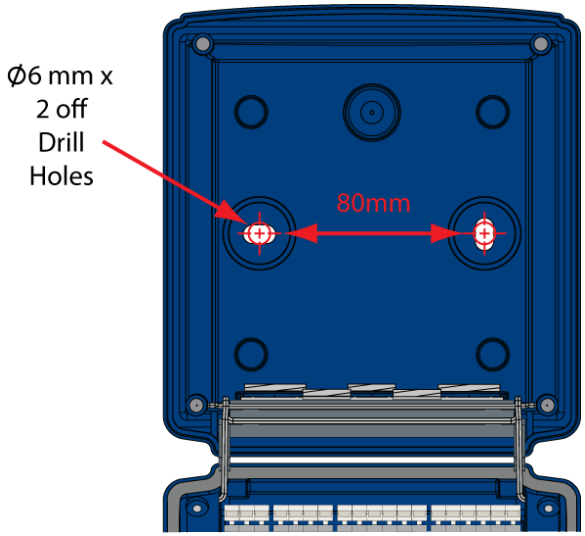
Lift front up and forward



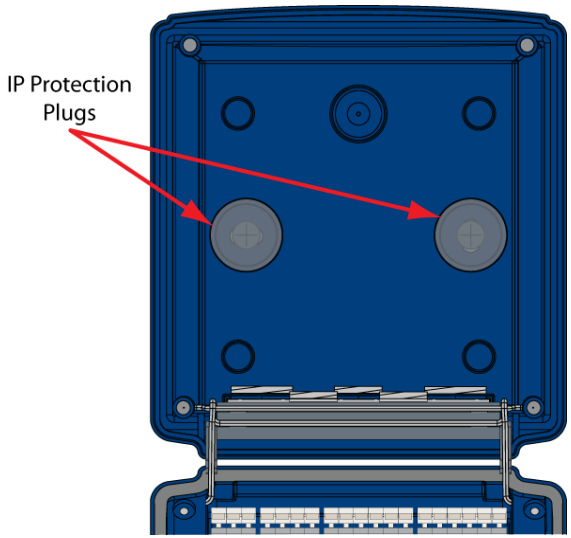
Rotate front down until hinge locks under the rear and front is supported

To close repeat process in reverse, folding the hinge into the rear.

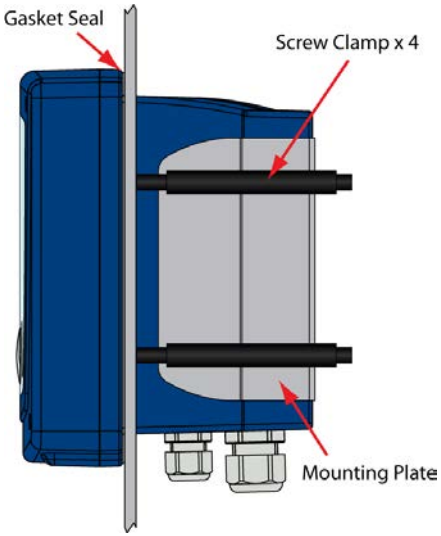
Surface-Mounting



- LTH recommends using No. 10 x 1¼ inch round head screws or similar for mounting.
- Care must be taken when fitting the instrument on uneven walls or surfaces.
- Once installed make sure accompanying IP protection plugs are installed over the mounting holes on the inside rear of the enclosure.

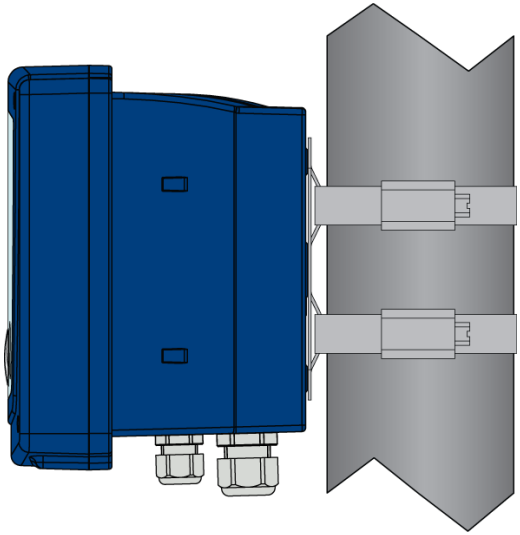


Panel-Mounting



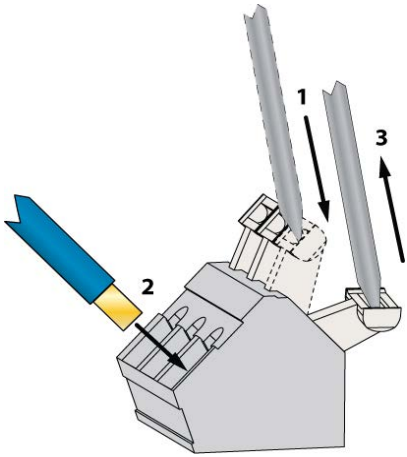
- 138.0mm Square Cut Out
- Uses Kit Part Number 6014.
- Fit the gasket seal into the grove on the back of the instrument front.
- Attach the Mounting Plate to the rear of the case with the supplied screws.
- To pass instrument rear through panel cut out remove cable glands.
- Use the 4 supplied screw clamps to affix the instrument to the panel.

Pipe-Mounting



- Fits pipe 50-100mm
- Uses Kit Part Number 6024.
- Attach the Mounting Plate to the rear of the case with the supplied screws.
- Pass supplied mounting straps through plate loops and tighten round pipe as required.
- Fit the accompanying IP protection plugs over the internal mounting holes on the inside rear of the enclosure.

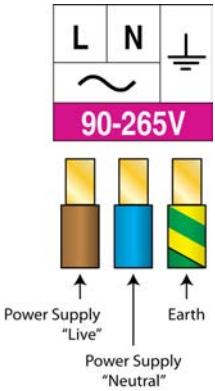
Terminal Operation



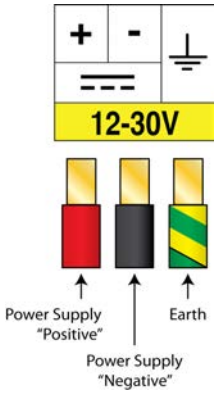
Whilst pushing terminal lever down using a 3.5mm Slotted Screwdriver, insert wire into opening and release level to retain.

Supply Voltage Connections

Depending upon version purchased BTD17 can be powered from either 90-265V AC or 12-30V DC supply voltage. **Refer to the label adjacent to the power supply terminals for the input voltage limits. Exceeding these limits may damage the instrument.**



90-265V AC
Power Connections

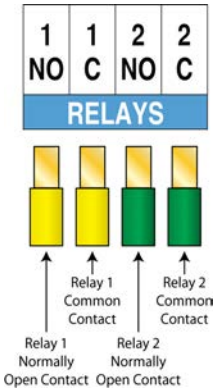


12-30V DC
Power Connections

The power supply should be taken from an isolated spur and fused to a maximum of 3 Amps. The incoming Earth connection must be connected to the Earth terminal.

Relay Connections

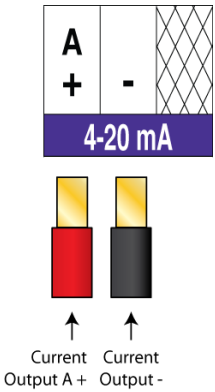
The BTD17 is supplied with 2 normally open volt free relays designated 1 & 2, The relay contacts are connected to the terminals only and are electrically isolated from the instrument itself. **They must be connected in series with a 5 Amp fuse.** A contact arc suppressor may be required to prevent excessive electrical noise, depending upon the load. To switch more than 5 Amps will require a slave relay.



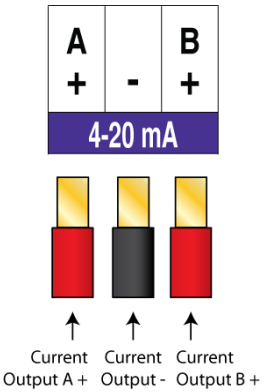
Relays 1 & 2 Connection Details

Current Output Connections

The BTD17 is supplied as standard with a single current output or as an option with two, either can terminate into a load resistance not exceeding 750Ω and are both galvanically isolated from the rest of the instrument. For best noise immunity use a screened twisted pair cable, with the screen connected to Earth at one end. Use a sufficiently large cable to avoid a high resistance in the overall current loop.



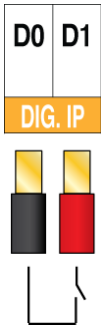
Basic Instrument Current Output Connection Detail



Advanced Instrument Current Output Connection Detail

Digital Inputs

The BTD17 features a single digital input, which can be used to initiate a user configurable instrument operation by use of a volt free link, switch or relay. The instrument can be configured to initiate the appropriate action when the contact either closes or opens.

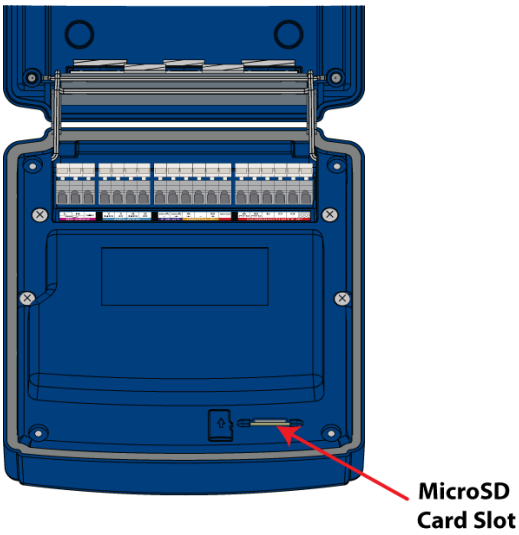


Current Output Connection Detail.

MicroSD Card Interface

The BTD17 features a MicroSD card interface which is compatible with SD, SDHC and SDXC formatted cards (N.B. SDXC cards may need formatted to Fat32 before use). Its primary function is to enable the upgrading of the instruments operating software

To insert the card, ensure that the side notch is on the right-hand side of the card, and then just push it all the way in to the socket. To remove the card push it in then release and the card should then come out of the socket. N.B. It may be required to pull the card out of the last bit of the socket.



Installation and Choice of Turbidity & Suspended Solids Sensors

The BTD17 is compatible with the two digital turbidity sensors – TU8325 and TU8525, and the two digital suspended solids sensors – TU8355 and TU8555. The sensors have been designed to measure turbidity values according to the nephelometric Method (EN 27027) for use with drinking water, civil and industrial treatment, and water quality monitoring.

The sensors feature a measuring system comprising of an infrared light source, a 90-degree scattered light detector, a clean lens status detector, and a temperature sensor.

The TU8325 & TU8525 are designed for submersible applications and are provided with an auto clean nozzle for external pressured air ensuring the sensing lenes are clean of any contamination.
Whilst the TU8525 & TU8555 are designed for in flow applications for insertion into a flow cell or pipe.
For both sensors the measurement performance is identical.

