Ultrasonic Detector *SDT 170*

Technical and Instruction User Manual

Eight edition.

The information herein is believed to be accurate to the best of our knowledge.

Due to continued research and development, specifications of this product can change without prior notice.

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Summary

1. The user manual

This *User manual* must be red carefully and completely prior to anyone using the equipment.

The *User manual* is designed as an educational guide and reference tool for anyone who wishes to use the *SDT 170* equipment for its intended purpose.

SDT produces this manual with the sole purpose of supplying simple and accurate information to the user. *SDT* shall not be held responsible for any miss-interpretation of this manual. Despite our efforts to provide an accurate manual, it may contain technical errors beyond our control. If in doubt, contact your local *SDT* distributor for clarification.

While every effort was made to present a true and accurate text, modifications and/or improvements to the product described herein can be made at any time without corresponding changes being made to the manual.

This *User manual* and its contents remain the inalienable property of *SDT*.

2. The package

According to the type delivered, the package contains the following elements:

	Model				
	S	**S+**	**M**	**M+**	**MD**
Storage case and foam	■	■	■	■	■
Unit with battery, rubber protection and user manual	■	■	■	■	■
Precision accessories (threaded tip, rubber precision cone and 2 plastic extensions)	■	■	■	■	■
Headphones 130 dB, noise isolating	■	■	■	■	■
Battery charger	■	■	■	■	■
Shoulder strap	■	■	■	■	■
Contact probe and needle			■	■	■
Center punch			■	■	■
MPlus software (1)				■	
DataManager software (2)					■
Cable RS232	■	■	■	■	■

(1) Data transfer from the unit to the PC. Delivered on a 3 ½'' floppy disk.

(2) Delivered on Cd-rom with user manual.

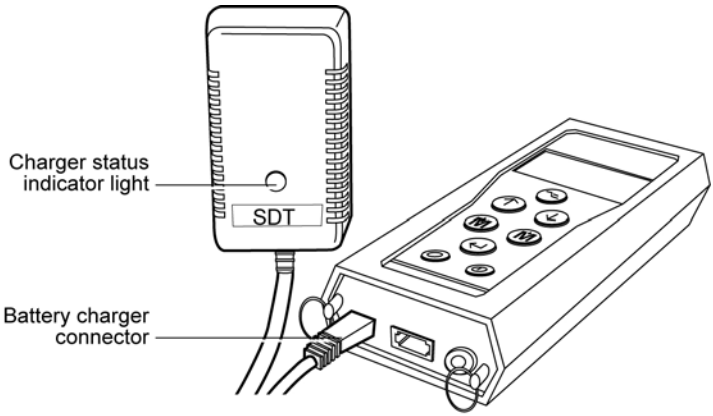
Quick reference guide

3. Recharging the battery pack

The battery pack **must** be charged before its first use.

The charger **must be unplugged** from the mains before recharging a new battery, in order to reset the internal timer.

3.1 RECHARGING THE BATTERY PACK IN THE UNIT

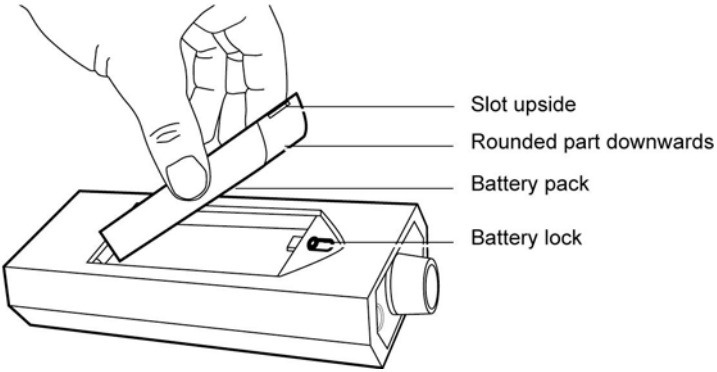


The connection of the charger to the unit. 052

1. **Connect the charger connector to the unit and plug the charger into the mains power socket.**
   The charging will be done in about 5 to 6 hours when the unit is switched off, or 12 to 14 hours when the equipment is used.
2. **The end of charging is done when the charger light is off.**

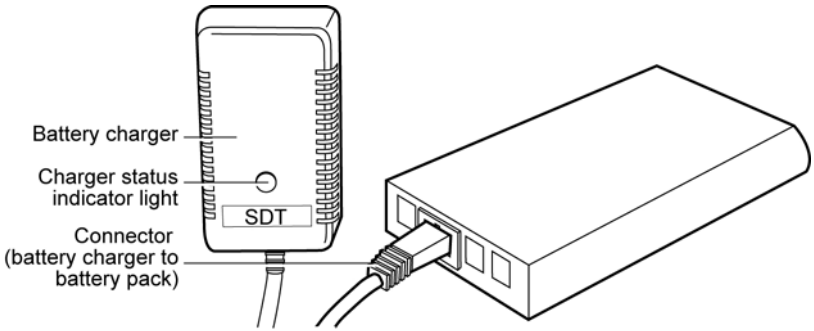
3.2 RECHARGING THE BATTERY PACK OUT OF THE UNIT

1. **Remove the battery pack by turning the equipment.**
   Maintain the battery lock towards the front of the equipment. Place your hand under the battery pack and gently tap the unit against your hand. The battery pack will release easily using this method.



Removing of the battery. 053

2. **Plug the connector on the end of the battery charger into the connector on the battery pack.**
3. **Plug the battery charger in the mains socket.**
   The charging cycle will take about 5 to 6 hours to be completed. The end of charging is done when the charger light is off
4. **Once charging over, replace the charged battery pack in the unit, like previously indicated.**



Connection of the battery charger onto the battery pack. 054

4. Using the SDT 170 S and S+

The chapter allows a quick use of the SDT 170 S and S+. It is nevertheless highly recommended to read carefully the whole manual before using the equipment. This chapter can therefore be considered has a quick reference guide.

4.1 RECHARGING ON THE EQUIPMENT

Refer to the chapter 3.

4.2 SWITCHING ON THE EQUIPMENT

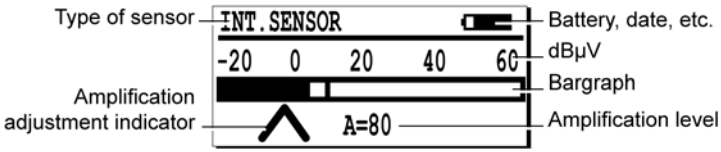
1. **Remove the sensor protective cap (see paragraph 7.3, page 38, marker 11) and press the ⏻ key to switch on.**
   The build in automated self-test is started and takes about 2 seconds to finish.
2. **The unit is ready to use if no problem or fault is detected during this build in self-test.**
   The message **`Battery charge too low`** flashes on the screen when the battery pack's charge is to low. Recharge the battery; see previous chapter.

4.3 THE SCREEN AFTER POWER ON

The *SDT 170 S+* displays a digital measurement, while the *SDT 170 S* only displays a bargraph.

SDT 170 S

The display shows the information as indicated in the following picture.



The measurement screen of the SDT 170 S displays a bargraph. 081

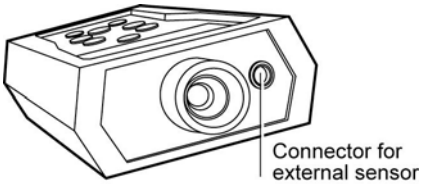
SDT 170 S+

The display shows the following information.

The measurement screen of the SDT 170 S+ displays a digital measurement. 083

4.4 CONNECTING THE OPTIONAL EXTERNAL SENSOR

If the measure requires an external optional ultrasonic sensor, connect it to the corresponding connector.



The external sensor connector. 034

4.5 SELECTION OF THE WORKING LANGUAGE

1. **Select the main menu with .**
2. ***Settings...* selected, push .**
3. **Select *Language…* with or and push .**
4. **Select the working language with or and push .**
5. **Push to go back to the main menu.**

4.6 ELECTION OF THE FREQUENCY BAND

In this mode, the *SDT 170* can not be used to measure or to store measurements. It can only be used to hear the ultrasounds signals.

If the standard frequency band (38.4 kHz) if sufficient, go to point 4.7.

If not, select the new frequency band, as follows:

1. **Select the main menu with .**
2. ***Settings...* being already selected, push .**
3. **Select *Sensor options* with or and push .**
4. ***Discov.fr.band* being already selected, push .**
5. **Set the frequency band displayed on the screen with or .**
6. **Push to go back to the main menu.**

4.7 SELECTION OF THE AMPLIFICATION LEVEL

1. **Look at the arrows (∧ and ∨) to optimize the amplification level (A).**
   Use the or buttons to modify the value **A** at the bottom of the screen.
   - When the *SDT170* receives ultrasonic sounds from a source, set the amplification level to have no arrow on the screen.
   - When no ultrasonic signal is present, set the amplification to **A = 80**.

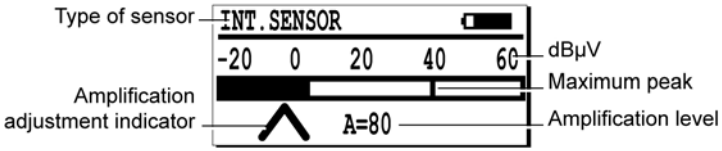
Note: it is advisable to begin the measurement with the maximal amplification (**A = 80**).

Prolonged or repetitive exposure to sound reduces hearing capabilities. Hence we advise users who use *SDT 170* devices in detection or for measurements with headphones to use the headphone attenuator marketed by SDT or to use hearing plugs.

4.8 TAKING A MEASUREMENT

SDT 170 S

1. **Remove the sensor protective cap.**
2. **Direct the internal sensor towards the noise source using or not an adaptator (precision accessories).**
   The screen indicates the measure.



The measurement screen of the SDT 170 S displays a bargraph. 082

SDT 170 S+

1. **Remove the sensor protective cap.**
2. **Direct the internal sensor towards the noise source using or not an adaptator (precision accessories).**
   The screen indicates the measure.

The measurement screen of the SDT 170 S+ displays a digital measurement. 084

4.9 SWITCHING OFF

1. **Press the ⏻ key and screw the sensor protective cap (see paragraph 7.3, page 38, marker 11).**
   Note: the unit will also automatically switch off after a pre-programmed period.

5. Using the SDT 170 M and M+

The chapter allows a quick use of the SDT 170 M and SDT 170 M+. It is nevertheless highly recommended to read carefully the whole manual before using the equipment. This chapter can therefore be considered has a quick reference guide.

Unlike the M version, the SDT 170 M+ can be connected to a PC on which the transfer software MPlus will be fist installed. One the data memorized bye the SDT 170 M+ transferred on the PC, these later can be viewed of processed by a specific software.

5.1 RECHARGING ON THE EQUIPMENT

Refer to the chapter 3.

5.2 SWITCHING ON THE EQUIPMENT

1. **Remove the sensor protective cap (see paragraph 7.3, page 38, marker 11) and press the ⏻ key to switch on.**
   The build in automated self-test is started and takes about two seconds to finish.
2. **The unit is ready to use if no problem or fault is detected during this build in self-test.**
   The message **`Battery charge too low`** flashes on the screen when the battery pack's charge is to low. Recharge the battery; see chapter 3.

5.3 THE SCREEN AFTER POWER ON

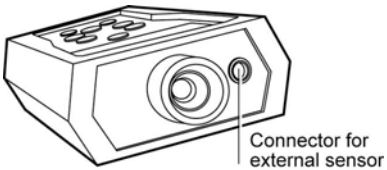
If the *SDT170* M or *SDT 170 M+* works with the:

- *Continuous* function, the screen is as shown below (see paragraph 5.7).
- *Max value* function, the screen shown any numeric value (see paragraph 5.7).

The measurement screen. 083

5.4 CONNECTING THE OPTIONAL EXTERNAL SENSOR

If the measure requires an external optional ultrasonic or non ultrasonic sensor, connect it to the corresponding connector.



The external sensor connector. 034

5.5 SELECTION OF THE WORKING LANGUAGE

1. **Select the main menu with .**
2. ***Settings...* selected, push .**
3. **Select *Language…* with or and push .**
4. **Select the working language with or and push .**
5. **Push to go back to the main menu.**

5.6 SELECTION OF THE FREQUENCY BAND

In this mode, the *SDT 170* can not be used to measure or to store measurements. It can only be used to hear the ultrasounds signals.

If the standard frequency band (38.4 kHz) is correct, go to point 5.7. If not, select the new frequency band, as follows.

1. **Select the main menu with .**
2. **Select *Settings...* with or and push .**
3. **Select *Sensor options* with or and push .**
4. **Select *Discov.fr.band* with or and push .**
5. **Set the frequency band with or .**
6. **Set the amplification with or .**
7. **Push to close this screen.**

5.7 SELECTING THE CONTINUOUS/MAX VALUE FUNCTION

Use the function:

- *Continuous* when the average value is to be measured. The screen will always display the value.
- *Max value* function when the peak value is to be measured. The screen will display the value only when pressing .

1. **Select the main menu with .**
2. **Select *Settings...* with or and push .**
3. **Select *Sensor options* with or and push .**
4. **Select *Continuous* or *Max value* with or and push to validate.**

5.8 SELECTION OF THE AMPLIFICATION LEVEL

1. **Look at the arrows (∧ and ∨) to optimize the amplification level (A).**
   Use the or buttons to modify the value **A** at the bottom of the screen.
   - When the *SDT 170* receives ultrasonic sounds from a source, set the amplification level to have no arrow on the screen.

- When no ultrasonic signal is present, set the amplification to **A = 80**.

Note: it is advisable to begin the measurement with the maximal amplification (**A = 80**).

Prolonged or repetitive exposure to sound reduces hearing capabilities. Hence we advise users who use *SDT 170* devices in detection or for measurements with headphones to use the headphone attenuator marketed by SDT or to use hearing plugs.

5.9 TAKING A MEASUREMENT

When using the continuous function

Use this function when the average value is to be measured.

1. **Point the sensor to the point to be controlled.**
2. **Read the signal level on the display.**
   The signal changes continuously. Measurement is to be performed while listening at headphone signals.

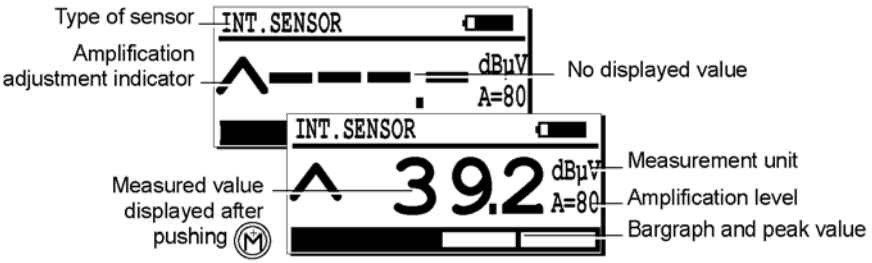
The measurement screen when using the continuous function. 084

When using the *Max value* function

Use this function when the maximal value is to be measured.

1. **Direct the sensor to the point to be controlled.**
2. **To visualize the signal level:**

Press	Result
M	The maximum (peak value) is displayed for as long as the key is pressed. When the M key is released, the *SDT 170* stops measuring. The display shows the highest value recorded while the key was pressed.
M	To make a new measurement and erase the previous maximum value, just press this again. If needed, store the measured value. Refer to next paragraph.



The measurement screen when using the maximal function. 094

5.10 STORING A MEASURED VALUE

Once the measured value is displayed on the screen and to store it in the data logger memory, proceed as follows:

1. **Push (M) to display the memory location menu.**
2. **With ↑ or ↓, choose the memory location (for example 2/999) for data storage.**
3. **Push (M) to display the value to be stored in the selected memory location. The type of sensor, date, time and value are also displayed.**
4. **Push ↵ to store the data which are now stored in memory.**
   The measurement screen is automatically displayed ready for a new measurement.

5.11 VIEWING A PREVIOUS STORED VALUE

To view a stored value in the data logger memory, proceed as follows:

1. **Select the main menu with ⏦.**
2. **With ↑ or ↓, choose *View data* and push ↵.**
3. **With ↑ or ↓, choose the memory location (for example 2/999) to be displayed and push ↵.**

   If exist, the recorded reading(s) is (are) displayed.
4. **With ↑ or ↓, choose one of these readings and push ↵.**

The data regarding the selected reading is displayed.