Digital Interface

The sensors interface with the BTD17 via a digital interface. Each sensor has a unique sensor address number which is equal to the last digit of the sensor's serial number, except for 0 which is equal to an address of 10. The address must be entered into the sensor address item of the channel menu. If no sensor is connected or the interface has not been configured correctly in the channel menu, then a communication error E08 will be shown, the sensor reading will change to ---.- and the instrument will automatically go offline.

Installation of TU8325 & TU8555 when using the Autoclean system:

The sensor should be submerged preferably with an inclination that favours cleaning air escaping upwards.
To help with ease of mounting various fittings is available – please contact LTH for further information.
Before the immersion of the sensor, it is necessary to make the following:

- Prepare an extension pipe with suitable length
- Prepare the PVC tubing with suitable length
- Prepare any sourced adapters
- Insert the flexible tubing in the air connector located at the rear of the sensor
- Insert the cable and the tubing in any supplied adapters and screw it on the sensor
- Insert the extension pipe and screw it to the adapter

! The pressurised air used must be clean and at 3 bar max. The typical cleaning time is 15 seconds, and the typical cleaning frequency is 2 times/day, but it is depending on the application and the actual efficiency of the cleaning action. Higher cleaning frequency could reduce the lifetime of optical lens, especially in the presence of abrasive suspended solids in the sample.

! Do not unscrew / remove the cable gland fitting. Doing so may result in permanent damage to the sensors electronics.

Installation of TU8325 & TU8555 when not using the Autoclean system:

Before the immersion of the sensor, follow the above procedure but:

- Do not install the PVC tubing
- Install a stopper on the sensor's airline connector to avoid water entering the space between the Autoclean adapter and the sensor.

! Without the installed airline stopper water will damage the cable and possibly result in damage to the sensors electronics.

! The sensor can be submerged but chemical compatibility against the sensor cable's PVC jacket must be checked. In any case it is recommended that the cable is periodically check to insure it is in good condition.

! Do not unscrew / remove the cable gland fitting. Doing so may result in permanent damage to the sensors electronics.

Installation of TU8525 & TU8555

These sensors are primarily designed for use either online or in a flow cell, though it is advised to use a flow cell with the TU8525 for applications below 40 NTU. TU910, a specifically designed flow cell, is available from LTH.
In suspended solids applications the sensor can also be installed directly in the flow, preferably in a bypass with shut-off valves to allow the removal of the sensor for maintenance.
The sensor can also be installed in a tank with extension pipe adapters again available from LTH.

! Do not unscrew / remove the cable gland fitting. Doing so may result in permanent damage to the sensors electronics.

Operating Principle

The turbidity measurement is based on the EN 27027 standard.

A light beam is sent to the sample through an optical lens. The 90-degree scattered light by suspended particle is collected by the sensor through a second lens and it is converted in an electric signal proportional to the turbidity of the sample.

The sensors use an infrared light so the measuring is not affected by the colour of the sample.

External light effect

The exposure of the sensors to high external light can influence the turbidity measurement. The circuit of the sensor can detect the external light that may be affecting the accuracy of the measuring.

If the effect cannot be automatically compensated, an error message will be shown (see page 63).

The user must modify the installation to protect the lens from the sun or the stray light.

Maintenance

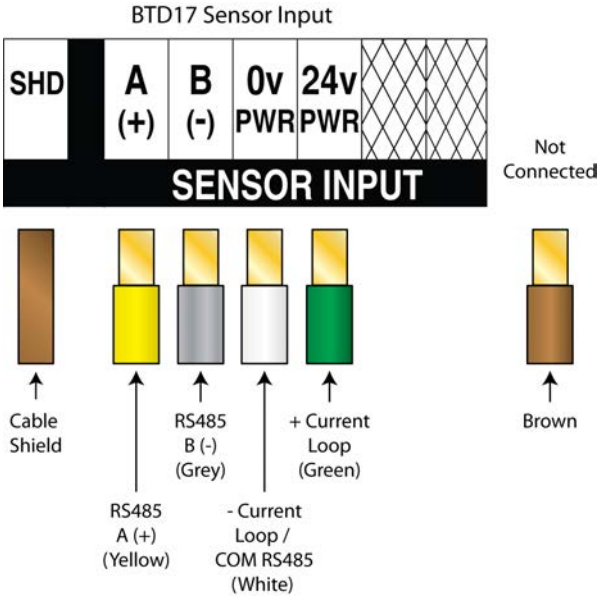
The two optical lenses at the bottom of the sensor should be inspected and cleaned periodically.

Cleaning is recommended before zero and sensitivity calibration.

Remove any deposit on the optical lens by using a soft, damp cloth or paper towel without pushing on the surface to avoid scratching it. If necessary, use a soft detergent or a very dilute acid if the deposits are of limestone type.

The frequency of cleaning depends on the type of use, the nature, and the concentration of the measuring sample.

BTD17 Sensor Input Connection Details



Turbidity & Suspended Solids Sensor Connection Details

! Do not connect a power supply to the sensor's RS485 interface wires (yellow and grey) to prevent damage to the sensor's electronics.

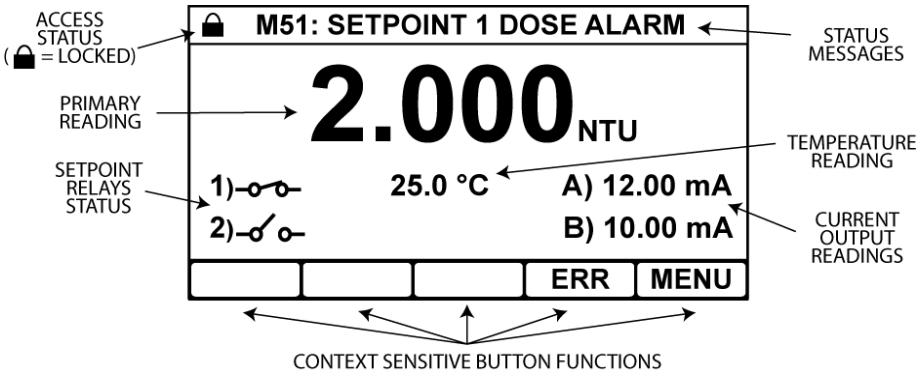
! To enable correct operation the sensor's address must be entered into the sensor address option in the channel menu.
The address is equal to the last digit of the sensor's serial number (note, if the last digit is 0 then the address is 10).
The serial number can be found on either the body of the sensor or at either end of the sensor cable.

! Do not remove the sensor while the "retrieving data" message is on the screen.

User Interface

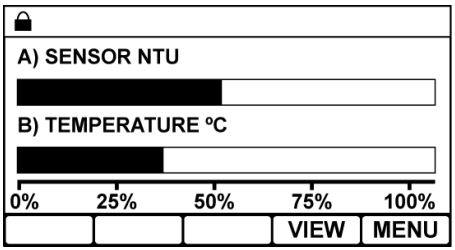
CAUTION! BEFORE PROCEEDING, ENSURE THAT THE INSTALLATION INSTRUCTIONS HAVE BEEN FOLLOWED CORRECTLY. FAILURE TO DO SO MAY RESULT IN AN ELECTRICALLY HAZARDOUS INSTALLATION OR IRREPARABLE DAMAGE TO THE INSTRUMENT.

The BTD17 uses a 3¾" 240x128 dot LCD Module to display the primary reading and temperature, show operational status and to provide an intuitive user interface. This is accompanied by 5 control buttons whose function varies depending upon which screen the user is viewing. The button function is indicated by the control section at the bottom of the display.

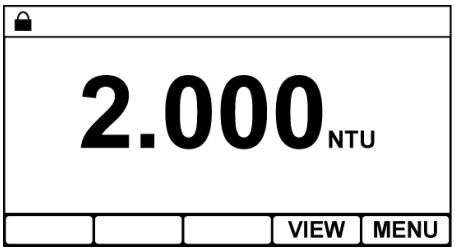


The Front Screen

Pressing the view button on the front screen cycles through 2 additional front screen options, note if an error occurs the instrument will return to the standard front screen.



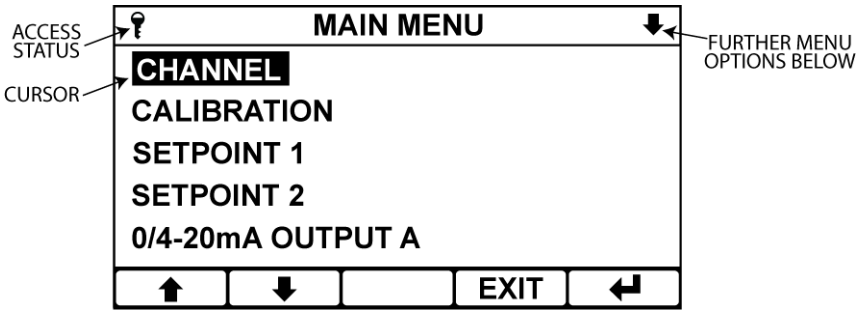
Current Output Bar Graph



Main Reading Only

Additional Front Screens

The instrument configuration is accessible by pressing the menu button on the front screen.



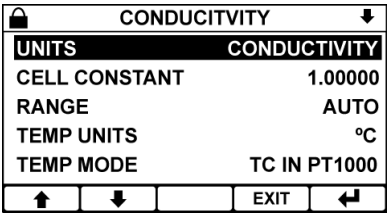
The main menu is split into two main sections. The top shows the current menu you are currently in the access status of the instrument and whether there are further menu options below. The bottom section shows the current options for that menu which may be selected by moving the cursor with the arrow buttons and pressing the enter button. The exit button is used to return to the previous menu. If no buttons are pressed after 2 minutes the instrument will default back to the front screen.

Security Code Access

To protect the instrument setup from unauthorised or accidental tampering, a security access code system is present. This is implemented via the instrument's menu system which operates in two modes, "locked" as indicated by a padlock symbol and "unlocked" as indicated by a key symbol. The locked mode allows the user to observe the instruments configuration but without the ability to change it. If the user wishes to change a setting then the "Security Code" menu will appear that will prompt them to enter the security code which will then change the instruments mode to "unlocked". Once unlocked, the user can change any setting without having to re-enter the security access code, however the instrument will automatically lock itself if no further buttons are pressed after 2 minutes 30 seconds.

The user can select their own access code in the set access code function of the configuration menu, or alternatively they can disable the security system permanently by changing the access code to 0000.

The default security access code is <u>1000</u>

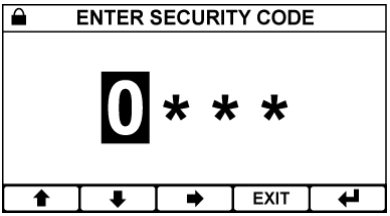


Select the option you wish to change and press enter to bring up the Security Code menu.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Chose Option



Enter the required Access Code.

If the code is incorrect the user will be prompted to try again.

If the code is correct the padlock at the top of the screen will turn to a key and the unit will be unlocked

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

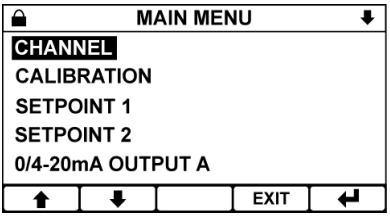
EXIT – Cancel

↵ – Enter Code

Turbidity & Suspended Solids Input Setup

The Channels Setup menu contains the basic configurations for the sensor's input.

The default security access code is 1000



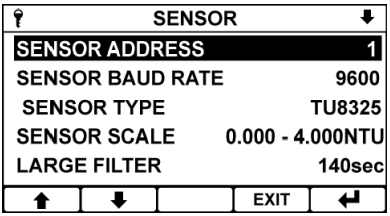
Main Menu

From the front screen press the menu button to show the main menu options.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



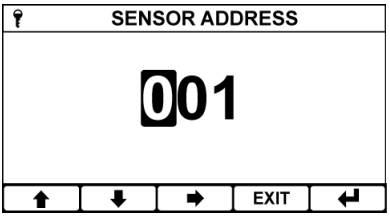
Channel Menu

From the main menu highlight "channel" and press the enter option button to show the channel menu options.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Sensor Address

To enable correct operation the sensor's address must be entered into this menu.

The address is equal to the last digit of the sensor's serial number (note, If the last digit is 0 then the address is 10).

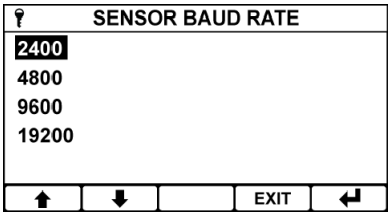
The serial number can be found on either the body of the sensor or at either end of the sensor cable.

⬆/⬇ – Increase/Decrease Digit

➡ –Select Next Digit

EXIT – Cancel

↵ – Save Value



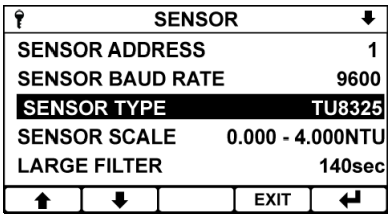
Sensor Baud Rate

Set the baud rate of the RS485 sensor interface. Note, the sensor default is 9600 baud.

⬆/⬇ – Select Option

EXIT – Cancel

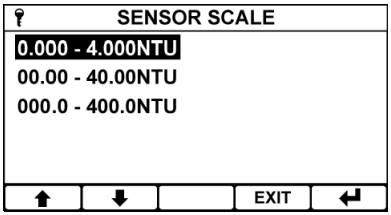
↵ – Save Selection



Sensor Type

Displays the sensor type of the connected sensor or disconnected when either no sensor is connected or when sensor address, or baud rate do not match the configuration of the connected sensor.

Note that this menu cannot be edited.



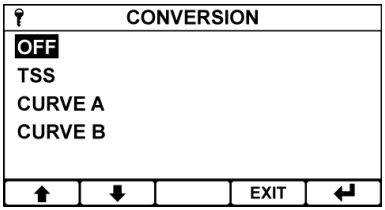
Sensor Scale

Set the sensor's operating scale. Available options will depend on sensor being used.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Conversion

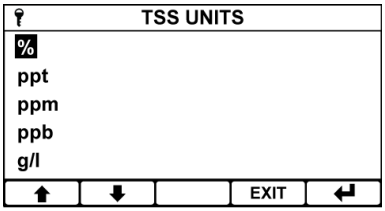
Enable conversion from the sensors raw measured value to an equivalent suspended solids using either the sensors built in TSS system or the instrument's user configurable custom curve system.

Only available when using TU8355 and TU8555.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



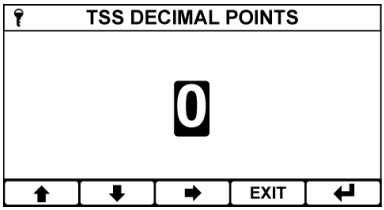
TSS Units

Set the equivalent measurement unit when using TSS mode. Available units: %, ppt, ppm, ppb, g/l, mg/l, µg/l

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



TSS Decimal Points

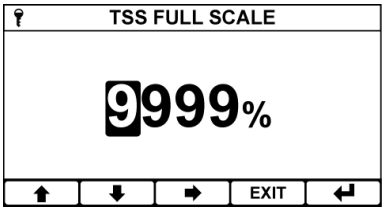
Set the number of decimal points used by the equivalent measurement when using TSS mode.

⬆/⬇ – Increase / Decrease Digit

➡ –Select Next Digit

EXIT – Cancel

↵ – Save Value



TSS Full Scale

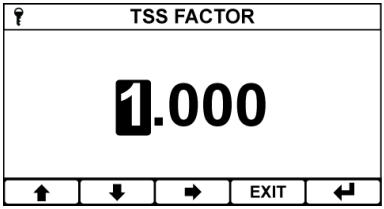
Set the maximum value the equivalent measurement will scale to when using TSS mode.

⬆/⬇ – Increase / Decrease Digit

➡ –Select Next Digit

EXIT – Cancel

↵ – Save Value



TSS Factor

Sets the conversion factor from FTU to TSS to be used by the equivalent measurement when using TSS mode.

Example 1, Sensor Scale = 0 – 99.9 FTU, Sensor Reading = 45.3 FTU, TSS Units = mg/l, Decimal Points = 2.

TSS Factor	TSS Reading
0.010	0.04 g/l
0.100	0.45 g/l
1.000	4.53 g/l
5.000	22.65 g/l

Example 2, Sensor Scale = 0 – 999 FTU, Sensor Reading = 674 FTU, TSS Units = g/l, Decimal Points = 3.

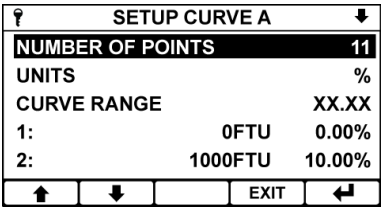
TSS Factor	TSS Reading
0.010	0.006 g/l
0.100	0.067 g/l
1.000	0.674 g/l
5.000	3.370 g/l

⬆/⬇ – Increase / Decrease Digit

➡ –Select Next Digit

EXIT – Cancel

↵ – Save Value

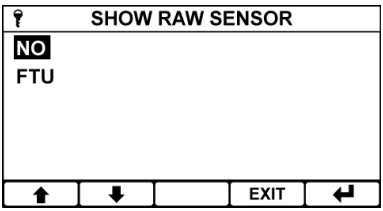


Setup Curve A or B

The instrument input provides the user with the facility to enter a custom relationship between the incoming raw sensor measurement and the displayed value.

The setup curve menu provides the following options.

- Number of Points – Define the number of data entry points which make up the custom curve (Maximum of 11)
- Units – Set the operating units of the curve input using a maximum of 5 characters.
- Curve Range – Select the operating range over which the curve is scaled.
- Data Points – Enter the raw sensor value and equivalent curve value.



Show Raw Value

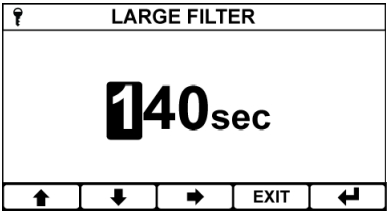
When enabled will show the raw sensor input reading in a secondary location on the front screen in addition to the primary reading.

Only available when conversion is set to TSS or one of the curves.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Large Filter

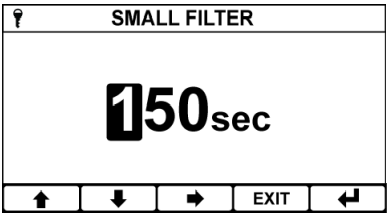
Set the sensor's filter response time relative to signals of large variance within the limit 2 - 220s.

⬆/⬇ – Increase / Decrease Digit

➡ –Select Next Digit

EXIT – Cancel

↵ – Save Value



Small Filter

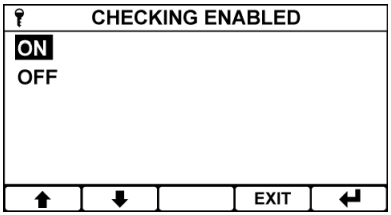
Set the sensor's filter response time relative to signals of small variance within the limit 2 - 220s.

⬆/⬇ – Increase/Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



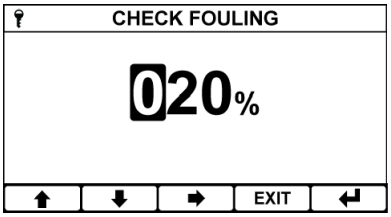
Checking Enabled

Enables the check signal, allowing the checking of dry or fouled sensors.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Check Fouling

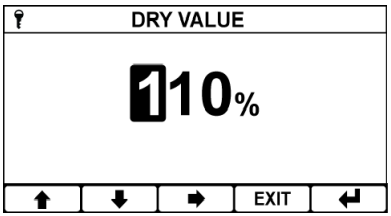
Set the fouling alarm level as a percentage of the check signal, in the of range 0 - 100%.

⬆/⬇ – Increase/Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Dry Value

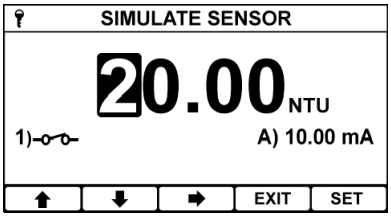
Set the dry alarm level as a percentage of the check signal, in the of range 100 - 200%.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Simulate Sensor

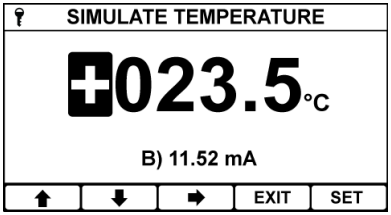
To help in commissioning of the instrument the user can use this menu to manually set the sensor reading and so test the operation of the setpoints and current outputs. Note, only setpoints or current outputs whose source is set to sensor will be shown.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

SET – Use Entered Value



Simulate Temperature

To help in commissioning of the instrument the user can use this menu to manually set the temperature reading and so test the operation of the current output. Note, only setpoints or current outputs whose source is set to temperature will be shown.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

SET – Use Entered Value

Calibration

The sensor is supplied with a factory calibration of the zero and span done with known standard solutions.

Checking and periodic calibration of the sensor is always necessary to ensure the accuracy of the measurement. The optical components can have small drifts during the life. The cleanliness of the optical lens is an important element to check before making a new calibration. If necessary, clean them with a soft cloth.

It is suggested to run the zero calibration before the span calibration.

Zero Calibration

The zero calibration must be performed in the zero standard solution or in water with known turbidity value next to zero.

Enter the known solution's value in the Zero Calibration Point menu and then with the sensor immersed in the solution use the Sensor Zero Calibration menu to commence with the calibration.