5. **Push ≈ until return to the measurement screen.**

5.12 ERASING A STORED VALUE

To erase a stored value in the data logger memory, proceed as follows:

1. **From the main menu push ≈.**
2. **With ↑ or ↓, choose *Erase data* and push ↵.**
3. **With ↑ or ↓, choose the memory location (for example 2/999) to be erased and push ↵.**

   If exist, the previous recorded reading(s) is (are) displayed.
4. **With ↑ or ↓, choose one of these readings and push ↵.**
   The date regarding the selected reading is displayed.
5. **Depress ↵ to erase the displayed data.**

   Note: push ≈ to abort the procedure without erasing and return to the previous screen.
6. **Push ≈ until return to the measurement screen.**

5.13 SWITCHING OFF

1. **Press the ⏻ key and screw the sensor protective cap (see paragraph 7.3, page 38, marker 11).**

   Note: the unit will also automatically switch off after a pre-programmed period.

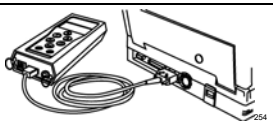
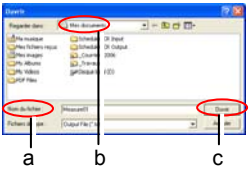
5.14 TRANSFER OF DATA FROM THE SDT 170 M+ TO THE PC

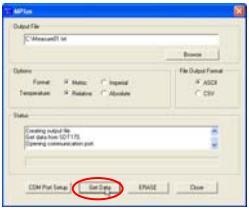
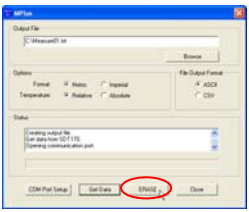
Installing the software on the PC

1. **Insert the floppy disk in the disk drive of the PC.**
2. **Move the `MPlus.exe` file in a folder of the PC or on the *Windows*® desk.**

Transferring the data to the PC

Proceed as follows:

Step	Displayed screen	Button	Action
1			Connect the delivered cable on the SDT 170 M+ and the serial input of the PC.
2			Switch on the *SDT 170 M+*.
3	 MPlus.exe		On the PC, double click on the icon to launch the **`MPlus.exe`** application.
4			Click the button *Browse*.
5	 a b c		a) Select the folder in which the data coming from the *SDT 170 M+* will be saved. b) In the field *File name*, enter the name of the file (txt file) under which the data coming from the *SDT 170 M+* will be saved. c) Click *Open*.

6		Click the button *COM Port Setup*.
7		Select the communication port on which the PC-SDT 170 M+ is connected to and click *OK*.
8		Click on the *Get data* button to launch the transfer of the memorized data by the *SDT 170 M+* towards the PC.
		The message `No response of SDT170` is displayed when a fault occurs during the transfer due to at least one of the following causes : - *SDT 170 M+* is off. - Battery flat or discharged. - Bad connection of the link cable or defect. - Bad selection of the Com port.
9		If necessary, click *Erase* to erase all data previously stored in the *SDT 170 M+* memory.
10		Once the transfer achieved, click on the *Close* button to close the *MPLus* application.
11		Switch of the *SDT 170 M+*.

6. Using the SDT 170 MD

The chapter allows a quick use of the SDT 170 MD. It is nevertheless highly recommended to read carefully the whole manual before using the equipment. This chapter can therefore be considered has a quick reference guide.

6.1 RECHARGING ON THE EQUIPMENT

Refer to the chapter 3.

6.2 SWITCHING ON THE EQUIPMENT

1. **Remove the sensor protective cap (see paragraph 7.3, page 38, marker 11) and press the ⏻ key to switch on.**
   The build in automated self-test is started and takes about two seconds to finish.
2. **The unit is ready to use if no problem or fault is detected during this build in self-test.**
   The message **`Battery charge too low`** flashes on the screen when the battery pack's charge is to low. Recharge the battery; see chapter 3.

6.3 THE SCREEN AFTER POWER ON

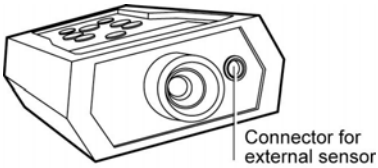
If the *SDT170* works with the:

- *Continuous* function, the screen is as shown below (see paragraph 6.6).
- *Max val* function, the screen shown any numeric value (see paragraph 6.6).

The measurement screen. 083

6.4 CONNECTING THE OPTIONAL EXTERNAL SENSOR

If the measure requires an external optional ultrasonic or non ultrasonic sensor, connect it to the corresponding connector.



The external sensor connector. 034

6.5 SELECTION OF THE WORKING LANGUAGE

1. **Select the main menu with .**
2. ***Settings...* selected, push .**
3. **Select *Language…* with or and push .**
4. **Select the working language with or and push .**
5. **Push to go back to the main menu.**

6.6 SELECTION OF THE FREQUENCY BAND

In this mode, the *SDT 170* can not be used to measure or to store measurements. It can only be used to hear the ultrasounds signals.

If the standard frequency band (38.4 kHz) if sufficient, go to point 6.7. If not, select the new frequency band, as follows.

1. **Select the main menu with .**
2. **Select *Settings...* with or and push .**
3. **Select *Sensor options* with or and push .**
4. **Select *Discov.fr.band* with or and push .**
5. **Set the frequency band with or .**

6. **Set the amplification with ↓ or ↑.**

7. **Push ~ to close this screen.**

6.7 SELECTING THE CONTINUOUS/MAX VALUE FUNCTION

Use the function:

- *Continuous* when the average value is to be measured. The screen will always display the value.
- *Max value* function when the peak value is to be measured. The screen will display the value only when pressing M.

1. **Select the main menu with ~.**

2. **Select *Settings...* with ↓ or ↑ and push ↵.**

3. **Select *Sensor options* with ↓ or ↑ and push ↵.**

4. **Select *Continuous* or *Max value* with ↓ or ↑ and push ↵ to go back to the main menu.**

6.8 SELECTION OF THE AMPLIFICATION LEVEL

1. **Look at the arrows (∧ and ∨) to optimize the amplification level.**
   Use the ↑ or ↓ buttons to modify the value **A** at the bottom of the screen.
   - When the *SDT 170* receives ultrasonic sounds from a source, set the amplification level to have no arrow on the screen.
   - When no ultrasonic signal is present, set the amplification to **A = 80**.

Note: it is advisable to begin the measurement with the maximal amplification (**A = 80**).

⚠ Prolonged or repetitive exposure to sound reduces hearing capabilities. Hence we advise users who use *SDT 170* devices in detection or for measurements with headphones to use the headphone attenuator marketed by SDT or to use hearing plugs.

6.9 SELECTION OF THE ROUTE

If the route selection is useless, go to the next paragraph.

1. **Select the main menu with .**
2. **Select the line *Select route* with or and push .**
3. **Select the desired route with or and push .**
4. **Push until to the main menu.**

6.10 TAKING A MEASUREMENT

When using the continuous function

Use this function when the average value is to be measured.

1. **Point the sensor to the point to be controlled.**
2. **Read the signal level on the display.**
   The signal changes continuously. Measurement is to be performed while listening at headphone signals.

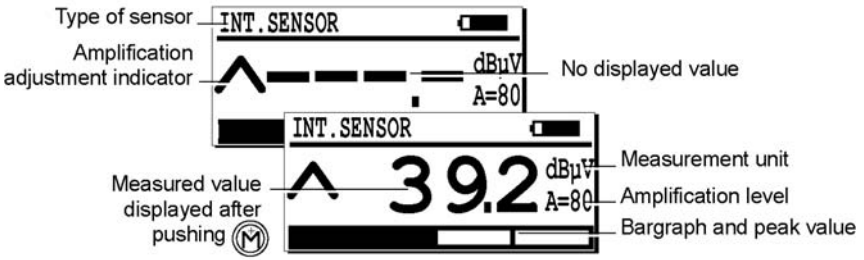
The measurement screen when using the continuous function. 084

When using the maximal function

Use this function when the maximal value is to be measured.

1. **Direct the sensor to the point to be controlled.**
2. **To visualizes the signal level:**

Press	Result
	The maximum (peak value) is displayed for as long as the key is pressed. When the key is released, the *SDT 170* stops measuring. The display shows the highest value recorded while the key was pressed.
	To make a new measurement and erase the previous maximum value, just press this again. If needed, store the measured value. Refer to next paragraph.



The measurement screen when using the maximal function. 094

6.11 STORING A MEASURED VALUE

Once the measured value is displayed on the screen and to store it in the data logger memory for the selected route, proceed as follows:

1. **Push (M) to display a memory location.**
2. **With ↑ or ↓, choose the point number for the previously selected route.**
3. **Push (M) to display the value to be stored in the selected memory location. The type of sensor, date, time and value are also displayed.**
4. **Push ↵ to store the data which are now stored in memory.**
   The measurement screen is automatically displayed ready for a new measurement.

6.12 VIEWING A PREVIOUS STORED VALUE

Selecting the route

1. **Select the main menu with .**
2. **Select the line *Select route* with or and push .**
3. **Select the desired route with or and push .**
4. **Push until to the main menu.**

Selecting the point

To view a stored value in the data logger memory, proceed as follows:

1. **From the main menu push .**
2. **With or , choose *View data* and push .**
3. **With or , choose, for the previously selected route, the point to be displayed and push .**
   If exist, the recorded reading(s) is (are) displayed.
4. **With or , choose one of these readings and push .**
   The data regarding the selected reading is displayed.
5. **Push until return to the measurement screen.**

6.13 ERASING A STORED VALUE

To erase a stored value in the data logger memory, proceed as follows:

1. **From the main menu push .**
2. **With or , choose *Erase data* and push .**
3. **With or , choose, for the previously selected route, the point to be erased and push .**
   If exist, the previous recorded reading(s) is (are) displayed.

4. **With ↑ or ↓, choose one of these readings and push ↵.**
   The date regarding the selected reading is displayed.
5. **Depress ↵ to erase the displayed data.**

   Note: push ≈ to abort the procedure without erasing and return to the previous screen.

6. **Push ≈ until return to the measurement screen.**

6.14 SWITCHING OFF

Note: after a power down of the detector (automatic switch off expired after delay or manual stop), the last used route will automatically be displayed.

1. **Press the ⏻ key and screw the sensor protective cap (see paragraph 7.3, page 38, marker 11).**
   Note: the unit will also automatically switch off after a pre-programmed period.

6.15 TRANSFER OF THE DATA FROM THE SDT 170 MD TO THE PC

Refer to the manual of the *DataManager* application.

Overview

7. Presentation

7.1 OPERATING PRINCIPLE OF THE SDT 170

General

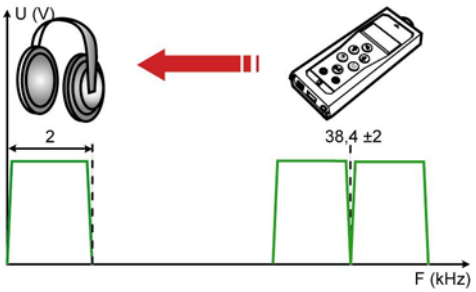
Ultrasonic waves are sound waves beyond the range of human hearing (>20 kHz). To be detected, we need to use equipment like the *SDT 170*, with the capability to receive ultrasonic frequencies and convert them to corresponding audible sounds.

Ultrasonic frequencies travel through gases (air) and solids (bearing housings) in a very directional nature; unlike audible sounds which disperse in all directions. Ultrasounds are low energy sound waves, therefore they are quickly absorbed by the medium through which they travel. Ultrasonic waves are generated by:

- Naturally occurring mechanical phenomena (friction of rotating equipment), pressure or vacuum leaks (pneumatic, gas, steam) or arcing and corona (electrical problems).
- Artificially by means of a transmitter (like the SDT 200 mW or the SDT 8 (8 x 125 mW) for tightness testing.

Applying ultrasonic waves on the SDT 170

The *SDT 170* detects ultrasonic signals, converts them to audible frequencies, and amplifies them. The challenge is to transpose the received signal, using the heterodyne technology, into an interpretable audible signal. This solution extends the ability of the human ear beyond the simple audible range and into the ultrasonic one.



The main function of the SDT 170 is converting high frequency signals into audible. 001

It is to be noticed that the central band frequency of the detector can be set to a specific frequency between 15.1 to 190.7 kHz (see *Chapter 12.3*) ; the standard frequency band being 38.4 kHz.

The frequency bands are used according to the type of noise to be detected. 088

7.2 THE VARIOUS VERSIONS OF THE SDT 170

They are summarized in this table.

	S	S+	M	M+	MD
Tunable frequency	■	■	■	■	■
LCD display on bargraph	■				
Digital LCD display		■	■	■	■
Built-in (internal) ultrasonic sensor	■	■	■	■	■
Audio output	■	■	■	■	■
Connector for charging unit	■	■	■	■	■
Connector for PC	■	■	■	■	■
Data memorization			■	■	■
Route possibilities					■ (3)
Data transfer software *MPlus* (1). Delivered on floppy disk.				■	
Data transfer software. *DataManager* (1). Delivered on CD.					■
External sensor connector	■	■	■	■	■
External ultrasonic sensors possibility (2)	■	■	■	■	■
External non ultrasonic sensors possibility (2)			■	■	■

(1) Through the connector for PC.
(2) Sensors as option.
(3) 128 max.

Updating and upgrading possibilities

Regularly and for different reasons, the software version from the *SDT 170* ultrasonic detector can be updated. One of these reasons, is the implementation of a new sensor in our *SDT* product line, another reason can be the addition of a language, the most common reason being a technical improvement in the core software.

This makes the *SDT 170* the only Ultrasonic Multifunctional detector in the world that's always *up to date*.

Every owner of an *SDT 170* detector can download this software update. The only things needed are a cable, an Internet connection, an unzip software and to contact your local SDT distributor for more information.

The difference between updating and upgrading is:

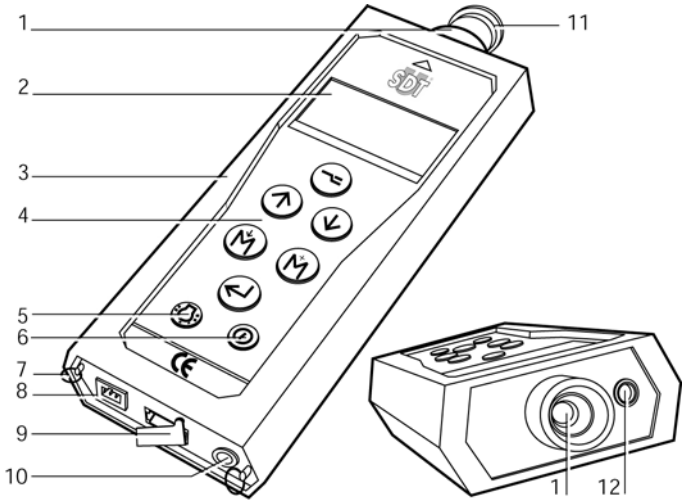
- Updating is downloading the latest software version into the *SDT 170*, without changing the level of the equipment. The build number will be changed.
- Except the *SDT 170 MD* (**M**ultifunctional **D**ataManager), any version of the *SDT 170* detector can be upgraded to any higher version and gaining all its possibilities.

To summarized

- **SDT 170 S**: basic detector.
- **SDT 170 S+**: same characteristics as the *SDT 170 S*, with moreover the digital display of the measure.
- **SDT 170 M**: up to 1000 points, each can store up to 4 measurement values, can be stored. The newest data pushes the oldest one (FIFO); this unit cannot memorize any route.
- **SDT 170 M+**: same characteristics as the *SDT 170 M*, with moreover the possibility of the data transfer memorized by the *SDT 170 M+* towards the PC.
- **SDT 170 MD**: this unit can memorize 128 routes. Each route can have up to 1,000 points. Each point can memorize up to 4 measurements. One route can therefore memorize 4,000 data. The route 000 works as a scratch pad and cannot receive a preloaded route.

7.3 FRONT AND BACK SIDE (FULL VIEW)

Presents itself as follows:



N°	Function	N°	Function
1.	Built-in ultrasonic sensor and cap.	8.	Battery charger connector.
2.	LCD display.	9.	RS 232 connector and cap.
3.	Holster.	10.	Audio output connector (headphone *minidisc*, PC, analyzer).
4.	Keyboard.	11.	Sensor protective cap.
5.	Backlight switch.	12.	External sensor connector.
6.	On/Off switch.		
7.	Strap carrying rings.		