Once complete the calibration result is displayed. If it has failed inspect the condition of the surface of the lenses and if necessary, clean the surface with a cloth. Also check that the sensor is immersed in the standard solution. In the case of a calibration fail the sensor will use the existing zero calibration value.

Note, the zero calibration will also fail if the calculated offset is greater than ±0.400 NTU for TU8325 or TU8525 sensors and ±10 FTU for TU8355 or TU8555 sensors.

The zero calibration is performed on all the scales at once.

Span Calibration

The span calibration can be done in either a Formazine solution or in a known turbidity value solution.

Set the scale the span calibration is to be conducted over using the Span Scale menu, then enter the known solution's value using the Span Calibration Point. Place the sensor in the solution and use the Sensor Span Calibration menu to calibrate the sensor.

Once complete the calibration result is displayed. If it has failed inspect the condition of the surface of the lenses and if necessary, clean the surface with a cloth. Also check that the sensor is immersed in the standard solution. In the case of a calibration fail the sensor will use the existing span calibration value.

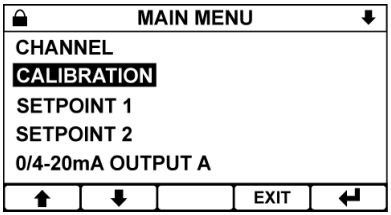
Note, the span calibration will also fail if the calculated slope is outside 70 to 130%.

When performing a span calibration it is recommended to not use values lower than 2 NTU for TU8325 or TU8525 sensors or 50 FTU when using TU8355 or TU8555 sensors.

Calibration Menu

The calibration menu provides the facility to adjust the sensor inputs to the system in which it is operating.

The default security access code is 1000



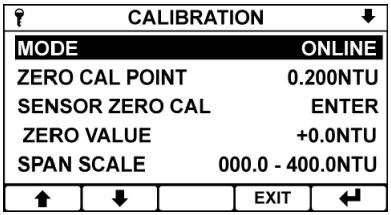
Main Menu

From the front screen press the menu button to show the main menu options.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



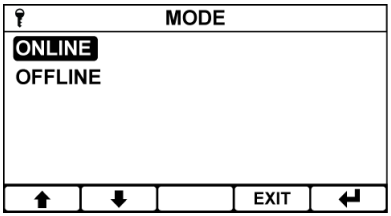
Calibration Menu

From the main menu highlight "calibration" and press the enter option button to show the channel menu options.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Mode

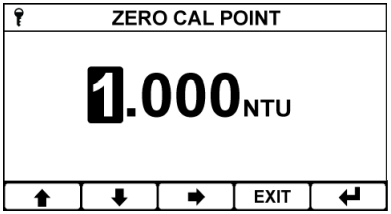
Selecting off-line causes any setpoints to de-energise and current outputs to go to their off-line state. Useful for when commissioning or calibrating the instrument.

When the instrument is placed in an off-line state "off-line" will appear on the front screen.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Zero Calibration Point

Sets the calibration point that the zero calibration is referenced to.

It is preferable to use a turbidity standard for the zero calibration with NTU values close to zero.

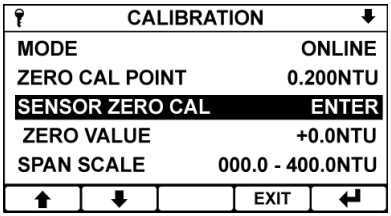
The standard value for the zero calibration must be within the 4.000 NTU scale for TU8325 and TU8525 sensors, and the 100.0 FTU scale for TU8355 and TU8555 sensors.

↑/↓ – Increase / Decrease Digit

→ – Select Next Digit

EXIT – Cancel

↵ – Save Value



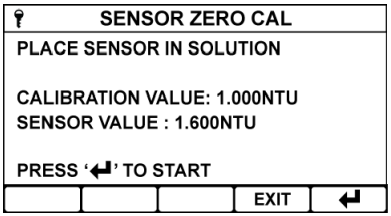
Sensor Zero Calibration

To start the Zero calibration, select the "Sensor Zero Cal" item from the calibration menu.

↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Enter Sensor Zero calibration

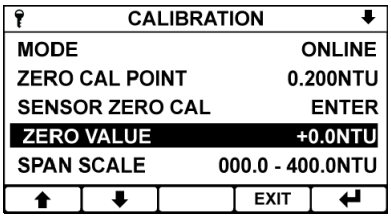


Place sensor in the zero solution and press enter to start the sampling.

Once the calibration is completed the screen will updating indicating whether the calibration was successful or not. Press enter to finish the zero calibration.

EXIT – Return to Main Menu

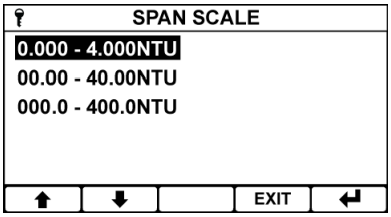
↵ – Begin Sensor Zero Calibration



Sensor Zero Value

Displays the currently used calculated zero calibration value.

Note this menu cannot be edited.



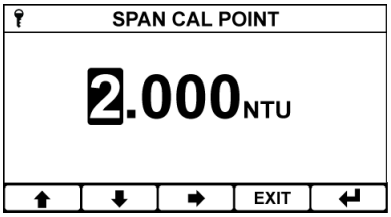
Span Scale

Sets the scale used by the span calibration point value. Available options will depend on sensor being used.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Span Calibration Point

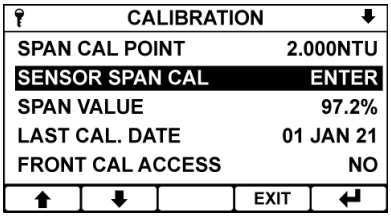
Sets the calibration point that the span calibration is referenced to.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



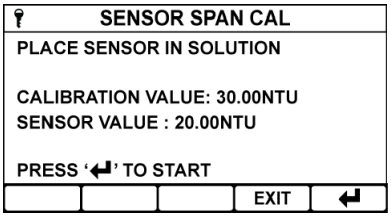
Sensor Span Calibration

To start the Span calibration, select the "Sensor Span Cal" item from the calibration menu.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Sensor Span calibration

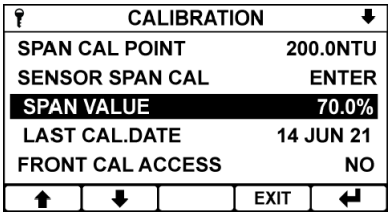


Place sensor in the span solution and press enter to start the sampling.

Once the calibration is completed the screen will updating indicating whether the calibration was successful or not. Press enter to finish the span calibration.

EXIT – Return to Main Menu

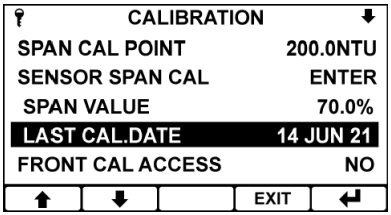
↵ – Begin Sensor Span Calibration



Sensor Span Value

Displays the currently used calculated span calibration value.

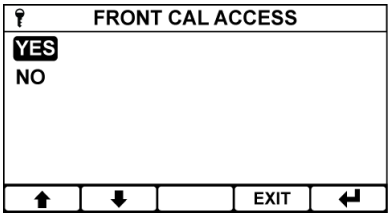
Note that this menu cannot be edited.



Last Calibration Date

Displays the last calibration date when either zero or span calibration was performed.

Note that this menu cannot be edited.



Front Screen Calibration Access Enable

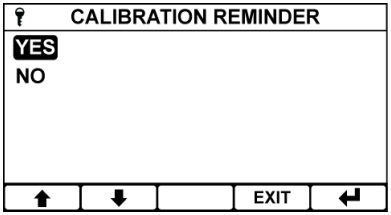
When enabled front calibration access allows direct entry into the calibration menu from the front screen by pressing the "CAL" button.

It also disables the security access system within the calibration menu enabling the calibration functions without having to enter the security access code.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Calibration Reminder

By enabling the calibration reminder the user can configure a calibration interval, which when expired will activate an alarm and message on the front screen.

On the completion of a successful sensor calibration the next cal date will be automatically incremented by calibration interval.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Calibration Interval

Sets the interval time for the calibration alarm.

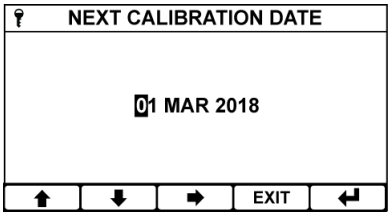
The Next Cal Date will update to show the date of the next calibration alarm.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Next Calibration Date

Sets the exact date of the next calibration alarm.

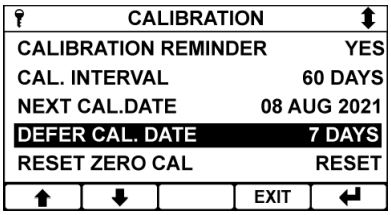
The Calibration Interval will update to show the number of days to the next calibration date.

⬆/⬇ – Increase / Decrease Digit or Text

➡ – Select Next Item

EXIT – Cancel

↵ – Save Value



Defer Calibration Date

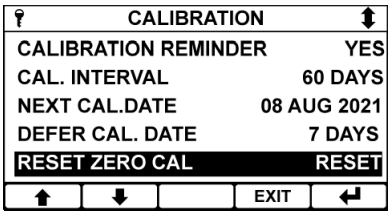
Turns off the alarm and increases the calibration interval by an extra 7 days.

Only appears once the calibration interval has expired.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



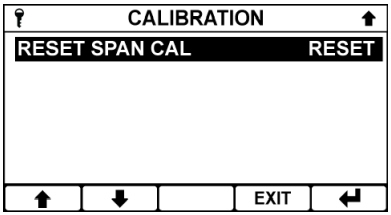
Reset Zero Calibration

Reset any sensor zero calibration that may have been performed.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Reset Span Calibration

Reset any sensor span calibration that may have been performed.

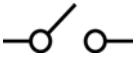
↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option

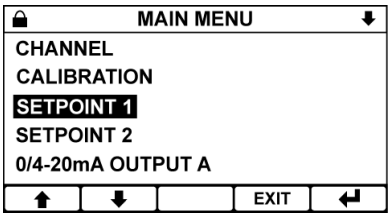
Setpoints

The BTD17 is be fitted with two "Normally Open" setpoint relays designated Setpoint 1 and Setpoint 2. The Setpoint menu contains all of the necessary setup functions to configure the setpoint. The instrument indicates the status of the relay by means of a symbol on the front screen.



Indicates that the relay contact is open

Indicates that the relay contact is closed (if flashing indicates that a dose alarm has occurred).



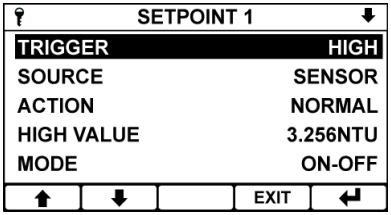
Main Menu

From the front screen press the menu button to show the main menu options and select the setpoint you wish to configure.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



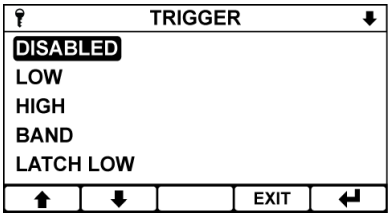
Setpoint Menu

Select the Setpoint function you wish to configure.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Trigger

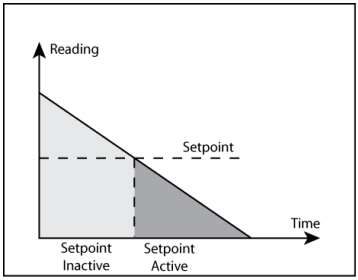
The setpoints can be configured to trigger in the following ways:

- Low
- High
- Band
- Latch Low
- Latch High
- Cleaning
- Alarm

⬆/⬇ – Select Option

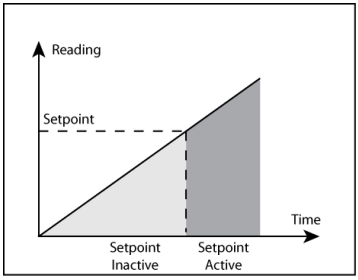
EXIT – Cancel

↵ – Save Selection



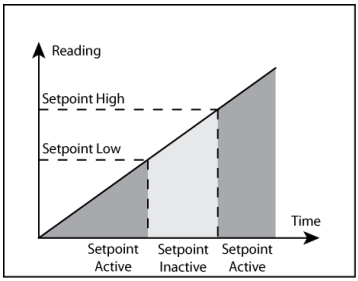
Low

The setpoint will activate when the sensor reading becomes less than the setpoint level.



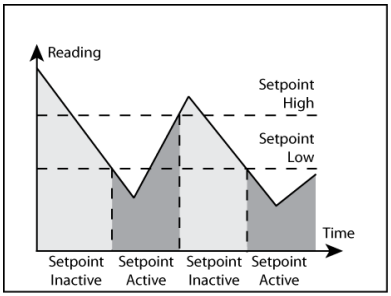
High

The setpoint will activate when the sensor reading becomes greater than the setpoint level.



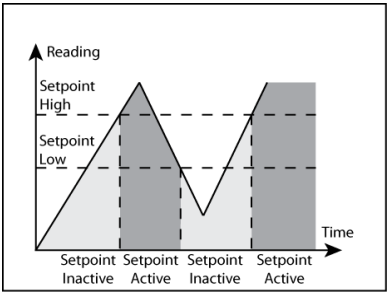
Band

The setpoint will activate when the sensor reading is either greater than the setpoint high level or less than the setpoint low level.



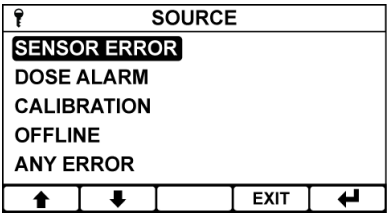
Latch Low

The setpoint will activate when the sensor reading is less than the setpoint low level and will remain active until the reading rises above the setpoint high level. It will then remain inactive until the reading level falls below the setpoint low level.



Latch High

The setpoint will activate when the sensor reading is greater than the setpoint high level and will remain active until the reading falls below the setpoint low level. It will then remain inactive until the reading rises above the setpoint high level.



Alarm

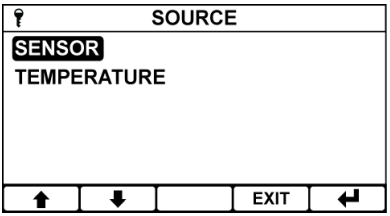
The setpoint will activate by one of the following sources.

- Sensor Error – When a sensor related error is detected.
- Dose Alarm – When the dose alarm activates.
- Calibration – When a calibration is in progress.
- Offline – When the instrument is taken offline.
- Any Error – When any error is detected.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



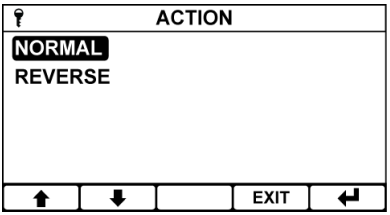
Source

Select the source for the setpoint. Note, the temperature option is only available if the Temp Mode option in the Channel Menu is set to either TC IN PT1000 or TC OUT PT1000.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



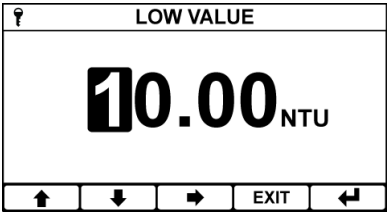
Action

Set the setpoint to work in the normal mode or reverse mode - which is akin to a normally closed relay except it will fall open if the power to the instrument is removed.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Low Value

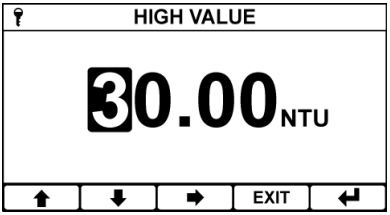
The Setpoint Low value. Note, the setpoint's scale is defined by the channel's scale value.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



High Value

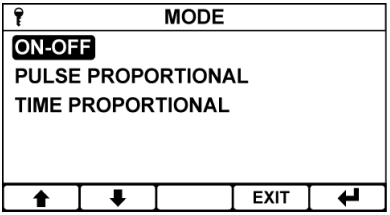
The Setpoint High value. Note, the setpoint's scale is defined by the channel's scale value.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Mode

The Setpoints can operate in one of three modes.

On-Off Mode – The setpoint energises when the setpoint is activated and de-energises when the setpoint is de-activated.

Pulse Proportional – See Setpoint proportional Mode Section.

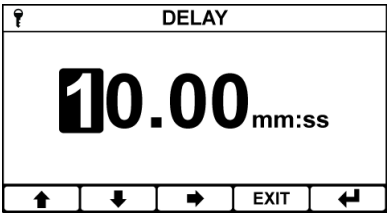
Time Proportional – See Setpoint proportional Mode Section.

Menu only available when trigger is set to either high or low

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Delay

In order to prevent short duration changes at the input affecting the setpoint operation a delay can be set before the setpoint is energised. If the input is still the same after the delay, then the setpoint will be energised.

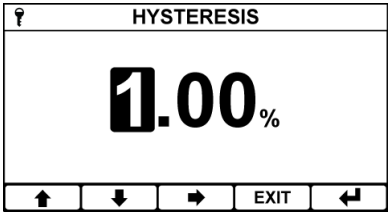
Note. Only available when Trigger is set to High, Low or Band and Mode is set to On-Off.

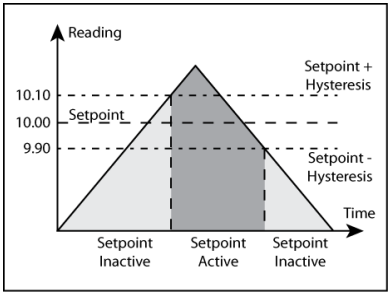
⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

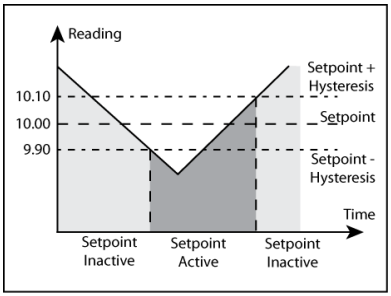
EXIT – Cancel

↵ – Save Value





Setpoint Trigger: High – Hysteresis



Setpoint Trigger: Low – Hysteresis

Hysteresis

A facility to apply hysteresis to the setpoint level allows the user to avoid setpoint "Chatter" when the reading level approaches the setpoint level.

"Chatter" is caused when the reading is sufficiently close to the set point value and noise on the signal repeatedly crosses the set point level, thus causing the relay to switch on and off rapidly.

The hysteresis level should therefore be set to be greater than the input noise level.

The Hysteresis value is a percentage of the setpoint value applied both + and – to the setpoint. For example, if the setpoint was 10.00 and the Hysteresis was 1% then the hysteresis band would operate from 9.90 to 10.10.

Hysteresis operates as follows:

Trigger High – The setpoint is inactive until the reading is greater than the Setpoint High + (Setpoint High X Hysteresis %). It remains active until it goes below Setpoint High – (Setpoint High X Hysteresis %).

Trigger Low – The setpoint is inactive until the reading is less than the Setpoint Low – (Setpoint Low X Hysteresis %). It remains active until it goes above Setpoint Low + (Setpoint Low X Hysteresis %).

Trigger Band – The setpoint uses both high and low.

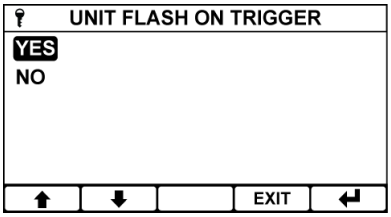
Note. Only available when Trigger is set to High, Low or Band and Mode is set to On-Off.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Unit Flash on Trigger

When enabled the backlight of the unit will flash when the setpoint has been triggered.

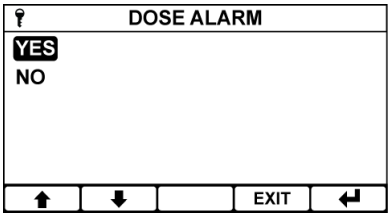
⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Setpoint Dose Alarm

The dose alarm timer can be used to prevent overdosing under many different fault conditions, such as sensor failure or application problems.



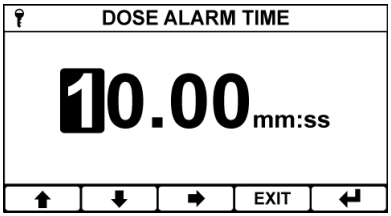
Dose Alarm

Enable the dose alarm for the selected setpoint.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Alarm Time

Sets the time which if the setpoint is active for longer than causes the dose alarm to activate.

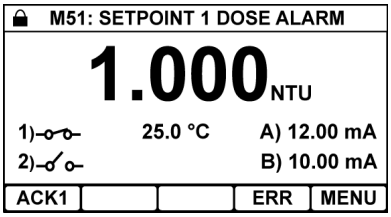
Note, when using Pulse or Time proportional mode the dose timer will only count once the reading is outside the proportional band.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Dose Alarm Active

When the dose alarm activates the following happens:-

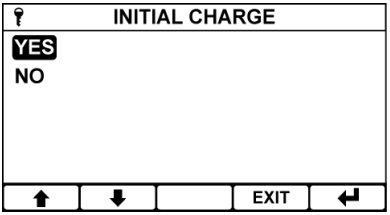
- The setpoint will de-energise.
- The associated front screen setpoint symbol will flash.
- The Dose Alarm error message will appear at the top of the front screen.
- ACK will appear as a function to acknowledge the setpoint on the front screen – press to clear the alarm.