The visible elements of the SDT 170. 002

7.4 THE KEYBOARD (ALL VERSIONS)

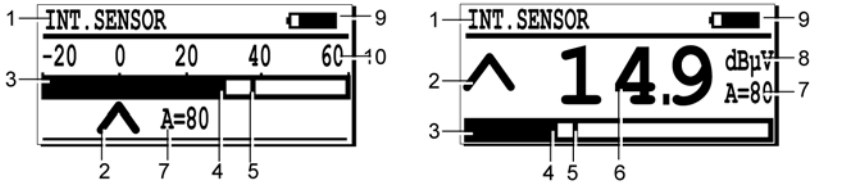
The keys correspond to the following functions:

Key	Function	Remarks
	First press: access to the menus and sub-menus.	See chapter “The main menu”.
	Second press: return to previous or basic screens.	
	Increase amplification level.	The **A** on screen is modified.
	Scroll up through menus.	Use to scroll through the menu options.
	Increment figures.	Increment a value (time, the date.
	Reduce amplification level.	The **A** on screen is modified.
	Scroll down through menus and sub-menus.	
	Decrement figures.	Decrement a value (time, the date.
	Measurement peak and hold key (except S version).	Keep the key depressed to display the value. Only used when measuring ultrasound and noise levels (dBµV and dBA).
	Tunable frequency setting.	Increase the tunable frequency.
	Storage of the shown (measured) value (except S version).	Only available when a valid measurement has been taken, by pressing the  key. Measured value is stored on the position selected; reading is done through the **`View data`** menu.
	Tunable frequency setting.	Decrease the tunable frequency.
	Move the cursor to the right.	Used during the enter comment procedure or to set date, etc.
	Acceptance of the choice (Enter).	Used to validate and confirm a shown selection.
	Activate backlighting.	Press the key to switch on the backlight. Pressing the key again switches off the backlight. The backlighting switches off automatically if no buttons are used within a pre-defined period of time set by the user.
	On/Off switch.	First key press: switch on the unit. Second key press: switch off the unit. The unit switches off automatically if no buttons are touched on the keypad within pre-defined period of time set by the user.

7.5 THE DISPLAY

Common icon to all versions

The following table summarizes the visible icons.

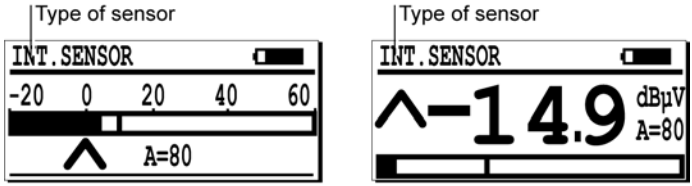


All the icons visible on the display. 063

N°	Function	Remarks
1	Type of sensor	Type of sensor used / connected.
2	Amplification indicator	Only for ultrasound (dBµV) measurements.
3	Bar graph.	Visual indications of the measured value.
4	Signal indicator.	This indicator shows the actual level of the signal.
5	Peak and hold maximum signal indicator.	This vertical line shows the maximum signal detected and resets itself after approximately 2 seconds.
6	Measurement value	The digital measured value, picture of signal indicator.
7	Amplification info	A = level selected in dB (ultrasound).
8	Unit of measurement.	Depends on the connected sensor.
9	Information	Display alternates between battery level indicator, time, used memory and date.
	Battery level indicator.	100% black corresponds to a fully charged battery.
	Time (Hour)	Current time.
	Used memory	In % of the RAM used. 100% = fully used memory.
	Date	Current date.
10	Maximum readable value	Full scale measurement.

Type of sensor used

The type of sensor used is displayed at the upper left corner of the display. The system auto recognizes externally connected sensors and switches to the appropriate parameters and measuring mode.



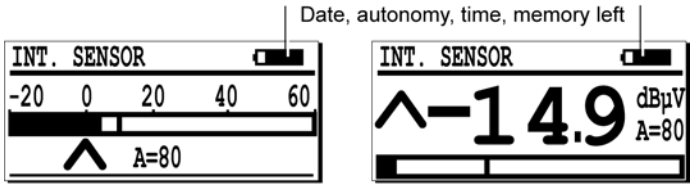
S version *S+, M, M+ and MD versions*

Display example of sensor type connected. 028

Date / Autonomy / Time / Memory left

This information is cycling on the upper right corner of the screen. The format of the displayed time and date depends on the type of language used. The remaining capacity in the battery is expressed by an icon (the amount of blackening corresponds to the remaining capacity of the battery). The memory capacity used is expressed in %. The following table shows the icons used.

Icon	Signification
06/16/2002	Date in the local format.
	Remaining capacity of the battery. 100% black means fully charged battery.
5:17 P	Local time.
3%	Used capacity of the memory.



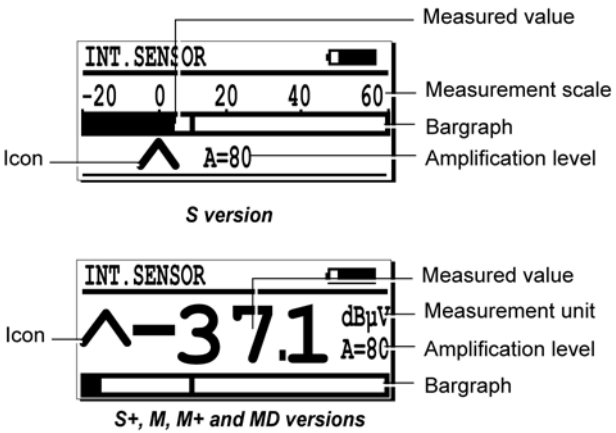
S version *S+, M, M+ and MD versions*

Example of battery capacity remaining. 029 -030

The measured data and its complementary information

The display shows the measured data and its complementary information described in the lower paragraphs, which are:

- Measured value.
- Measurement units.
- Amplification level selected.
- Icon of the amplification level.
- Bargraph.



The main information relating to the measure. 031

The measured value

The measured value is shown in the middle of the screen. It should be remembered that for each memory number the last four measurements can be recalled at any time, by pressing the ≈ key and selecting the **VIEW DATA** menu. Refer to chapter 10 for more details on this operation.

The measurement unit (except *S* version)

The measurement unit is shown on the right side of the display, such as **dBµV**.

The measurement scale (S version only)

It varies according to the amplification level as shown in the following table.

	Selected amplification level							
	10	20	30	40	50	60	70	80
Min value*	50	40	30	20	10	0	-10	-20
Max value*	130	120	110	100	90	80	+70	+50

(*) values in dBµV. The noise values lower that the min value will not be displayed. As example, an amplification level of 50 will detect US from 10 up to 90.

The icons ∧ and ∨

The displayed arrows must be used to guide the operator when adjusting the amplification. Optimum amplification is reached when no arrows are shown on the display. See the paragraph below.

The amplification level

This is displayed when using ultrasound sensors only. The amplification level ('A' symbol) can be increased by pressing ↑ or decreased by pressing ↓ keys.

The optimum adjustment of the amplification level is assisted by means of the arrows located on the left side of the screen.

- ∧ indicates that the amplification level is to low, and that a higher amplification level should be selected.
- ∨ indicates that the amplification level is too high, and that a lower amplification level should be selected.

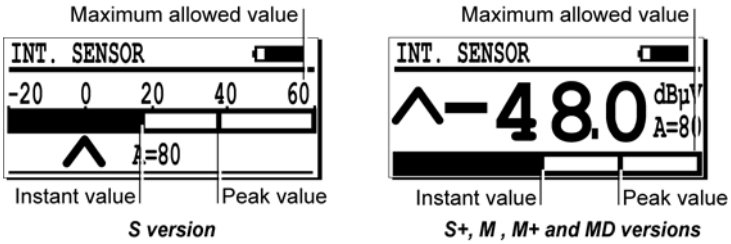
The table below indicates the correlation between the amplification level in dB and the absolute amplification value.

A (dB)	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**
Gain	3	10	30	100	300	1 000	3 000	10 000
Min (1)	49	39	29	19	9	-0.6	-4.1	-7

(1) It is to be pointed out, that these data are displayed with *M*, *M+* and *MD* versions after selection of **`Continuous`** in the **`Sensor options`** menu, and when pushing ↓ or ↑, are the minimal noise level detected by the equipment once set with a given amplification. So, with an amplification set to 40, all noises lower than 19 dB **will not be displayed**. It is the reason why the amplification level must be set to 80 for small leak detection.

The bargraph

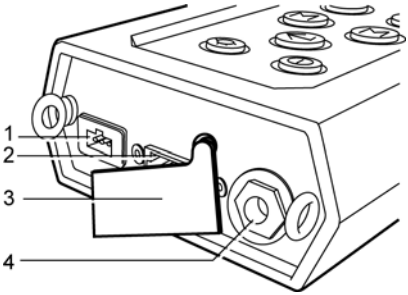
Situated on the lower side of the display, it graphically illustrates the amplitude of the measured signal. While measuring, an indicator line shows the peak value measured. Every two seconds, the peak and hold indicator is reset.



The bargraph and its peak and hold indicator. 032

7.6 THE BOTTOM PLATE VIEW

This figure represents the location of the connectors at the back side.



1. Battery charger connector.
2. RS232C connector.
3. Protective cap.
4. Audio output connector (headphone *minidisc*, PC, analyzer).

The rear connectors. 005

The battery charger connector

This 3-pin connector is used to make the connection with the battery charger provided with the *SDT 170*. Due to the active interaction between the charger and the battery/equipment, only this charger can be used to charge the batteries.

Connecting another charger will do serious damage to the equipment and void the warranty.

The PC communication/expansion connector

The 8 pin plug connects with a PC by means of a RS 232 C type connection. This is used to download measurements to a PC. This port is also used to upgrade or update new software to the *SDT 170*. The functions are described in the *SDT 170 Datamanager Software Manual*. The connector is protected against dust and moisture by a rubber protection cap.

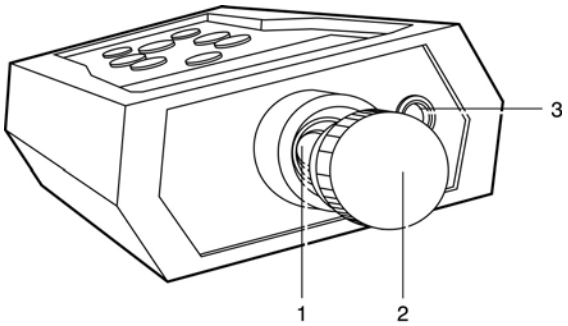
The headphones connector

Allows the connection to supplied headphones for converted ultrasounds listening, and/or to complementary equipment such as PC, minidisk (for audio signal recording), analyzer, etc.

7.7 THE FRONT VIEW

The internal ultrasonic sensor

The detector has an internal sensor for detecting airborne ultrasonic phenomena such as compressed air leaks, vacuum leaks and corona discharge. It is directly connected to the internal components and protected by the sturdy extruded aluminum housing.



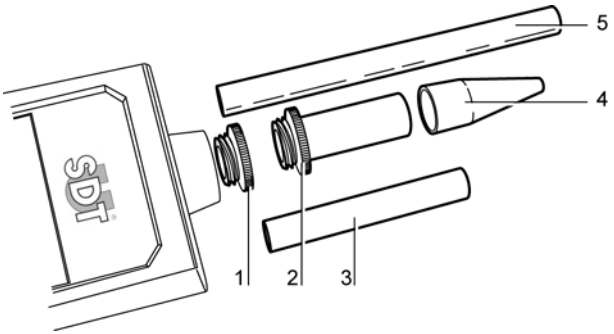
1. Ultrasonic sensor.
2. Protection cap.
3. Connector for external sensor.

Elements located on the top of the SDT 170. 005

This sensor is not waterproof. Precautions must be taken to protect the sensor from humidity and projections of liquids. For that purpose, the internal sensor is protected by a metal cap which has to be fitted if the sensor is not in use.

Warning: when using the internal sensor, do not forget to remove the protection cap (rep. 2).

Several precision accessories are delivered with the unit which permits to focus the emission point. They to be connected as follows:



1. Protection cap to be removed before any measurement.
2. Threaded tip to be used with the elements 3, 4 or 5, if useful.
3. Extension to be fitted between 2 and 4.
4. Rubber precision cone to be fitted on items 2, 3, and 5, if useful.
5. Plastic extension to be fitted between 2 and 4.

Precision accessories to be mounted on the sensor of the SDT 170. 072

The connector for external sensors

It is insistently advised to refer to paragraph *Important note concerning the plugging to the connector* on page 124 regarding the connecting procedure, in order to avoid any premature deterioration of the connector and the plug.

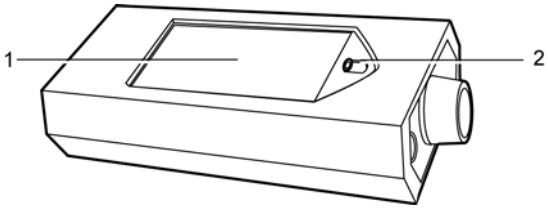
Depending on the version (*S*, *S+*, *M*, *M+* or *MD*) you have purchased, additional external sensors can be connected. The internal airborne ultrasound sensor is automatically disconnected when an external sensor is connected.

The sensor families (ultrasonic or non ultrasonic) can be connected on the various *SDT170* as follows:

	Ultrasonic sensors	Non ultrasonic sensors
SDT 170 S	■	
SDT 170 S+	■	
SDT 170 M	■	■
SDT 170 M+	■	■
SDT 170 MD	■	■

7.8 THE BACK SIDE

Permits the access to the battery pack.



1. Battery pack
2. Locking catch of the battery pack

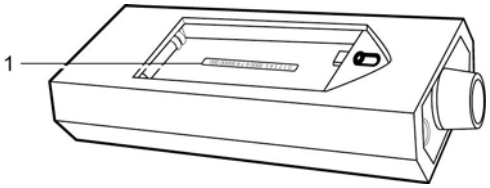
Visible elements of the backside of the equipment. 006

The battery

The battery is a NiMH type (Nickel Metal Hydrate; operating voltage 7.2 V). It is specific to the equipment. Chapter 14 presents the general characteristics of the battery pack. Chapter 15 explains how to recharge the battery pack.

The serial number of the SDT 170

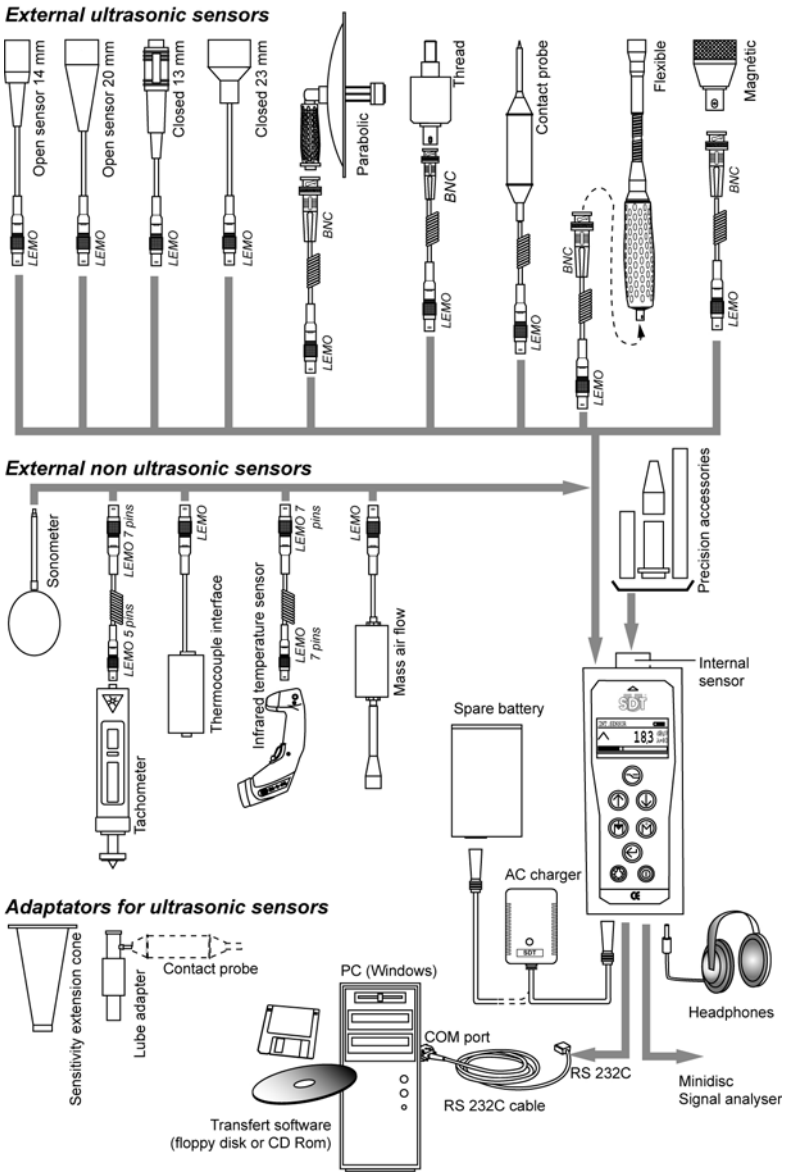
The serial number of the *SDT 170* is visible in the battery compartment, on the back side of the unit.