Note – If, once cleared, the setpoint again remains energised for the length of the dose alarm timer then the dose alarm will once again activate. If this problem persists then a dosing problem will need to be investigated.

ACK 1 – Clear Setpoint 1 Dose Alarm

ACK 2 – Clear Setpoint 2 Dose Alarm

Menu – Access Main Menu



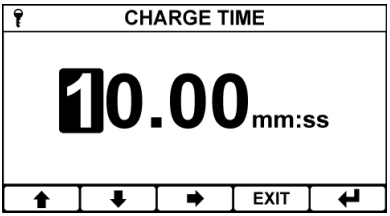
Initial Charge

This allows the user to have a onetime over-ride of the Dose Alarm to use for example when filling a tank for the first time.
The user enters a charge time and then initiates the charge time. The instrument will then disable the dose alarm until either the relay becomes inactive because the setpoint has been reached or the charge timer reaches zero in which event the instrument will automatically display enter a Dose Alarm state.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Charge Time

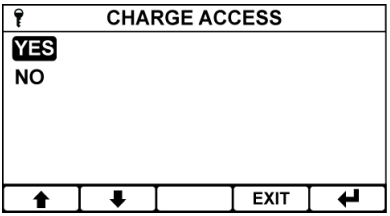
Sets the initial charge time.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



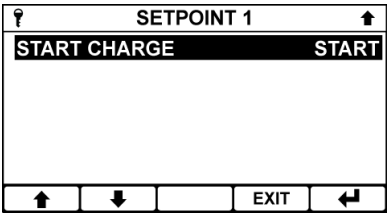
Charge Access

Enabling this allows the user to initialise the initial charge by means of a button on the front screen.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Start Initial Charge

The user can also start the initial charge via this option in the setpoint menu.

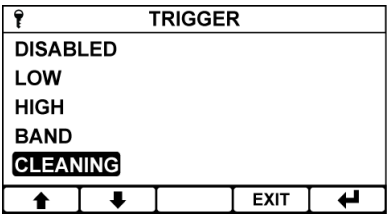
⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Setpoint Cleaning Mode

The Setpoints can be configured to operate a jet spray wash or rotary electrode cleaning system on a timed cycle. Its purpose is to prevent accumulation of particulate matter on the active surfaces of the sensor. Note when cleaning is active the input will be taken offline, this will prevent any undesired control actions resulting from spraying cleaning solution onto the sensor.



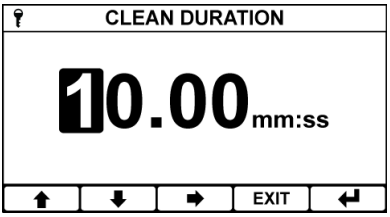
Trigger

If available select cleaning from the list of options.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Clean Duration

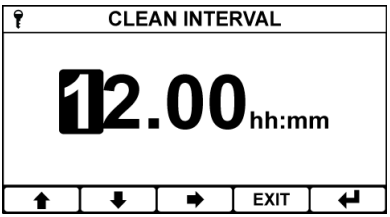
Enter the duration of the cleaning operation.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Clean Interval

Enter the time between cleaning operations.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

Clean Recovery

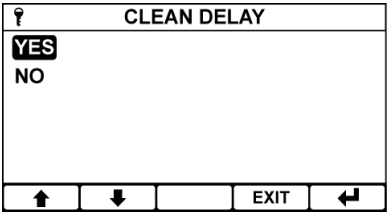
The user can introduce an additional post cleaning delay before coming back "On-line", this provides the sensor a period to stabilise after the cleaning has finished.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



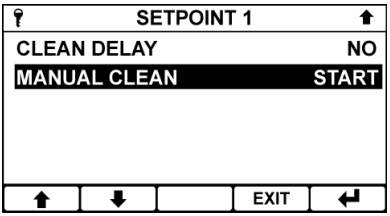
Clean Delay

If enabled this causes the clean cycle to wait if any other control setpoints are active. This is shown by a clean delayed message on the front screen.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Manual Clean

This manually starts a clean cycle.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Setpoint Proportional Mode

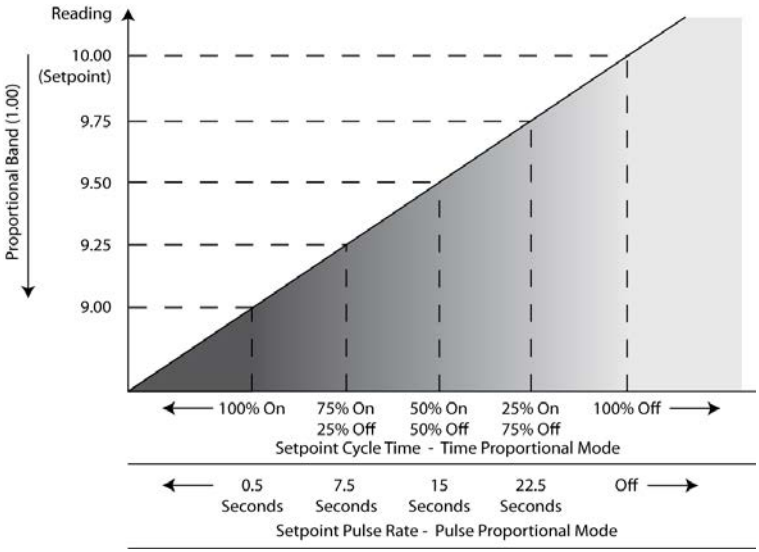
In addition to On/Off mode the instrument also provides two forms of pseudo proportional control, which can be used to control the levels to a defined value when used in conjunction with a pump or valve. When the reading deviates from the programmed set point level the relay pulses at a rate proportional to that deviation. Note – Only available when Setpoint Trigger is set to either High or Low.

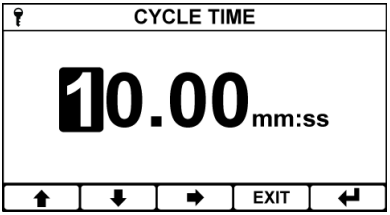
Pulse Proportional Mode

The Pulse Proportional mode is intended to drive solenoid type dosing pumps which have the facility to accept an external pulse input. The setpoint relay operates by producing a pulse of 0.25 seconds in duration and with a maximum period of one pulse per 30 seconds. The pulse rate increases as the measurement moves further from the set point, until it reaches the minimum period of one pulse per 0.5 seconds at the limit of the proportional band.
For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls just below 10.00 the setpoint will begin to pulse at its longest period of once per 30 seconds. As the reading falls further from the setpoint the period will decrease until it reaches its minimum of one pulse every 0.5 seconds at the limit of the proportional band. (See Setpoint Pulse Rate – Pulse Proportional Mode section on the diagram below.)

Time Proportional Mode

Time Proportional Mode allows a user defined cycle time to control any on/off device such as a solenoid valve or dosing pump over a user set proportional band.
For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls below 9.00 the setpoint would be energised 100% of the cycle time. As the input rises and approaches the set point the setpoint starts to cycle on and off with the on time reducing and the off time increasing, respectively until it reached the setpoint and would be off for 100% of the cycle time. The cycle time is adjustable and is the sum of the on and off times. (See Setpoint Cycle Time – Time Proportional Mode section on the diagram below.)





Cycle Time

Sets the cycle time (sum of both On and Off periods)

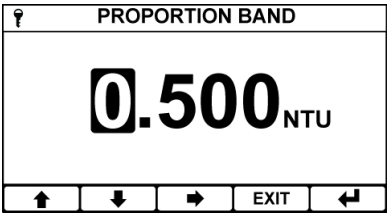
Only available when Mode is set to Time Proportional.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Proportion Band

Enter the size of the Proportion Band.

Only available when Mode is set to Pulse or Time Proportion.

⬆/⬇ – Increase / Decrease Digit

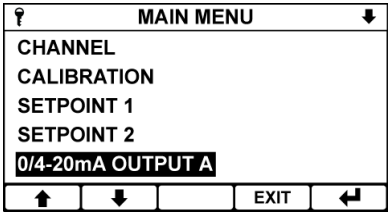
➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

0/4-20mA Output

The BTD17 is fitted with two current outputs, either which can be used for the transmission of the primary variable or temperature. The current output menu contains all the necessary setup functions to configure the current output sources. The instrument will display the status of the current output on the front screen, where --.--mA indicates that the output is disabled.



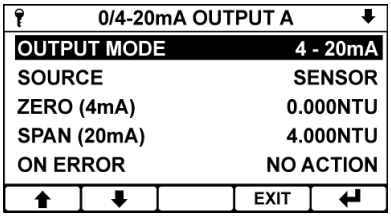
Main Menu

From the front screen press the menu button to show the main menu options and select the desired 0/4-20mA Output.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



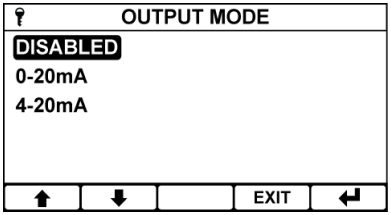
0/4-20mA Output Menu

Select the 0/4-20mA function you wish to configure.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



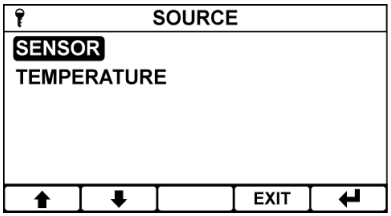
Output Mode

Enable the current output by selecting its output mode, either 0 – 20mA or 4 – 20mA.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



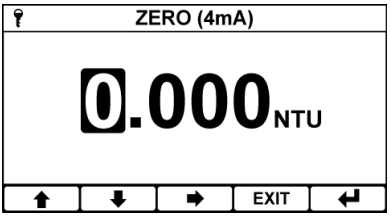
Source

Select the source for the current output.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Zero (0mA) / Zero (4mA)

Enter the desired sensor value to be represented by 0mA or 4mA (depends on current output mode). An inverse relationship can be achieved by setting the Zero greater than the Span.

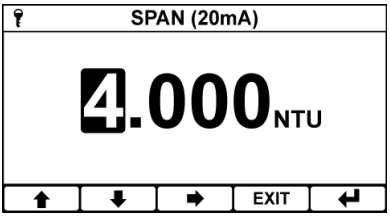
If the sensor reading falls outside this or the span value an error will be activated.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



Span (20mA)

Enter the desired sensor value to be represented by 20mA. An inverse relationship can be achieved by setting the Span less than the Zero.