1. Bar code and serial number of the detector.

Localization of the serial number of the detector. 076

7.9 GENERAL VIEW OF ACCESSORIES

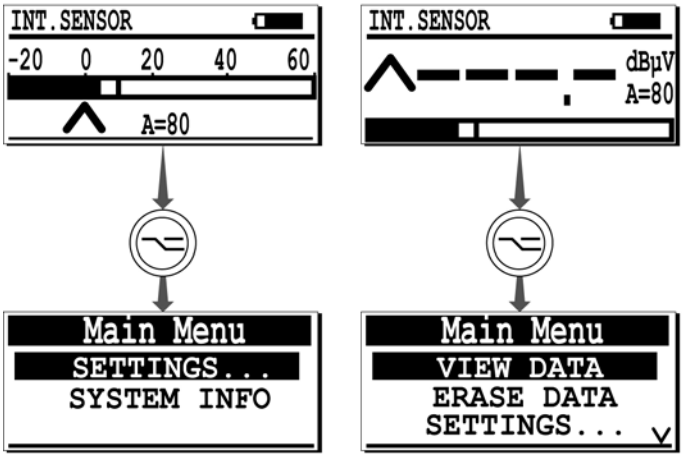


General view of accessories to be mounted on the SDT 170. 100

8. The *Main menu* (all versions)

8.1 ACCESS TO THE MAIN MENU

- Switching on the equipment by pressing the ⏻ key.
- Once the equipment switched on, the self-test is started and takes about two seconds to finish. If no problem or fault is detected during this test, the unit will place itself into the measurement mode.
- Once the measurement screen is shown, press ≈ to access the main menu.



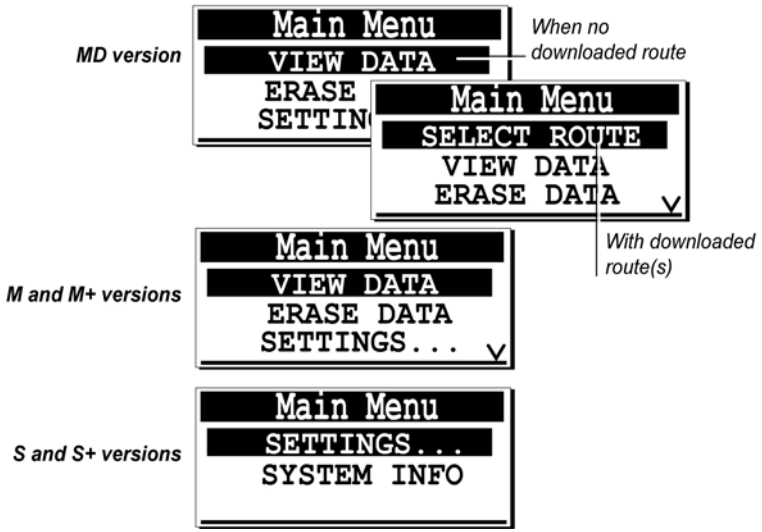
S version *S+, M, M+ and MD versions*

Access to main menu is done by depressing the ≈ key. 007

8.2 THE MAIN MENU SCREEN

Presentation

The main menu contains the following choices.



The main menu. The menu SELECT ROUTE is only in the SDT 170 MD version accessible. The menus View data and Erase data are not available in the SDT 170 S and S+ versions.[008]

The accessible menus

They depend of the type of the unit (S, *S+*, *M*, *M+* or *MD*):

- '**SELECT ROUTE**': (*MD* version only and when at least one route has been uploaded from the PC) select a user-defined route for storing measured data. See chapter 9.
- '**VIEW DATA**': (*M*, *M+* and *MD* versions only) preview the measurements stored in the detector point by point. See chapter 10.
- '**ERASE DATA**': (*M*, *M+* and *MD* versions only) delete measurements stored in the detector point by point. See chapter 11.
- '**SETTINGS**': (all versions) use this menu to set sensor options, clock and date of the internal real time clock, LCD display's contrast, displays backlighting timer, auto power down timer, language, type of measurement system, unit of measurement relative to temperature and frequency range (only available when a contact probe is attached to the equipment). See chapter 12.

- **'SYSTEM INFO**: (all versions) display's complementary equipment information on the display: serial number, software version, language used, serial number and type of battery, number of times the battery has been recharged, last calibration date. See chapter 13.

Each of these menus is fully described in the next chapters. The menus available can be summarized as follows:

Menu	S	S+	M	M+	MD
Select route (1)					■
View data			■	■	■
Erase data			■	■	■
Settings…	■	■	■	■	■
System info	■	■	■	■	■

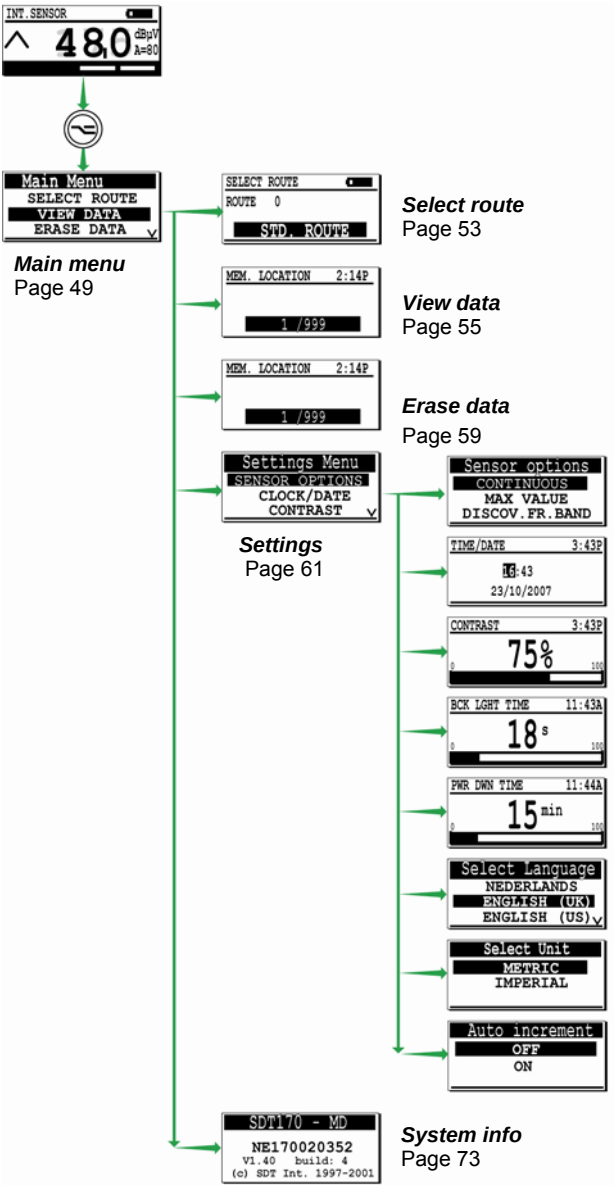
(1) only if at least one route has been download into the SDT 170 MD.

The activated keys in the main menu and sub menu contexts are:

Key	Function
	Return to the previous menu.
	Select one of the menu lines by moving the inverted line upwards, only when the ∧ sign is displayed in the upper right corner of the display.
	Select one of the menu lines by moving the inverted line downwards, only when the ∨ sign is displayed in the lower right corner of the display.
	Enter, validates the choice (the inverted line).
	Activates the backlight. This key is available at any time.
	Switch of the equipment. This key is available at any time.

8.3 MAIN FUNCTION TREE

It is displayed on next page. Some screens are not available on all models. Refer to this manual.



General tree of the menus. Some screens are not available on all models. 200

9. The *Select Route* menu (MD only)

This menu is only available when at least, one route has been uploaded from the PC. Refer to the *DataManager - User' Manual* to learn how to transfer a route, to or from the collector (*SDT 170 MD*).

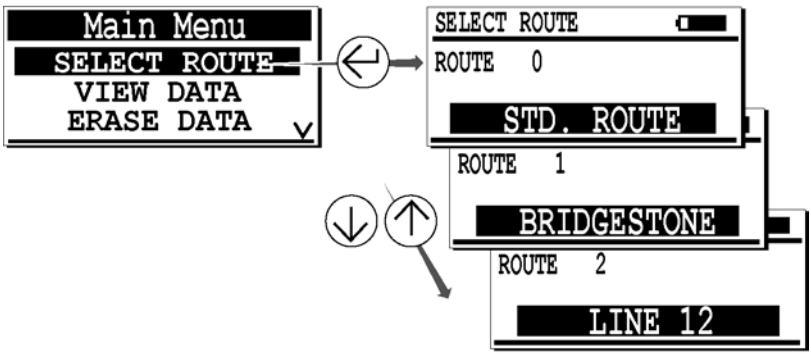
The route concept is explained in the Chapter 23.

9.1 CHOOSING A ROUTE

It allows the choice of:

- One of the preloaded route(s).
- The **`Std route`** (standard route) is also numbered `Route 0`. This one is only used as a scratch pad and has no preloaded point.

The user will memorized the data on each measuring point according to the schema defined by the route.



The Select route menu. 039

The activated keys in the main menu and sub menu contexts are:

Key	Function
	Return to the previous menu.
	Select one of the menu lines by moving the inverted line upwards, only when the ^ sign is displayed in the upper right corner of the display.
	Select one of the menu lines by moving the inverted line downwards, only when the v sign is displayed in the lower right corner of the display.
	Validates the route (the inverted line).
	Activates the backlight. This key is available at any time.
	Switch of the equipment. This key is available at any time.

9.2 USING A ROUTE

Once the route chosen according to the previous paragraph, return to the measuring screen thanks to the  key.

The unit waits for its measurements according to the preloaded program.

Chapter 6, *Using the SDT 170 MD*, explains how to use the *SDT 170 MD* with a preloaded route.

10. The *View Data* menu (M, M+ and MD)

This menu allows the viewing of the stored data for a given route already selected in the **`Select route`** menu. It permits the user to display for any memory number, the stored memory contents (four last values only).

It is assumed that measured data have been previously stored.

10.1 VIEWING DATA WITH THE *SDT 170 M* AND *M+*

Proceed as follows:

- The equipment switched on, press the ⏦ key to display the **`Main menu`**.
- Using the ↑ or ↓ keys, select the line **`View data`** and press ↵.
- Select the Memory location (**`0/999`** until **`999/999`**) to be displayed using the ↑ or ↓ keys. Hold the key to rapidly increment/decrement the memory number.
- Validate the selection by pressing the ↵ key. The available measurement(s) is (are) displayed. When no data is stored on the selected memory location, the display responds with **`No measurement`** ; in this case, press again the key ↵ to return to the previous display.
- Use the ↑ or ↓ keys to select the measurement line to be displayed.
- Press ↵ shows a more detailed screen; see paragraph *Detailed information* below.
- Return to the previous menus by pressing the ⏦ key.

10.2 VIEWING A DATA WITH THE *SDT 170 MD*

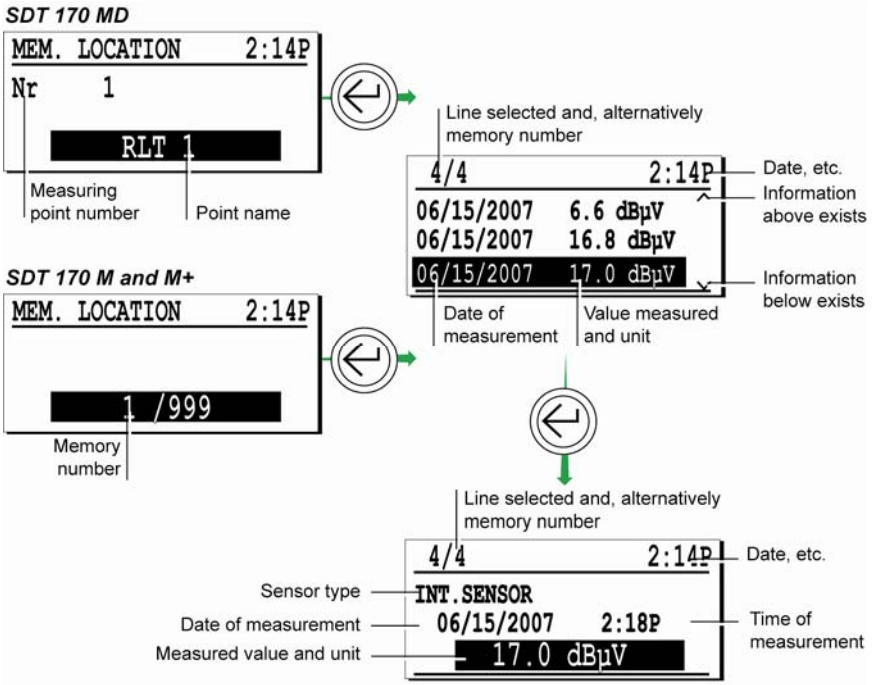
The data stored in the memory relating to the preloaded route or in **`Route 0`** if no preloaded route, will be displayed. Proceed as follows:

- The equipment switched on, press the ⏦ key to display the **`Main menu`**.
- Select the line **`Select route`** using the ↑ or ↓ keys and press ↵.

- Select the desired route number using the ↑ or ↓ keys and press ↵ to return to the **`Main menu`**.
- Using the ↑ or ↓ keys, select the line **`View data`** and press ↵.
- For the previously chosen route, select the point to be displayed using the ↑ or ↓ keys (hold the key to rapidly increment/decrement the memory number) and press ↵.
- Select the measurement line to be displayed using the ↑ or ↓ keys.
- Validate the selection by pressing the ↵ key. The measurement is displayed. When no data is stored on the selected memory location, the display responds with **`No measurement`** ; in this case, press again the key ↵ to return to the previous display.
- Press ↵ shows a more detailed screen; see paragraph *Detailed information* below.
- Return to the previous menus by pressing the ~ key.

10.3 DETAILED INFORMATION

When a particular measurement line has been selected, press the ↵ key to display more detailed information.



The general data shows the measured values. 036

The activated keys are:

Key	Function
	Return to the previous menu.
	Move the inverted selection line upwards. The first number is the last measurement made.
	Move the inverted selection line downwards. The first number is the last measurement made.
	Validates the selected memory number and displays more details about the measurement.

11. The *Erase Data* menu (M, M+ and MD)

This menu allows the removing of the stored data. The data to be erased will be:

- With a *SDT 170 MD*, one of the current uploaded route.
- With a *SDT 170 M* or *M+*, one of the measurement point (0 to 999).

11.1 ACCESS THE *ERASE DATA* MENU

- The equipment switched on, press the key to display the **`Main menu`**.
- Select the line **`ERASE DATA`** and press .