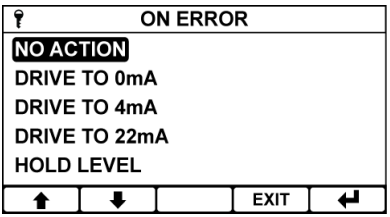
If the sensor reading falls outside this or the zero value an error will be activated.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value



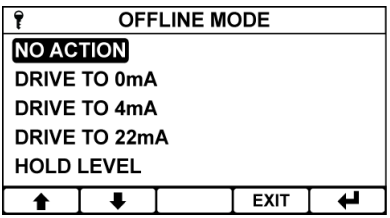
On Error

The current outputs can be programmed to output 0mA, 4mA, 22mA or Hold their value when an error is detected on the input source (i.e. Sensor Fault), to provide remote warning of error conditions or to ensure fail safe operation.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



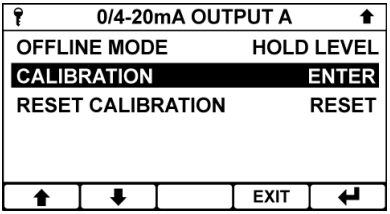
Offline Mode

The current outputs can be programmed to output 0mA, 4mA, 22mA or Hold their value when the instrument is put in an offline state.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



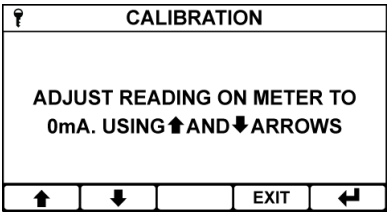
Calibration

Enter Menu to calibrate the 0/4-20mA

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Adjust 0mA Output

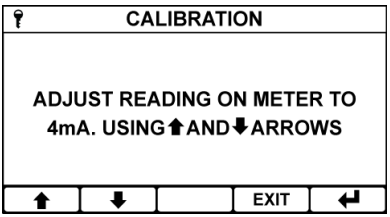
Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter. Please keep in mind that the current output cannot go below 0mA.

Only used when the mode is set to 0-20mA

⬆/⬇ – Adjust Output

EXIT – Cancel

↵ – Save Adjustment



Adjust 4mA Output

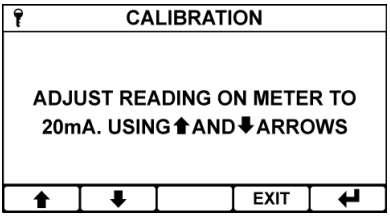
Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter.

Only used when the mode is set to 4-20mA

⬆/⬇ – Adjust Output

EXIT – Cancel

↵ – Save Adjustment



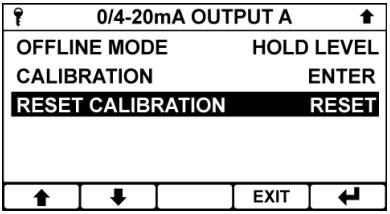
Adjust 20mA Output

Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter.

⬆/⬇ – Adjust Output

EXIT – Cancel

↵ – Save Adjustment



Reset Calibration

Used to reset any user calibration applied to the 0/4-20mA Output

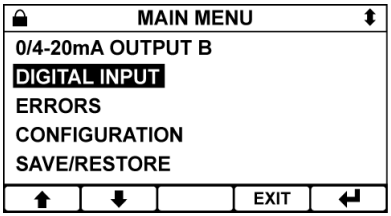
⬆/⬇ – Select Option

EXIT – Return to Calibration

↵ – Enter Option

Digital Inputs

The BTD17 is fitted with a single digital input. The digital input menu contains all the necessary setup functions to configure the digital input sources. This input is intended to be switched using a volt free link, switch, or relay. The user can select whether closing or opening the contact initiates the configured action.



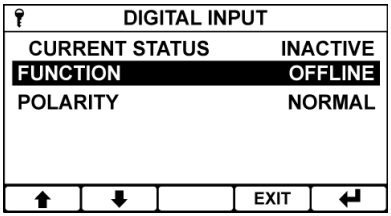
Main Menu

From the front screen press the menu button to show the main menu options and select digital input.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



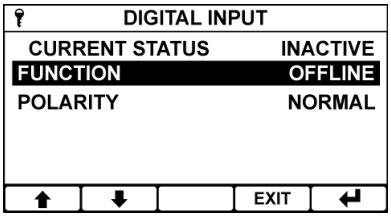
Digital Input Menu

Select the digital input function you wish to configure.

⬆/⬇ – Select Option

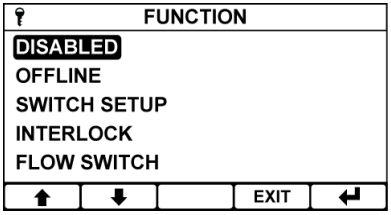
EXIT – Return to Main Menu

↵ – Enter Option



Current Status

Shows the current status of the digital input. (Non-selectable)



Function

The digital input can be configured to operate in the following ways:

- Offline
- Switch Setup
- Interlock
- Flow Switch
- Tank Level

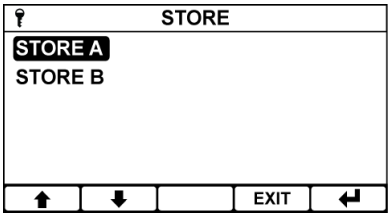
Offline, Interlock, Flow Switch and Tank Level – when active will take the instrument "offline". This causes any active setpoints to de-energise, the 0/4-20mA output to change to its set offline state and the selected function message to appear on the front screen.

Switch Setup – when active the instrument will load an alternative Sensor Setup, Setpoint Setup and Current Output Setup that have been stored in one of the two internal save stores.
Whilst the digital input is active the instrument configuration cannot be changed.
The original configuration is restored upon the digital input going inactive.

↑/↓ – Select Option

EXIT – Cancel

↵ – Save Selection



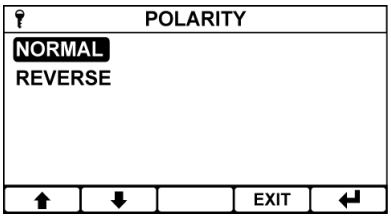
Store

Select which store the Switch Stores loads when active.

↑/↓ – Select Option

EXIT – Cancel

↵ – Save Selection



Polarity

Configure whether the digital input activates on the closing of circuit (normal) or the opening of the circuit (reverse).

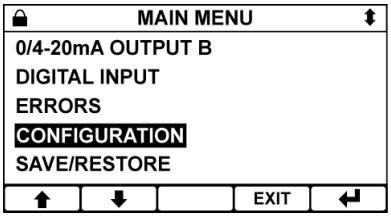
↑/↓ – Select Option

EXIT – Cancel

↵ – Save Selection

Configuration

The configuration menu enables the user to configure the basic operating parameters of the instrument.



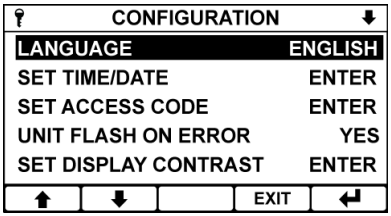
Main Menu

From the front screen press the menu button to show the main menu options and select Configuration.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



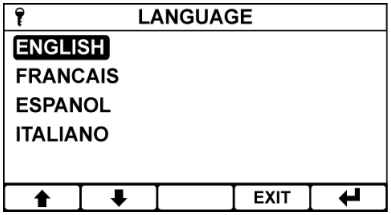
Configuration Menu

Select the function you wish to configure.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



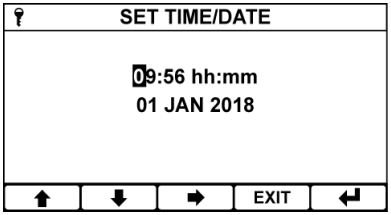
Language

The BXD17 Series has the ability to support multilingual menus. The language of choice can be selected from this menu.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection



Set Time/Date

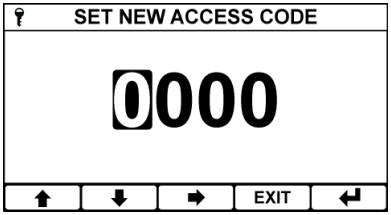
Sets the instruments time and date.

⬆/⬇ – Increase / Decrease Digit / Item

➡ – Select Next Digit / Item

EXIT – Cancel

↵ – Save Time



Set Access Code

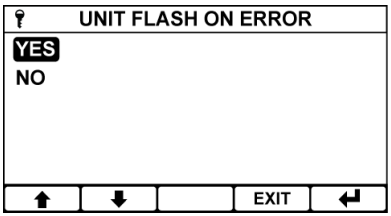
Sets the access code used by the instrument to prohibit changes to configuration by unauthorised personnel.

⬆/⬇ – Increase / Decrease Digit / Item

➡ – Select Next Digit / Item

EXIT – Cancel

↵ – Save Time



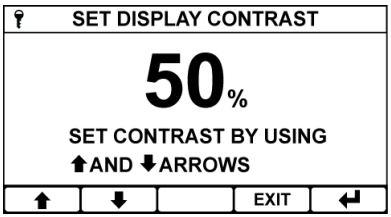
Unit Flash On Error

Enables the flashing of the display backlight in the event of an instrument error.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



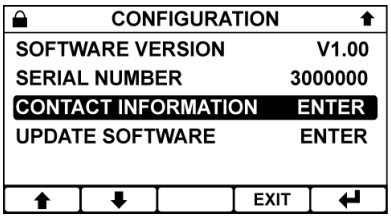
Set Display Contrast

This allows the user to adjust the contrast of the display to compensate for environmental conditions that may affect the readability of the display.

⬆/⬇ – Adjust Contrast

EXIT – Return to Configuration Menu

↵ – Enter Option



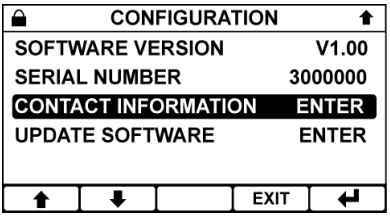
Software Version

Displays the instrument's current software version number.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



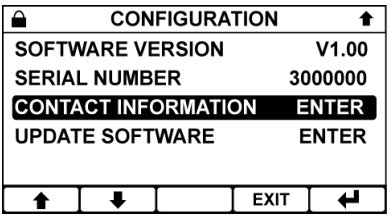
Serial Number

Displays the instrument's serial number.

↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Contact Information

Display the contact information.

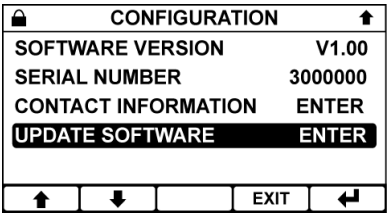
↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option

Update Software

The BTD17 operating software can be upgraded by saving the latest version from LTH onto a micro-SD card, inserting it into the instrument and following the instructions below. All three files must be present on the SD card for the update to work. The instrument supports SDHC and SDXC cards; however, they must be formatted to fat32 which can be accomplished using a personal computer.



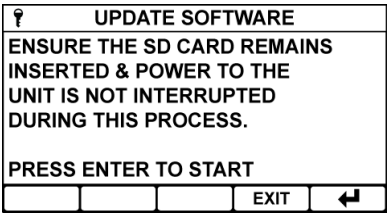
Update Software

Select the update software option from within the configuration menu.

↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option



Update Software

If the instrument has verified that all of the required software is present on the micro-SD card press enter to begin the update.