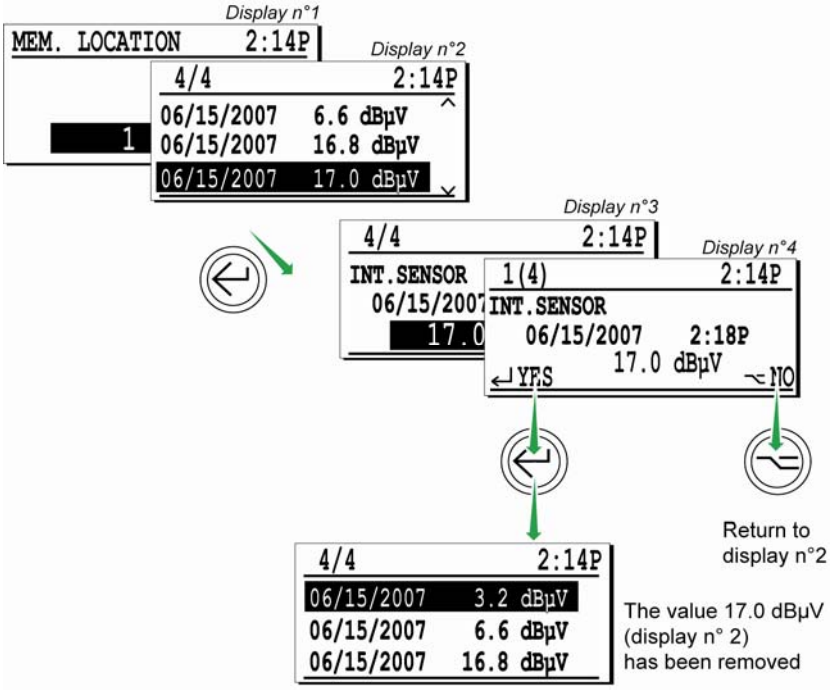
11.2 ERASING DATA

This erase the designed data stored in the designed memory. Proceed as follows:

- Select the **`Memory location`** to display using the or keys. Hold the key to rapidly increment/decrement the memory number.
- Validate the selection by pressing the key. The screen of memorized data is displayed. When no data is stored on the selected memory location, the display responds with **`No measurement`** ; in this case, press again the key to return to the previous display.
- Press again the key to display the complementary information before deleting.
- To erase the data, press:
  - to quit the screen without erasing the data and return to the previous menu.
  - to erase the data. The measurement is erased and the previous screen is displayed.
- Return to the previous menus by pressing the key.

The active keys are:

Key	Function
	Return to the previous menu without erasing the data.
	Erasing the data and return to previous menu.



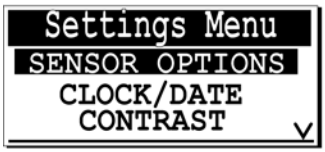
The various screens displayed when erasing a data. 038

12. The *Settings* menu (all versions)

This menu allows the configuration setting of the detector, such as sensor options, date and internal clock, contrast of the display, duration of the backlighting, delay of the auto power down, etc.

12.1 ACCESS THE *SETTINGS* MENU

- The equipment switched on, press the ⏦ key to display the Main menu.
- Select the line **`Settings…`** and press ↵.
- The following menu is then displayed.



The Settings Menu shows several settings. 015

12.2 THE ENTRIES OF THE *SETTINGS* MENU

The following menus are displayed, by using the ↑ or ↓ keys. Each of them, entered by pressing the key ↵, is fully described below.

	S	S+	M	M+	MD
Sensor options	■	■	■	■	■
Clock/Date	■	■	■	■	■
Contrast	■	■	■	■	■
Back light	■	■	■	■	■
Auto power down	■	■	■	■	■
Language	■	■	■	■	■
ISO/Imperial			■	■	■
Auto increment			■	■	■

12.3 SENSOR OPTIONS

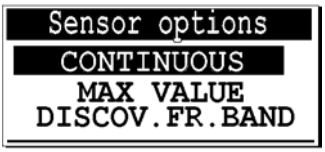
Note: for the *SDT 170 S* and *S+*, sole the **`Discov.Fr.Band`** line is available.

The function of the sensor determines automatically the screen display. Different external sensors can be connected to the detector such as those listed below. For all other external sensors please refer to their specific user instructions. The following sensors have a *Sensor options* menu:

- US sensors (dBµV).
- Contact probe (dBµV).
- Sound level meter (dbA).
- Thermocouple interface (°C, °F, °K or °R).
- Non-contact infrared temperature sensor (°C, °F, °K or °R).)

With an US sensor

The following menu is displayed.



The Sensor options menu when an US sensor is fitted. 016

The selection acts as follows:

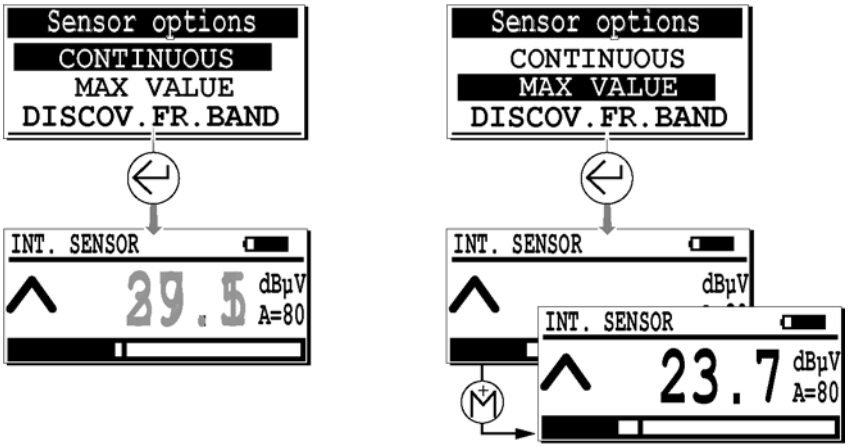
Continuous

The bar graph and the display show a measure which varies continuously, according to the signal measured. If necessary, sole the instant measurement can be stored.

Max value

The bar graph shows the instant level which varies continuously but the display only shows the maximal measurement when the M is depressed. If necessary, the maximal measurement can be stored.

The picture, on next page, shows the influence of the choice.



When using "Continuous", the measure varies continuously (left side). When using "Maximal value", the display only shows the maximal measurement when the (M) is depressed. 018

The active keys are:

Key	Function
	Return to the parameter menu, without taking into account eventual changes.
	Move up the upper line.
	Move down the lower line.
	Enter, validate choice and return to the measurement display.

Discov Fr Band

Choose this option to define the central band frequency normally set to 38.4 kHz.

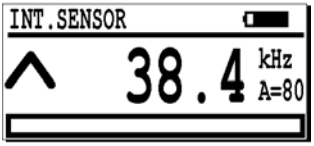
The central band frequency should be set to:

- Lower frequencies (15.1 to 38.4 kHz).
- Upper frequencies (38.4 to 190.7 kHz).

The band width is always 2 kHz from the central displayed frequency. This allows the user to characterize phenomena on another frequency. This option is available with all ultrasonic sensors except the contact probe and the parabolic sensor.

The frequency bands are used according to the type of noise to be detected. 088

The screen displays the central band frequency as follows.



The screen when setting the frequency band. 087

The active keys are:

Key	Function
	Enter, validate choice (frequency and/or amplification) and return to the measurement display.
	To lower the central band frequency.
	To upper the central band frequency.
	To increase the amplification level.
	To decrease the amplification level.

In this mode, the *SDT 170* can not be used to measure or to store measurements. It can only be used to hear the ultrasounds signals

With a contact probe

This function is only accessible when a contact probe is plugged into the unit (by means of the external sensor connector). The following menu is displayed.

The menu with a contact probe. 026

The user can select one of three operating modes, depending on the application:

- **US:** ultrasonic mode, to use as your default mode.
- **MEC:** mechanical mode, to use in complement of the ultrasonic mode.
- **SLOW MEC:** high sensitivity mechanical mode (+ 40dB).

For the choice of the appropriate mode to each application, see paragraph 17.1, Contact Probe – Operating mode. The active keys are:

Key	Function
	Return to the parameter menu, without taking into account eventual changes.
	Move up to the contact probe frequency band selector.
	Move down to the contact probe frequency band selector.
	Enter, validate choice and return to the measurement display.

With a sound level meter (dbA)

The following menu is displayed.

The menu with sound level meter. 048

The selection acts as follows:

- **Slow**: slow reaction to sound peaks.

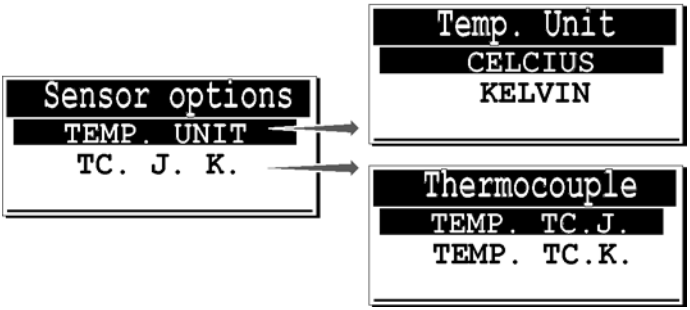
- **Fast**: fast reaction to sound peaks.

The active keys are:

Key	Function
	Return to the parameter menu, without taking into account eventual changes.
	Move up to the *Slow* mode.
	Move down to the *Fast* mode.
	Enter, validate choice and return to the measurement display.

With a thermometer (infrared or thermocouple)

The following menu is displayed.



The Sensor options menu with interface pyrometer. 025

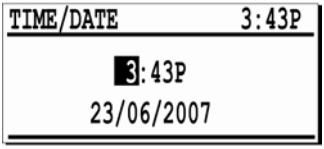
- **Temp. Unit**: defines the measurement system used for temperature measurement. A normal temperature scale or a temperature relative to absolute zero can be used. This selection is done in combination with the ISO/Imperial selection, see paragraph 12.9.
  - **CELCIUS** or **KELVIN**: in the ISO/METRIC system, one of both scales can be used.
  - **FAHRENHEIT** or **RANKINE**: in the English Imperial system, one of both scales can be used.
- **TC J. K**: this function defines the type of temperature probe used for temperature measurement.
  - **TEMP. TC. J.**: -40 °C to +750°C.
  - **TEMP. TC.K**: -40°C to +1500 °C.

The active keys are:

Key	Function
	Return to the parameter menu, without taking into account eventual changes.
	Move up to the upper selection.
	Move down to lower selection.
	Enter, validate choice and return to the previous menu.

12.4 CLOCK/DATE

This set the internal clock (date and time). This one is used to date the measurements. Regularly check that displayed date and time are correct. The display is as follows:



The Clock/Date setting. 017

Display example that permits to change the time and date of the units internal real time clock.

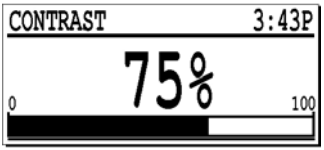
Note: when the *DataManager* software is used, the clock and date are synchronized with the PC clock (master).

The active keys are:

Key	Function
	Return to the parameter menu, without taking into account eventual changes.
	Increment the inverted field. Hold key for auto increment.
	Decrement the inverted field. Hold key for auto decrement.
	Go to the next field to be modified.
	Enter, validate values and return to the settings menu.

12.5 CONTRAST

This function permits to change the displays contrast ratio. The display will show a screen similar to the one below:



Screen example when changing the displays contrast ratio. 019

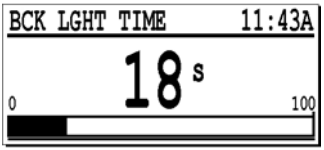
A contrast ratio of 75 % is ideal in normal conditions.

The active keys are:

Key	Function
	Return to the parameter menu, without taking in to account eventual changes.
	Increases the contrast ratio. Hold key for auto increment.
	Decreases the contrast ratio. Hold key for auto decrement.
	Enter, validate the adjusted contrast ratio, and return to the settings menu.

12.6 BACKLIGHTING

This function adjusts the amount of time before the backlight automatically switches off to save the battery pack's power.



Example of the screen that permits the adjustment of the backlighting timer. 020

The backlighting accounts for about 40 % of the power consumption of the unit.

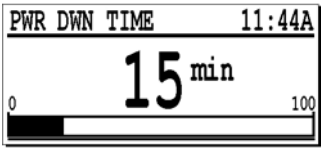
The backlighting timer restarts each time a key is pressed. When no key is pressed for the pre-programmed time, the backlighting will switch off automatically. The display will show a screen similar to the one above. The auto power off timer is adjustable between 1 and 100 seconds.

The active keys are:

Key	Function
	Return to the parameter menu, without taking in to account eventual changes.
	Increases the backlighting timer. Hold key for auto increment.
	Decreases the backlighting timer. Hold key for auto decrement.
	Enter, validate the adjusted backlighting timer's value, and return to the settings menu.

12.7 AUTO PWR DWN

This function adjusts the time before the unit switches off power automatically to save the battery pack's power. The auto power off restarts each time a key is pressed. When no key is pressed for the pre-programmed time, the unit will switch off power. The auto power off timer is adjustable between 1 and 100 minutes.



An example of the screen that permits the adjustment of the auto power off timer. 021

The active keys are:

Key	Function
	Return to the parameter menu, without taking in to account eventual changes.
	Increases the auto power off timer. Hold key for auto increment.
	Decreases the auto power off timer. Hold key for auto decrement.
	Enter, validate the adjusted auto power off timer's value, and return to the settings menu.

12.8 LANGUAGE

This function permits the user to change the language of the messages on the display. The display will show a screen similar to the one below:

Screen example when changing the language. 023

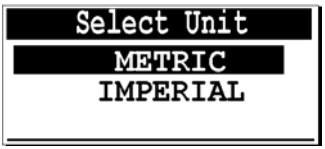
The active keys are:

Key	Function
	Return to the parameter menu, without taking in to account eventual changes.
	Move up the inverted language selection.
	Move down the inverted language selection.
	Enter, validate the selected language, and return to the settings menu.

12.9 ISO/IMPERIAL

Defines the unit system that is used for the measurements (except *SDT 170 S*):

- **METRIC**: the measurements will be done in the ISO (METRIC) system. The mass flow sensor will read in SCCM (Standard Cubic Centimeter per Minute). Temperatures will read in degrees Celsius or in degrees Kelvin depending on the setting.
- **IMPERIAL**: the measurements will display the English imperial measurement system. The mass flow sensor will read in SCFM (Standard Cubic Foot Minute). Temperature will read in degrees Fahrenheit or in degrees Rankine depending upon the setting.



Example of screen that permits to change the measurement system. 022

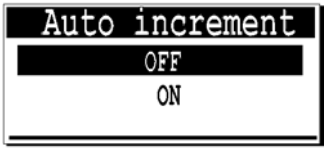
The active keys are:

Key	Function
	Return to the parameter menu, without taking in to account eventual changes.
	Move up the inverted measurement system selector.
	Move down the inverted measurement system selector.
	Enter, validate the measurement system, and return to the settings menu.

12.10 AUTO INCREMENT

This function can only be used on the *M* and *MD* versions. It is useful when working with the memory locations.

When settled on “ON”, this function allows an automatic increment of the memory location after each storage procedure. When settled on “OFF”, the user must manually choose the memory location.



The Auto increment menu can be settled on OFF or ON. 024

The active keys are:

Key	Function
	Return to the previous menu.
	Select Yes or No.
	Select Yes or No.
	Enter, validates the choice and return to the settings menu.

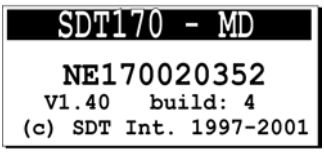
13. The *System Info* menu

This menu permits the visualization of the system information and is a sequence of five consecutive screens.

13.1 FIRST SCREEN

It consists of information relative to the:

- Type of equipment. (*S*: Standard, *S*+: Standard+, *M*: Multifunctional, *M*+: Multifunction+, *MD*: Multifunctional-DataManager).
- Serial number of the unit.
- Software version of the unit.
- Copyright message.



The first system information menu (first screen). 027A

13.2 SECOND SCREEN

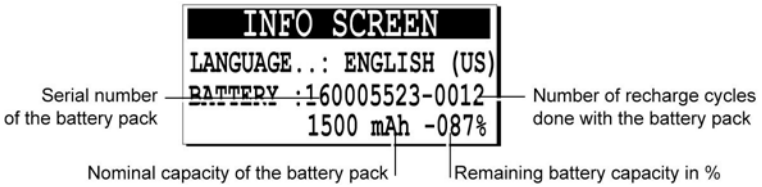
Starting from the previous display, press the ↵ key. The display shows information relative to the internal electronics and system software.

This information is only useful to a service engineer in case of a problem.

Example of the complementary information (second screen). 027B

13.3 THIRD SCREEN

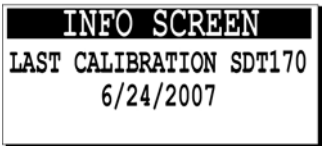
Starting from the previous display, press the ↵ key. The display shows information relative to the selected language, serial number and type of battery, and the amount of capacity left in the battery pack as well as the number of battery recharge cycles done.



Example of the complementary information (third screen). 027C

13.4 FOURTH SCREEN

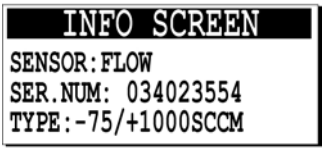
Starting from the previous display, press the ↵ key. The display indicates the last calibration date.



Example of the complementary information (fourth screen). 027D

13.5 FIFTH SCREEN

Starting from the previous display, press the ↵ key. The display shows the type of the connected sensor, as well as its serial number.



Example of the complementary information (fifth screen). 027E

After this fifth screen, the measurement screen is displayed.

For all the screens, the active keys are ⇆ or ↵.

The battery pack

14. Technical considerations

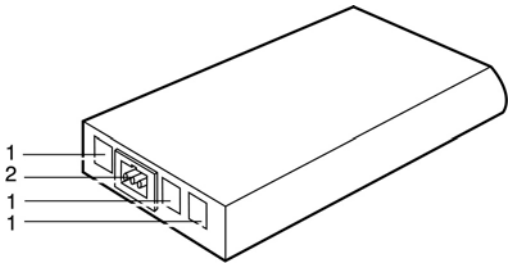
14.1 IMPORTANT NOTE

The battery packs are charged in the factory for test purpose, but are discharged before being dispatched, because of international air transport legislation. At reception, the battery packs should be reloaded during at least five hours. Optimal functioning will be obtained after several (3 minimum) full reloads.

14.2 THE BATTERY PACK

General

The battery pack is represented as follows.



1. Battery contact pads. Do not short circuit.
2. Battery charger connector.

The elements of the battery pack. 052

Recommendations

- Never short-circuit the contact pads, nor use with inverted polarity, nor incinerate or disassemble the battery pack or the battery cells. The components used in the battery are corrosive and may be dangerous for skin and eyes. In case of any harm, contact a doctor as soon as possible.
- Always drain the battery before recharging to maximize the number of cycles, charge the battery pack completely and store the battery pack charged and in a cool dry place.
- After a long period without use, it is advised to charge/discharge the battery 3 times before the full battery capacity can be used again.

- Contains NiMH type batteries (Nickel Metal Hydrate, operating voltage 7.2 V). Short circuit of the battery pack's connections can be dangerous.
- Must not be thrown into a flame or fire.
- Must be protected from any mechanical shock that can lead to a rupture of the battery pack's outer casing that can compromise the life of the batteries.
- Must be recharged at least every 3 months when not used for long periods of time.

14.3 THE BATTERY CHARGER

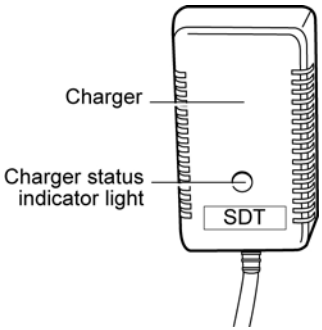
General

The mains supply voltage depends on the model used (110 or 220 VAC). The output voltage of the battery charger can be either 7.2V or 9V depending on its operating mode (charger connected directly to the battery pack, or charger connected to the *SDT 170*, the unit being switched on or off). The maximum output current is about 500 mA.

The charger **must be unplugged** from the mains before recharging a new battery, in order to reset the internal timer.

While charging the battery pack the following charge criteria are permanently monitored:

1. The battery cannot be overcharged because of the presence of battery charging cycle detection by means of the ΔU method.
2. End of the battery charging cycle detection by means of excessive change in the battery pack's temperature.
3. Detection of temperature overload.
4. End of charging cycle by means of timeout timer.



View of the battery charger and its status indicator. 050

The status indicator light

When the battery charger is connected to the power supply, it informs the user of its charging status by means of the status light. The definitions of the status light are shown in the following table:

Status of the light	Meaning
No light	Battery charged.
Green / Fix	Power supply to the *SDT 170* unit, the battery pack is in a slow charging mode (12 to 14 hours).
Green / Flashing	Fast charging (5 to 6 hours), only on the battery pack.
Red / Fix	Problem with charging.

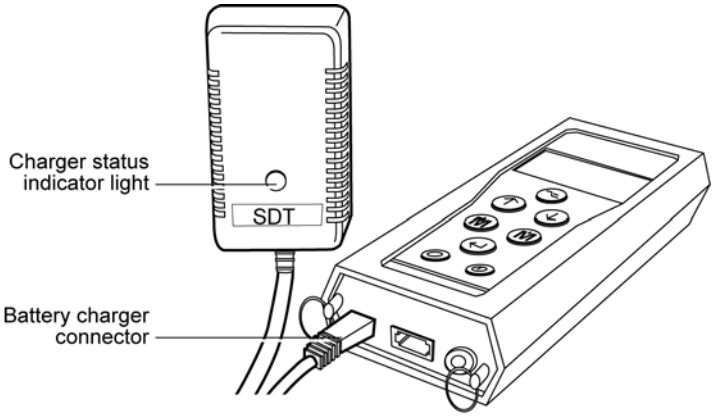
Recommendations

- Contains no user serviceable parts and must not be opened by the user.
- Must not be subjected to water or used in humid environments.
- Always keep and use the battery charger in a dry indoor place.
- Never short-circuit the pins of the charger connector, nor use a battery charger to charge the battery pack, other than the one supplied with your kit.
- The charging of the battery pack must always be done in a cool place, for example, room temperature (out of the sun or away from any heating system).

15. Recharging the battery pack

15.1 RECHARGING IN THE UNIT

The battery pack can be charged while still in the unit.



The connection of the charger to the unit. 052

Charging will be done transparently to the operation of the unit. The advantage is the possibility to charge the battery pack while the unit is in use. The disadvantage is that the charging time is longer when the equipment is switched on (due to power consumption restrictions of the charger).

Warning: never use this method (charger connected to the mains and detector) in a classified area.

Operation

- Unplug the charger from the mains before recharging a new battery, in order to reset the internal timer.
- Connect the charger connector to the unit and plug the charger into the mains power socket.
- The charging will be done in about 5 to 6 hours when the unit is switched off, or 12 to 14 hours when the equipment is used.

- When a charger is connected to the unit, the charger automatically switches to slow charge when the unit is switched on. To switch back into fast charge mode, turn off the unit. It is not advised to change charging speeds of the battery by switching on and off the unit, this reduces the life of the battery. Once a charging cycle has begun, it should be allowed to finish.

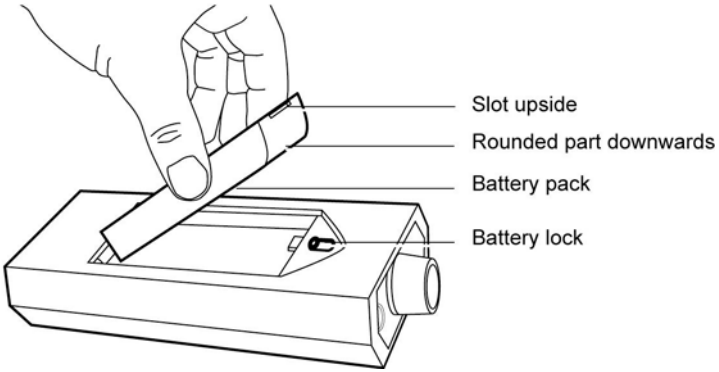
Please refer to paragraph *The status indicator light* on page 66 for more information on the status light of the battery charger.

15.2 RECHARGING OUT OF THE UNIT

The battery pack being always charged in fast mode, this is the best solution. The unit can be used with another battery while charging the empty one.

Operation

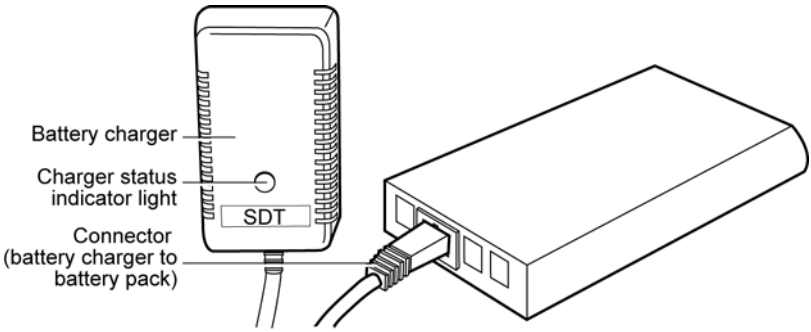
- Shift the battery lock towards the front of the unit (towards the build in sensor).
- Remove the battery pack by turning the equipment while maintaining the battery lock towards the front of the equipment. Place your hand under the battery pack and gently tap the unit against your hand. The battery pack will release easily using this method.



Removing of the battery. 053

- Plug the connector on the end of the battery charger into the connector on the battery pack.
- Unplug the charger from the mains before recharging a new battery, in order to reset the internal timer.
- Plug the battery charger in the mains socket.

- The charging cycle will take about 5 to 6 hours to be completed.
- Once charging over, replace the charged battery pack in the unit, like previously indicated.



Connection of the battery charger to the battery pack. 054

Please refer to paragraph *The status indicator light* on page 66 for more information on the status light of the battery charger.

15.3 BATTERY DISCHARGED MESSAGE

The message **`Battery charge too low`** flashes on the display, when the battery pack's charge is to low.

Change the battery pack and recharge the empty pack as previously indicated.

Important note: the battery packs are charged in the factory for test purpose but the battery pack is discharged before being dispatched, because of international air transport legislation. At reception, the battery packs should be reloaded during at least five hours. Optimal functioning will be obtained after several (3 minimum) full reloads.

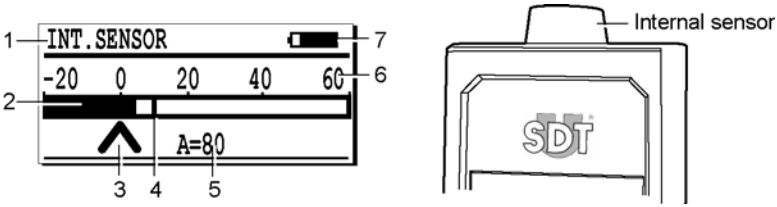
Moreover, a battery might be never charged if the charger is not unplugged **from the mains** between two charges; the internal timer is so never reset.

Sensors and options

16. Internal ultrasonic sensor

16.1 S VERSION

How to read the displayed data



The orientation of the main icons on the S version. 004

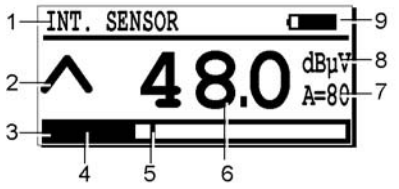
N°	Function	Remarks
1	Type of sensor	Type of sensor used / connected.
2	Bargraph	Visual indication of the measured values.
3	Amplification adjustment	Optimal amplification when no arrow shown.
4	Peak value	Indicates the maximum measured signal; self reset after approximately two seconds.
5	Amplification	A = amplification level used in dB (ultrasound).
6	Measuring scale	Gives a visual idea about the amplitude strength of the measured signal.
7	Information	Display alternates between battery level, time, and date.
	Battery level indicator	100% black corresponds to a fully charged battery.
	Time (Hour)	Current time.
	Date	Current date.

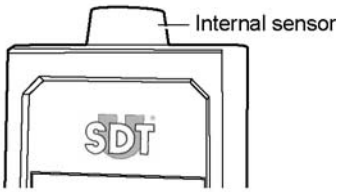
Technical Data

Item	Data
Function & type	Open type ultrasonic sensor
Bandwidth	± 2 kHz at -6 dB
Frequency	40 kHz ± 1 kHz
Sensitivity	-65 dB/V/µbar at 40 kHz
Total beam angle	55° typical at -6 dB

16.2 S+, M, M+ AND MD VERSIONS

How to read the displayed data





Primary icon locations on the display on S+, M, M+ and MD versions. 003

N°	Function	Remarks
1	Type of sensor	Type of sensor used / connected.
2	Amplification adjustment	Optimal amplification when no arrow shown.
3	Bargraph	Visual indication of the measured values. The scale gives a visual idea about the amplitude strength of the measured signal.
4	Instant strength	The black zone indicates the instant signal strength.
5	Peak value	Maximum measured signal; self reset after 2 seconds.
6	Instant value	Reading.
7	Amplification	A = amplification level used in dB (ultrasound).
8	Measuring unit	Measuring unit of the displayed value
9	Information	Display alternates between battery level, time, memory left and date.
	Battery level indicator	100% black corresponds to a fully charged battery.
	Time (Hour)	Current time.
	Memory left	Used memory.
	Date	Current date.

Technical Data

Item	Data
Function & type	Open type ultrasonic sensor
Bandwidth	± 2 kHz at -6 dB
Frequency	40 kHz ± 1 kHz
Sensitivity	-65 dB/V/µbar at 40 kHz
Total beam angle	55° typical at -6 dB

17. External ultrasonic sensors

They can be connected on all versions (*S*, *S*+, *M*, *M*+ and *MD*). It is to be reminded that the detector *SDT 170* will recognize the presence of the sensor and will automatically change to the appropriate settings, scales and units.

It is insistently advised to refer to paragraph *Important note concerning the plugging to the connector* on page 124 regarding the connecting procedure, in order to avoid any premature deterioration of the connector and the plug.

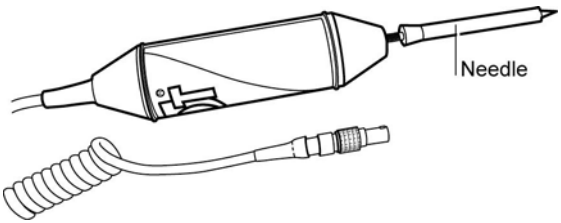
17.1 CONTACT PROBE

Main field of application

Use the contact probe for detecting and localizing bearing defects, gear meshes problems, pump cavitations, steam trap failures, valve and reciprocating compressor checks, and lubrication trending of rotating equipment.

Description

The contact probe is provided as a standard sensor with the *SDT 170 M*, *M*, *M*+ and *MD* ultrasonic inspection kit. When plugged into the sensor input of the 170 the equipment switches to “contact measurement” mode. It is supplied with a spiral cable with its appropriate connector.



The contact probe. 064

Technical Data

Item	Data
Bandwidth	1 kHz at -6 dB
Frequency	40 kHz ± 1 kHz
Sensitivity	-60 db/V/µbar at 40 kHz
Length	260 mm (without cable and needle)
Diameter	36 mm
Cable length	coiled cable 0.5 m to 2 m

Operating method

To determine the status of the bearing, two operating methods are possible:

- Trending the evolution: periodical measurements are recorded for further analysis with PC software or by consultation of the internal memory of the unit (versions *M*, *M+* and *MD*). Any signal increase higher than 10 dBµV needs to be watched.
- By comparison: any significant difference (several dBµV) between the measurements take on the bearings evolving under similar operating conditions is to be watched.

Operating mode

The contact probe (or Tri-band contact probe) has three operating modes. The choice of mode depends on the application:

- **US**: This mode uses the ultrasound frequency band like the airborne sensors and is particularly useful for clearly detecting at very early stage defects in rolling element bearings and incorrect lubrication condition. This mode is also useful on gearboxes for tooth condition, pumps cavitations and internal leakage on valves and steam traps.

  It is recommended that the "US" mode be used exclusively when attaching the tri-band contact probe to the acoustic lubrication adaptor and while capturing sound files for further use in the Ultranalysis™ Suite software.

  This mode is well suited for most applications and should be used as your default mode.

- **MEC**: This is a mechanical mode and can be used to listen to additional information during your rotating machines survey. Since it is a mechanical mode, this mode picks up similar information to that you might expect to obtain by using a screwdriver in your ear or by listening to an accelerometer.

Besides gear tooth meshing and bearing problems, this mode detects defects such as: imbalance, misalignment and coupling failures.

It is NOT recommended that the "MEC" mode be used when attaching the tri-band contact probe to the acoustic lubrication adaptor and while capturing sound files for further use in the Ultranalysis™Suite software.

This generic mode is used to enlarge the diagnosis on rotating machines and should be used in complement of the US mode. It is not recommended that you use this mode for bearing lubrication or for trending.

- **SLOW MEC**: this is a high sensitivity mechanical mode. In the event that you are using the MEC mode and the up arrow is always displayed even when the maximum amplification is set, switch to the SLOW MEC mode and this will provide an additional 40dB of gain. The information provided by the SLOW MEC mode is therefore similar to the MEC mode. The origin of this mode is steeped in SDT history and was once used as the mode for inspection of slowly rotating items. Subsequent refinements to the US mode have made this requirement redundant, but the name remains.

  It is NOT recommended that the "SLOW MEC" mode be used when attaching the tri-band contact probe to the acoustic lubrication adaptor and while capturing sound files for further use in the Ultranalysis™Suite software.