During the update the display will indicate the progress of the update.

Once finished the instrument will restart automatically.

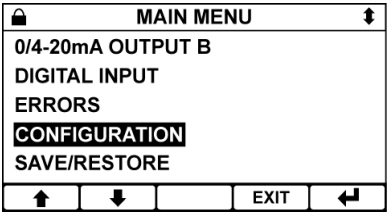
EXIT – Return to Update Software Menu

↵ – Begin Update

Save, Restore & Reset

The BTD17 features the ability to save and restore the current configuration of the channel, setpoints, current outputs, and digital inputs to one of two stores “A and B”.

The save and restore menu also features the ability to reset the whole instrument back to its factory settings.



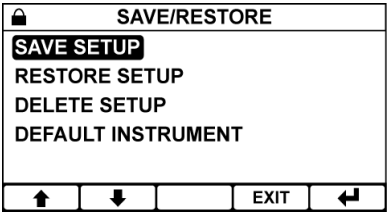
Main Menu

From the front screen press the menu button to show the main menu options and select Save/Restore.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option



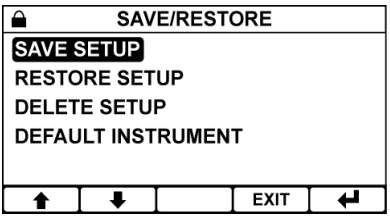
Save / Restore Menu

Select the operation you wish to carry out.

⬆/⬇ – Select Option

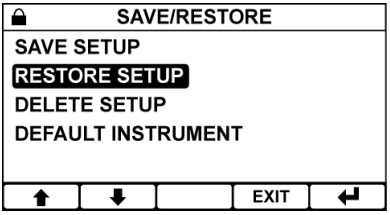
EXIT – Return to Main Menu

↵ – Enter Option



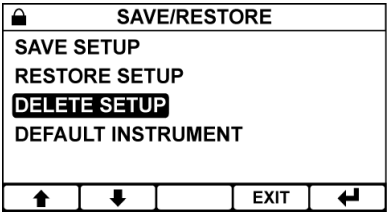
Save Setup

Save the current instrument setup to either of the two stores.



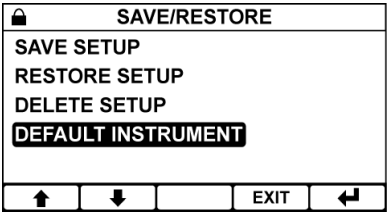
Restore Setup

Restore either of the previously saved setups.



Delete Setup

Delete the either of the previously saved setups.

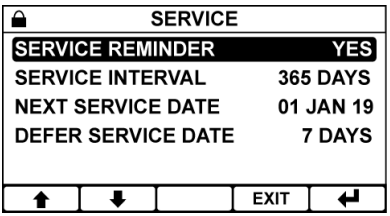


Default Instrument

Reset the whole instrument back to its factory settings.

Service

The BTD17 features a service reminder system that will inform the user when the instrument is due its service.



Service Alarm

Service alarm configuration:

- Service Reminder – Turn the service alarm on or off. Requires service security code prior to use.
- Service Interval – Set the Service Interval. Requires service security code prior to use.
- Next Service Date – Sets the exact service date. Requires service security code prior to use.
- Defer Service Date – Only appears once the service interval has expired. Increases the service interval by an extra 7 days. Requires standard security code prior to use.

↑/↓ – Select Option

EXIT – Return to Main Menu

↵ – Edit Option

Appendix A - Error Messages

Switch On Diagnostic Errors

E01	**Read/Write Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E02	**Data Error** The instrument configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the Default Instrument function in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E03	**Storage A Error** The save setup configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the delete setup function in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E04	**Factory Error** The factory configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E05	**User Cal Error** The instrument user calibration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the Default Instrument function in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E07	**Storage B Error** The save setup configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists use the delete setup function in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E08	**Sensor Read Error** The digital interface with the sensor has encountered a read error. Check sensor wiring. Check that the sensor address in the channel matches the last digit of the sensor's serial number (located at either end of the sensor's cable), note 0 = 10). Check the sensor baud rate in the channel menu, note unless instructed this should always be the default value of 9600. If the message persists consult with your supplier as the unit or sensor may require repair.
E09	**Sensor Write Error** The digital interface with the sensor has encountered a write error. Check sensor wiring. Check that the sensor address in the channel matches the last digit of the sensor's serial number (located at either end of the sensor's cable), note 0 = 10). Check the sensor baud rate in the channel menu, note unless instructed this should always be the default value of 9600. If the message persists consult with your supplier as the unit or sensor may require repair.

Sensor Input Errors

E21	**Fouling** The sensor's lens has become dirty or damaged, inspect and clean (as per maintenance on page 20) as necessary. If the message persists, please consult with your supplier.
E22	**Dry Sensor** The sensor's lens is not in contact with the liquid or there is the presence of air bubbles near the lens. Inspect the sensor's installation. If the message persists, please consult with your supplier.
E23	**High External Light** The sensor reading is being affected by external light sources. Inspect the sensor's installation. If the message persists, please consult with your supplier.
E24	**Indeterminate Measurement** The sensor's reading can not be determined. Check that the scale in the channel menu has been set high enough for the solution being measured. Inspect the sensor's lens for any damage or dirt. Inspect the sensor's installation. If the message persists, please consult with your supplier.

Setpoint Status

M51	**Setpoint 1 Dose Alarm**
M52	**Setpoint 2 Dose Alarm**
	The dose alarm for the setpoint is active.
M90	**Setpoint 1 Triggered**
M91	**Setpoint 2 Triggered**
	The setpoint has been triggered. (Only shows when setpoint flash on trigger is enabled.)

Current Output Errors

E61	**Output A Hardware**
E71	**Output B Hardware**
	The current output circuit has detected an error in the current output loop; this is most commonly due to either a broken loop or too large a load resistor.
E62	**Sensor < OP A Zero**
E72	**Sensor < OP B Zero**
	The sensor input level is below that set for the current output zero.
E63	**Sensor > OP A Span**
E73	**Sensor > OP B Span**
	The sensor input level is greater than that set for the current output span.
E64	**Sensor > OP A Zero**
E74	**Sensor > OP B Zero**
	The sensor input level is greater than that set for the current output zero.
E65	**Sensor < OP A Span**
E66	**Sensor < OP B Span**
	The sensor input level is below that set for the current output span.

Service Messages

M80	**Service Due** The Planned Service interval for this unit has expired. Please contact LTH Electronics at the details below: LTH Electronics ltd Chaul End Lane Luton Beds LU4 8EZ Tel. 0044 (0) 1582 593693 Fax 0044 (0) 1582 598036 Email sales@lth.co.uk NB. LTH overseas users should contact their LTH distributor – See www.lth.co.uk for details.
M81	**Calibration Due** The user entered calibration interval has expired.

Fault Finding

NOTE: THERE ARE NO USER SERVICEABLE PARTS INSIDE THE UNIT

The BTD17 has been designed to include a wide range of self-diagnostic test, some of which are performed at switch on, and some on a continuous basis. This guide aims to provide a route to diagnosing and correcting any faults that may occur during normal operation. The table shown previously in this section gives a list that the BTD17 generates, along with their probable causes. If the fault has not been cleared after these checks have been made contact LTH. Please have as much of the following information available as possible in any communication with LTH, to enable quick diagnosis and correction of the problem.

- Serial number of the instrument and sensor.
- The approximate date of purchase.
- Details of the program settings and application.
- Electrical environment and supply details.
- Circumstances under which the fault occurred.
- The nature of the fault or faults.
- Any error messages that are displayed.
- The sensor type, cable length and type.
- Current output configuration.
- Relay connection configuration.
- Digital Input Configuration.

It is often worthwhile to check the measurement by an independent method, for example using a handheld meter.

The Instrument Appears Dead
Check that power is available to the unit. Using a voltmeter, set to AC or DC, check the power supply voltage at the connector. The design of the BTD17 allows the unit to accept from 90 to 265V AC, an alternative option allows operation from 12 to 30V DC, check the connection label for voltage specification. Check that the power cable is securely and correctly attached. There are no user serviceable fuses fitted within this unit.

The Access Code Does Not Work
It is probable that the access code has either been changed or the operator does not recall the code correctly. Contact LTH or your local distributor should this problem arise.

The display reads ---.-
- Check the sensor is wired up correctly (see page 22)
- Check for damage to the connecting cable.
- Check that all input connections are secure.
- Check the sensor address in the channel menu matches the last digit of the sensor's serial number except for 0 which equals 10.
- Unless previously told differently check the sensor baud rate in the channel menu equals the default value of 9600.

The Sensor Reading Is Incorrect
- Check the condition of the sensor's lens.
- Check the installation is not being affected by external light sources.
- Check the sensor face is not being contaminated with bubbles.
- If another sensor is available, this can be used to determine whether the fault lies with the instrument or the sensor.

- Check that the sensor cable is not damaged or broken and that the outer screen does not contact any other terminals or metal work.
- Check that the sensor cable is sufficiently distant from power cables or electrical noise sources.
- Check that the correct scale has been selected.
- Check that the correct sensor calibration values have been used.
- Check that the calibration procedure has been followed precisely.

Current Output is Incorrect or Noisy

- Check that the maximum load for the current loop has not been exceeded. (750Ω).
- Check that the terminals have been wired correctly.
- Check that the cable screen is attached to Earth at one end and that the cable does not pass too close to a power cable.
- Check that the current output has been configured properly.

Relays Appear to Malfunction

- Check that the unit is "On-Line" (Page 23)
- Check that the set point has been configured properly.
- If the relays are vibrating or "chattering" as they pass the set point, check the hysteresis setting and increase if necessary.
- Ensure that the relays are connected properly and that the voltage/current levels are not exceeding 5A @ 30V DC or 5A @ 250V AC.
- Check that the instrument input cables are not picking up excessive noise.

Instrument display appears to malfunction

- Switch the instrument power off and on again.
- Check that the display back-light is on, indicating power is reaching the unit.
- See that it displays meaningful text (Issue number etc.) in its start-up sequence, indicating processing activity.

Guarantee and Service

Products manufactured by LTH Electronics Ltd are guaranteed against faulty workmanship and materials for a period of three years from the date of despatch, except for finished goods not of LTH manufacture, which are subject to a separate agreement.

All sensors made by LTH Electronics Ltd are thoroughly tested to their published specification before despatch. As LTH have no control over the conditions in which their sensors are used, no further guarantee is given, although any complaints concerning their operation will be carefully investigated.

Goods for attention under guarantee (unless otherwise agreed) must be returned to the factory carriage paid and, if accepted for free repair, will be returned to the customer's address free of charge. Arrangements can also be made for repair on site, in which case a charge may be made for the engineer's time and expenses.
If any services other than those covered by the guarantee are required, please contact LTH direct.

N.B. Overseas users should contact their LTH nominated representative. Special arrangements will be made in individual cases for goods returned from overseas.

Blank

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