  This high sensitivity mode is used in substitution of the MEC mode for low signal level applications and should be used in complement of the US mode. Once again, it is not recommended that you use this mode for bearing lubrication or for trending

To change mode, first connect the contact probe to the SDT 170, then select the menu `Settings, Sensor options, Select freq` and choose using the up and down arrow (↑ ↓) between **US**, **MEC** or **SLOW MEC** mode. Confirm your choice by pushing the ↵ key.

The menu with a contact probe. 026

At the top of the LCD display you will see `Contact –US-`, `Contact –M-` or `Contact –S-`.

Rules to respect

In most circumstances, the contact probe is the best sensor to monitor a bearing.

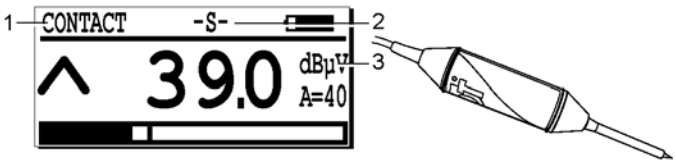
To ensure the repeatability of the measurements taken with the contact probe, it is imperative to follow the next rules.

- Attach the needle correctly and connect the contact probe to the unit.
- Always take a measurement by applying the top of the needle on the same spot (possible marking with the awl to dimple the housing).
- Maintain the contact on the vertical plane (perpendicular) of the measurement point. Any oblique position should be avoided.
- Apply about the same holding pressure on the probe.
- Hold the button down for 3 to 4 seconds until stabilization of the measurement is achieved.
- Make sure that the appropriate functioning mode has been selected (Slow mec, Mec or US).
- Ideally, take the measurement when no arrow is displayed (^ or v).

How to read the displayed data

The LCD display contains the same icons as described in previous paragraphs.

1. Type of sensor connected (here, a contact probe).
2. Selected mode (S, M or US).
3. Data (amount of ultrasonic sounds) is given in dBµV.



The specific icon with an ultrasonic contact probe. 055

17.2 FLEXIBLE SENSORS

Two models are available: 550 and 820 mm long.

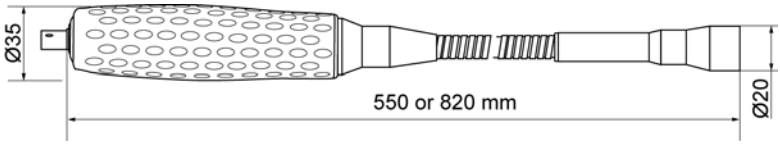
Main field of application

They are:

- Leak detection.
- Tightness testing with an ultrasonic transmitter.
- Control of mechanical units and predictive maintenance.
- Control of the aligning of mechanical coupling.
- Electrical arcing and corona detection.

Description

Each of these sensors is supplied with a BNC type connector and a coiled cable equipped with BNC and 7-pin LEMO connectors. The coiled cable can be stretched to about 2 m (6.6 ft).



View of the flexible sensor. 043

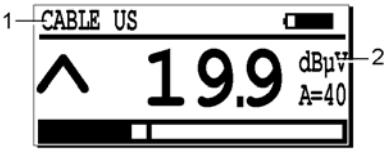
Technical data

Item	Data
Bandwidth	2 kHz at -6 dB
Frequency	40 kHz ± 1 kHz
Sensitivity	-65 dB/V/µbar at 40 kHz
Length	550 mm or 820 mm (without cable)
Diameter	20 mm external 16 mm internal
Cable length	coiled 0,5 m to 2 m

How to read the displayed data

The LCD display contains the same icons as previously described. The sole difference is:

1. Indicates that a cable for ultrasonic sensor is connected between the sensor and the detector.
2. Indicates the data (amount of ultrasonic sounds) given in dBµV.



The icon with a flexible sensor. 091

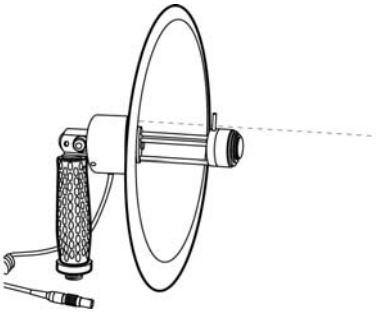
17.3 PARABOLIC SENSOR

Main field of application

This typical waveform concentrator equipped with a laser pointer is used to detect ultrasonic phenomena, at short or large distances, with a very high precision. The main applications are the leak and electrical arcing detection.

Description

This sensor allows is an exceptional highly unidirectional ultrasonic measurement tool that minimizes background noises and concentrate on distant leaks or focuses on corona discharge and electrical arcing at distances more than several meters.



View of the parabolic sensor and the laser beam (artist's representation). 074

The dish is transparent to easy visualize the object while measuring. For this same purpose of “pin pointing the object to measure” this parabolic concentrator has two sights: a “rifle-sight-shaped” sight and a very effective laser pointer sight.

In some cases (corona detection) the *SDT 170* is used with the special SDT loudspeaker instead of using the normal headphones.

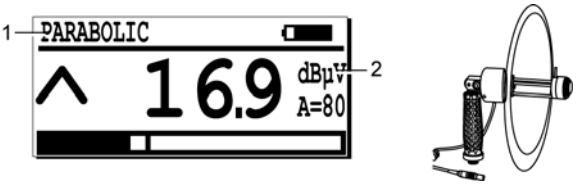
DANGER

- The parabolic sensor is a 3R class laser device (EN 60825-1).
- Direct exposure to laser rays is harmful for the eyes.

How to read the displayed data

The LCD display contains the same icons as usual. The sole difference is:

1. **`Parabolic`**: means that a parabolic sensor is connected.
2. **dBµV**: the data (amount of ultrasonic sounds) is given in dBµV.



The specific icon with an ultrasonic parabolic sensor. 096

Technical data

Item	Data
Function	Detection of remote ultrasonic signals (5 to 50m)
Transducer type	Ultrasonic at resonance of 16 mm (6.2 inches) diameter
Main frequency	40 kHz ±1 kHz
Bandwidth (-6 dB)	±2 kHz
Typical gain	25 dBµV
Material	Parabolic dish: Transparent plexiglas (polymethacrylate) Body: anodized aluminium Handle: aluminum covered with a rubber sheath
Laser	Power: ≤ 2.5 mW Wavelength: 645 - 665 nm 3R class as per EN 60825 Spot: ≈ 8mm at 5m (3.15 inches at 16 feet)
Temperature of use	+10°C to +40°C (+50°F to +104°F)

Weight	0,8 kg (28 oz)
Diameter	Nominal 250 mm (9.8 inches) - Exterior 275 mm (10.8 inches)
Parabola length	195 mm (50 inches) with handle at 90°
Handle	Adjustable from -90° to + 90° with respect to the pointed direction

17.4 MAGNETIC SENSOR

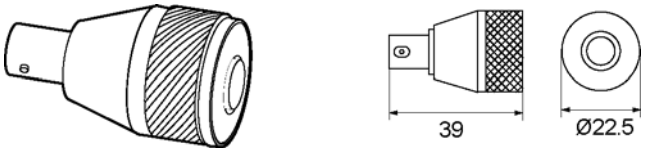
Main field of application

Fitted with a magnet, this sensor allows the localization of anomalies and irregularities. The main applications are:

- Control of mechanical units and predictive maintenance.
- Control of bush, motor, pumps, valve, steam trap, condensate purge.

Description

The sensor is supplied with a spiral cable, equipped with the appropriate connectors on both sides.



View of the magnetic sensor. 042

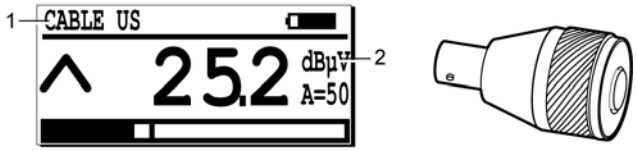
Technical Data

Item	Data
Bandwidth	2 kHz at -6 dB
Frequency	40 kHz ± 3 kHz
Sensitivity	-80 dB/V/µbar at 40 kHz
Temperature	-20°C to +80°C
Weight	35 g
Diameter	22,5 mm
Cable length	coiled 0,5 m to 2 m
Tractive power	4 kg

How to read the displayed data

The LCD display contains the same icons as usual. The sole difference is:

1. **`Cable US`**: a cable for ultrasonic sensor is connected between the sensor and the detector.
2. **dBµV**: the data (amount of ultrasonic sounds) is given in dBµV.



The icon with an ultrasonic external magnetic sensor. 057

17.5 THREADED SENSOR

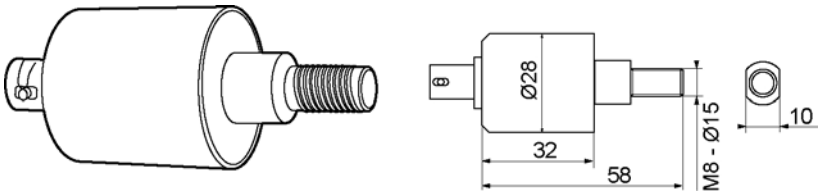
Main field of application

They are:

- Permanent control of mechanical units and predictive maintenance.
- Control of bush, motor, pumps, valve, steam trap, condensate purge.

Description

The sensor is equipped with a thread (M8) and a NBC connector.



View of the threaded sensor. 044

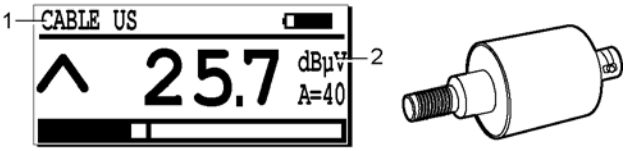
Technical Data

Item	Data
Bandwidth	2 kHz at – 6dB
Frequency	40 kHz ± 3 kHz
Sensitivity	-73dB/V/µbar at 40 kHz
Temperature	-20°C to +150 °C
Weight	90 g
Diameter	28 mm
Cable length	Coiled 0,5 m to 2 m
Thread	M8 x 15

How to read the displayed data

The LCD display contains the same icons as usual. The sole difference is:

1. **`Cable US`**: a cable for ultrasonic sensor is connected between the sensor and the detector.
2. **dBµV**: the data (amount of ultrasonic sounds) is given in dBµV.



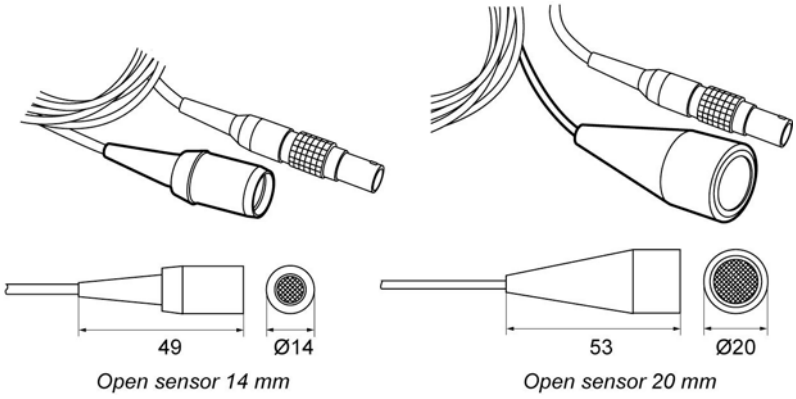
The icon with an ultrasonic external threaded sensor. 093

17.6 OPEN SENSORS

Open sensor means non waterproof sensor. Two models are available: 14 and 20 mm diameter.

Description

Each of these sensors is supplied with a 2.5 m / 8.2 ft cable, equipped with a 7 pin LEMO connector.



View of the open sensors 14 and 20 mm diameter. 040

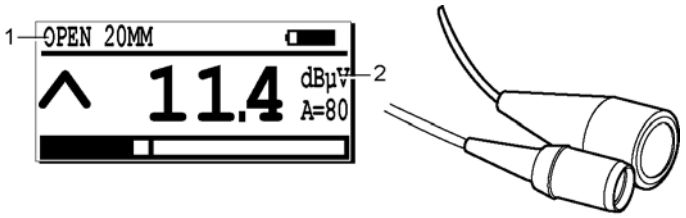
Technical data

Item	Data
Bandwidth	3 kHz at -6 dB
Frequency	40 kHz ± 1 kHz
Sensitivity	-70 dB/V/µbar (14 mm) and -65 dB/V/µbar (20 mm) at 40 kHz
Length	50 mm (without cable)
Diameter	14 mm or 20 mm external
Cable length	2,5 m

How to read the displayed data

The LCD display contains the same icons as previously described. The sole difference is:

1. Indicates the type of sensor connected. The information depends of the sensor: open sensor 14 mm, open sensor 20 mm.
2. Indicates the data (amount of ultrasonic sounds) given in dBµV.



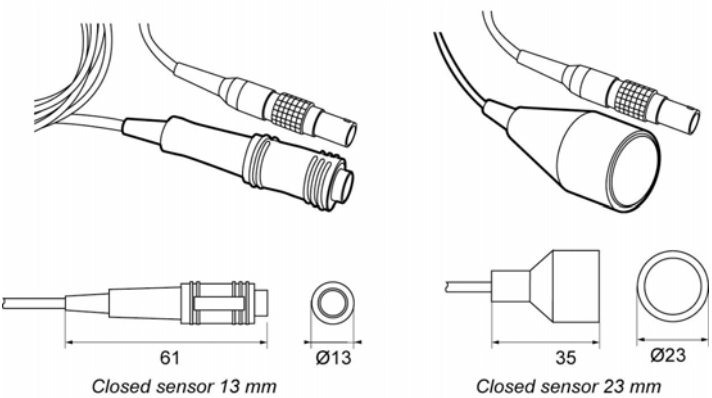
The specific icon with an ultrasonic external open sensor. 089

17.7 CLOSED SENSORS

Closed sensor means waterproof sensor. Two models are available: 13 and 23 mm.

Description

Each of these sensors is supplied with a 2.5 m / 8.2 ft cable, equipped with a 7 pin LEMO connector.



View of the closed sensors 13 and 23 mm. 041

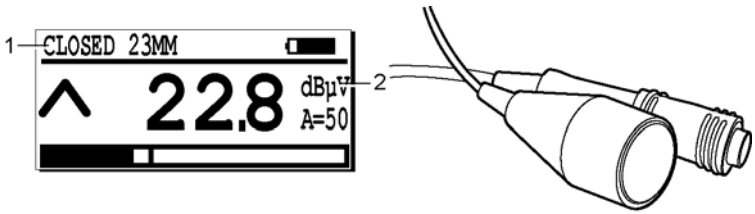
Technical data

Item	Data 13 mm closed sensor	Data 23 mm closed sensor
Bandwidth	2 kHz at -6 dB	1,5 kHz at -6 dB
Frequency	40 kHz ± 3 kHz	40 kHz ± 1 kHz
Sensitivity	-80 db/V/µbar at 40 kHz	-70 db/V/µbar at 40 kHz
Length	61 mm (without cable)	35 mm (without cable)
Diameter	13 mm	23 mm
Cable length	2,5 m	2,5 m

How to read the displayed data

The LCD display contains the same icons as previously described. The sole difference is:

1. Indicates the type of sensor connected. The information depends of the sensor: closed sensor 13 mm, closed sensor 23 mm.
2. Indicates the data (amount of ultrasonic sounds) given in dBµV.



The specific icon with an ultrasonic external closed sensor. 058

18. Adaptators for ultrasonic sensors

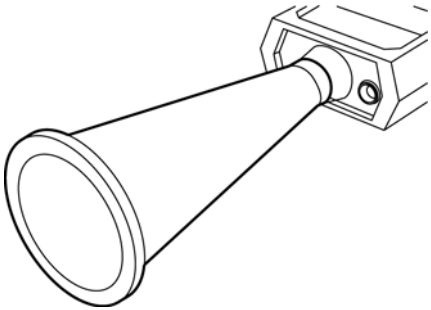
18.1 EXTENDED DISTANCE SENSOR (EDS)

Main field of application

This cone form concentrator is used for leak and discharge detection with subtle ultrasonic sounds.

Description

Foreseen with a screw thread, this adapter can be screwed on the internal sensor of the unit and allows a better detection at an average distance with a good precision approach.



View of the sensitivity extension cone. 095

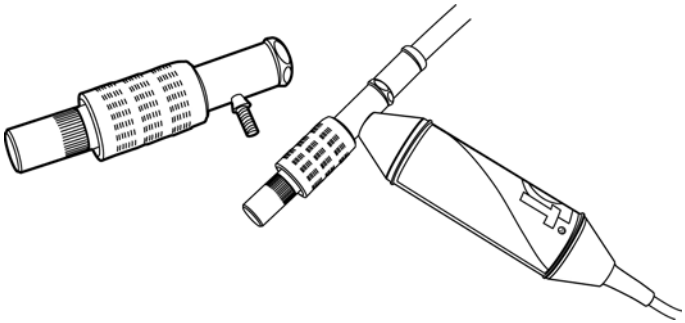
18.2 LUBE ADAPTER

Main field of application

- Adaptator for greasing control of mechanical unities and predictive maintenance.
- Listening to bearing, bush.

Description

Connected to the contact probe and fixed on the top of the pump flexible to grease, this adapter allows controlling the efficiency level of greasing in real time.



View of the lube adapter. 097

19. Ultrasonic transmitters

19.1 SDT 200 mW TRANSMITTER

Main field of application

It is the tightness control of small volumes which cannot be pressurized or depressurized.

Description

This is a small portable ultrasonic transmitter, equipped with one transducer and an internal rechargeable NiCd battery. The transmitter is available in directional and bi-sonic modes. The user can select between two power positions.

View of the ultrasonic transmitter type SDT 200 mW 071

Although there is no conclusive scientific research to prove the harmfulness of ultrasound, we advise the use of hearing protections during prolonged exposures at less than 3 meters from the transmitters.

Its main characteristics are as follows:

Item	Data
Transmitter frequency	Bisonic 39.2 kHz and 39.6 kHz
Transmitter power	200 mW
Transmitter angle	60°
Internal battery	9,6V 110 mAh NiCd
Autonomy	±4 hours at 20 °C
Charging time	6 hours

Dimensions	108 x 35 x 40 mm (4.25 x 1.37 x 1.57 inches) (L x W x H)
Weight	230 g (8.11 oz)

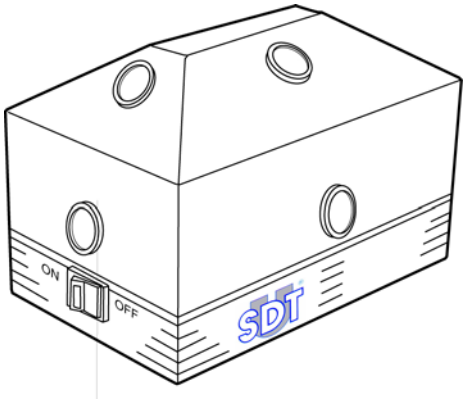
19.2 SDT 8 (8 x 125 mW) TRANSMITTER

Main field of application

It is the tightness control of large volumes which cannot be pressurized or depressurized, without control of the emitting ultrasonic power.

Description

This unit is a small portable fixed power multihead ultrasonic transmitter. Eight (8) oriented ultrasonic transducers are localized all around the unit, for a 8 x 125 mW ultrasonic power. The *SDT 8* uses the bisonic mode and is equipped with a removable rechargeable lead-acid gel battery pack.



View of the ultrasonic transmitter type SDT 8. 061

Although there is no conclusive scientific research to prove the harmfulness of ultrasound, we advise the use of hearing protections during prolonged exposures at less than 3 meters from the transmitters.

Its main characteristics are as follows:

Item	Data
Transmitter frequency	bisonic: 39.2 kHz and 39.6 kHz
Transmitter power	8 x 125 mW
Transmitter angle	240 °
Internal battery	12 V 1.2 sealed lead-acid gel type

Autonomy	2.5 hours at 20 °C
Charging time	6 hours
Dimensions	160 x 100 x 95 mm (6.29 x 4 x 3.75 inches) (L x W x H)
Weight	1.5 kg (3.3 lb)
Operating temp.	-10 to +50 °C (14 to 122 °F)

19.3 SDT 8 (8 x 125 mW) MULTISETTING TRANSMITTER

Main field of application

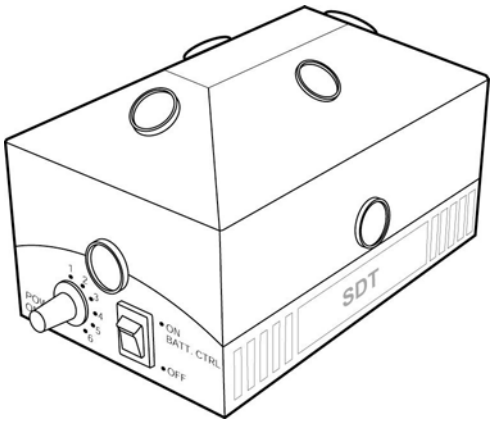
It is used in situations where the emitted ultrasonic power must be adjustable to the volume that has to be controlled, mainly in the tightness control of large volumes which cannot be pressurized or depressurized.

Description

This equipment is an adjustable (six positions) ultrasonic transmitter used in combination with an *SDT Ultrasonic Detector*. Eight (8) oriented ultrasonic transducers are localized all around the unit, for a variable 8x 125 mW ultrasonic power.

A 6 position selector allows the choice of the ultrasonic power.

This combination is an accurate and reliable tool for testing the tightness of every kind of object or volume.



View of the ultrasonic type SDT 8 multisetting transmitter. 075

Although there is no conclusive scientific research to prove the harmfulness of ultrasound, we advise the use of hearing protections during prolonged exposures at less than 3 meters from the transmitters.

Its main characteristics are as follows:

Item	Data
Function	Ultrasonic multi-transmitter
Frequencies	Stabilized at 39.2 and 39.6 kHz (bi-sonic mode)
Nbr of transducers	8
Transmission power	Power control in 6 levels:
	Typical value from 1 to 6: -20dB, -15dB, -9dB, -6dB, -2dB, Max
Max trans. power	8 x 125 mW
Dispersion	240 °
Voltage/capacity	12V DC/1,2 Ah
Battery	Sealed lead-acid gel type rechargeable.
Recharge	By means of an external charger and integrated connector (without removing the battery) or by using a charge adapter (removing the battery)
Autonomy	2.5 hours at 20 °C
Charging time	6 hours
Safety	Chemical control fuse with automatic reset
Command	By on/off switch
Visual indication	On/off/battery charge control indicator. Flashes when undercharged
Temperature range	-20° C to +50° C
Dimensions	160 x 100 x 95 mm (L x W x H)
Weight	1.5 kg

20. External non ultrasonic sensors

They can only be connected on versions *M*, *M+* and *MD*.

It is to be reminded that the detector will sense the presence of the sensor and will automatically change to the appropriate settings, scales and units.

Measurements can be time-dated and logged inside the memory of the *SDT 170 M*, *M+* or *MD* equipment.

It is insistently advised to refer to paragraph *Important note concerning the plugging to the connector* on page 124 regarding the connecting procedure, in order to avoid any premature deterioration of the connector and the plug.

20.1 SOUND LEVEL METER

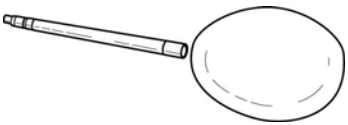
Main applications

Designed for the sound measure (dBA), this equipment allows the measure of the ambient noise and the determination of the level of the hearing protection (safety, ergonomics).

Description

Its main characteristics are as follows:

Item	Data
Function	Sound (pressure) level meter
Measuring ranges	45 to + 130 dBA
Precision	± 2 dB at full scale
Resolution	0.1 dB over the whole range
Type of filter	'A' weighted, compliant with IEC 651A
Measuring unit	dBA

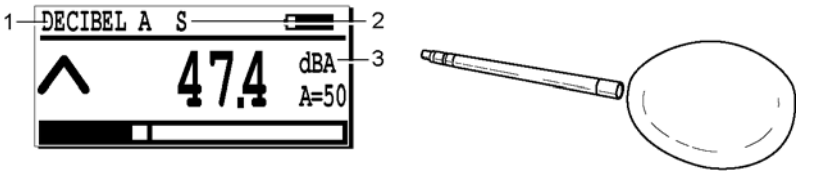


External view of the sound level meter and its bonnet. 066

How to read the displayed data

The display indicates:

1. Decibel **A**: measure of the dBA.
2. **S** or **F**: Indicates the selected mode (Slow or Fast – See *Chapter 12.3*).
3. **dBA**: the data (level of ultrasonic sounds) is given in dBA.



The specific icon with a sound level meter. 049

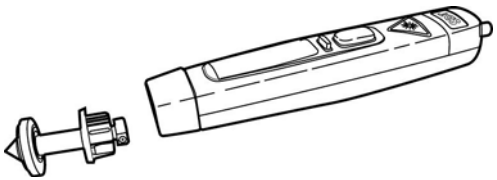
20.2 TACHOMETER

Main applications

All linear or rotation measurements with or without contact of a mechanical or electrical system, mainly for the control of mechanical units and predictive maintenance.

Description

The *SDT* laser tachometer can be used separately as an individual unit or in combination with the *SDT 170 M 170 M*, *M+* or *MD*.



External view of the tachometer. 070

The SDT tachometer is an extremely versatile fully featured sensor, with a wide selection of practical functions including revolutions per minute (rpm) and revolutions per second (rps) both optically with a laser pointer and by contact method, contact linear speeds, in feet, yards or meters per minute and per second.

Special memory functions include maximum, minimum reading capture, employing a unique dual time base for high speed data grabbing. Truly average

speed measurement mode is also standard, with time interval measurement for reciprocal speeds and cycle timing, other features include revolution count and length count in meters, yards or feet, with last reading hold and auto-memory retention of last selection function mode.

Technical data

Display tachometer

Item	Data
Display tacho	Inverting LCD vertical 5 digit display
Display functions tacho	180° inverting
On target indicator	Yes, on LCD
Low battery indicator	Yes, on LCD
Function icons	Comprehensive selection of ranges shown in display

Controls - 3 push buttons

Item	Data
On/Off normal mode	Dual action rocker type touch button (UP ARROW)
On/Off inverted mode	As above but for inverted operation (DOWN ARROW)
Program control	Selects program mode in conjunction with up/down switches

Optical system

Item	Data
Optical range	50mm - 2000mm
Minimum optical angle	+/- 45° incidence against the reflecting zone
Light source	Red Spot Laser Class II

Measurement range

Item	Data
Measurement modes	rpm & rps optically (also count & time)rpm & rps, meters, yards, feet, per min.& sec. Via contact adaptor count total revs, meters, feet, yards, measure time interval in seconds between pulses (reciprocal rate)speed capture feature - max, min, or average rate

Speed range

Item	Data
Optical mode	3 - 99.999 rpm (or equivalent in rps)
Contact mode	Max 50.000 rpm for 10 sec. (or equivalent in rps)
Linear speeds maximum	0.3 - 1500 meters/min (or equivalents)

Other

Item	Data
Resolution range features	Fully autoranging, up to 0.001 digit or +/- 1 digit fixed
Accuracy speed modes	0.01% +/- 1 digit
Count mode	Resolution +/- 0.1 meters (or equivalent in all ranges)
Time interval mode	0 - 99999 seconds autoranging only (max. 0.001 resolution)
Time base standard	0.8 sec. Or time between pulses, whichever is longest
Time base fast mode	0.1 sec. Auto-selection in max. or min. capture mode
Memory features	Last reading held for 1 minute, Auto switch off. Program settings retained in memory after power down.
Contact adapter	Included complete with rpm cone & metric wheel assembly
Power requirements	4 x AAA alkaline cells
Operating temp.	0°C to 60°C / 32°F to 140°F
Operating humidity	0 % to 90 % R.H. when temperature is less than 35°C/95°F
	0 % to 70 % R.H. when temperature is above 35°C/95°F

How to read the displayed data

The display indicates (above left) the connection of a rotation sensor, as follows. The data is displayed in revolutions per minute.

The Sensor options menu with the tachometer. 060

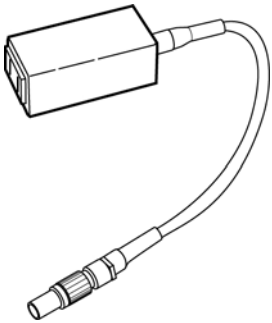
20.3 THERMOCOUPLE INTERFACE

Use

It is used to check any kind of temperature that can be measured with a thermocouple. Its main applications are for the control of mechanical units and maintenance.

Description

This "Digital Thermocouple Interface" allows any 'J' or 'K'-type thermocouple to be connected via its plug to the *SDT 170 M 170 M*, *M+* or *MD*. The temperature can be read out in degrees Celsius, Kelvin, Fahrenheit and Rankine. Designed for usage in an industrial environment, the interface is made out of a rugged metal casing, and has a miniature thermocouple connector. The interface has on board digital cold junction compensation and is equipped with a wire brake or thermocouple not present detector.



External view of the thermocouple interface. 045

Technical Data

Thermocouples types:	"J" and "K" (user selectable, not automatic)
Connector	With a standard miniature thermocouple connector, 7.9 mm or 0.312 inch, center to center.
Interface dimensions	108 x 73 x 23 mm / 4.3 x 2.9 x 0.9 inch
Interface weight	106 gram / 0.36 lb
Cable to the SDT 170	Included
Thermocouple	Not included

*Accuracy and measuring ranges for 'J' thermocouples**

	Range	Resolution	Accuracy (2)
Celsius	-210 to +1200°C	0.1°C /1°C (1)	0.3 % of lecture bol'± 1.2°C (3)
Kelvin	+63.1 to +1473°K	0.1°K /1°K (1)	0.3 % of lecture bol'± 1.2°K (3)
Fahrenheit	-346.0 to +2192°F	0.1°F /1°F (1)	0.3 % of lecture bol'± 2.16°F (3)
Rankine	+113.6 to +2651°R	0.1°R /1°R (1)	0.3 % of lecture bol'± 2.16°R (3)

(1) the measuring resolution 0.1° up to 999.9° from 1000° onwards resolution is 1°.
(2) with the interface at +18°C to +28°C / 64°F to 82°F.
(3) whichever is greater.
* : typical ranges. The measuring ranges depend of the thermocouple used.

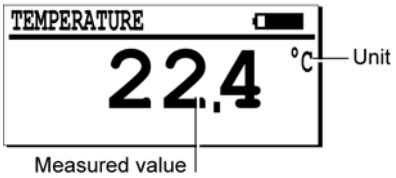
*Accuracy and measuring ranges for 'K' thermocouples**

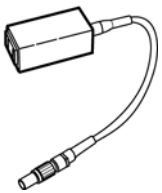
	Range	Resolution	Accuracy (2)
Celsius	-200 to +1372°C	0.1°C /1°C (1)	0.3 % of lecture bol'± 1.2°C (***)
Kelvin	+73.1 to +1645°K	0.1°K /1°K (1)	0.3 % of lecture bol'± 1.2°K (***)
Fahrenheit	-328.0 to +2501°F	0.1°F /1°F (1)	0.3 % of lecture bol'± 2.16°F (***)
Rankine	+131.6 to +2961°R	0.1°R /1°R (1)	0.3 % of lecture bol'± 2.16°R (***)

(1) the measuring resolution 0.1° up to 999.9° from 1000° onwards resolution is 1°.
(2) with the interface at +18°C to +28°C / 64°F to 82°F.
(3) whichever is greater.
* : typical ranges. The measuring ranges depend of the thermocouple used.

How to read the displayed data

The display indicates (above left) the connection of a temperature sensor (Temperature and type of sensor TC K for example). The display is as follows:





The Sensor options menu with a thermocouple interface. 056

- The word **TEMPERATURE** indicated that a thermocouple interface is connected.
- The units are °C or °K and °F or °R. The unit depends of the setting made in the **Settings** menu.
- The thermocouple types are “J” and “K”, selectable by the user in the **Settings** menu.
- The data represents the actual temperature applied on the sensor. **Open** displayed means that the sensing unit is out of order or not connected.

20.4 NON-CONTACT INFRARED TEMPERATURE SENSOR

Main applications

This non-contact infrared pyrometer can be used alone or in conjunction with the SDT 170 receiver. It is powered by a 9 V alkaline battery.

A laser pointer allows you to home in on the centre of the measuring spot. The spot diameter depends on the distance between the pyrometer and the measured surface. It is 20 mm at 1m and 60 mm at 2m.

When the pyrometer is used alone, the measured temperature can be displayed on the pyrometer screen in °C or °F, over a measuring range of -32 to +550 °C (-25 to 1022 °F).

When connected to the SDT 170 receiver, it can display the temperature in °C, °K, °F and °R, from -18 °C to +260 °C (-0.4 to 500 °F) and store the result in memory in the SDT 170 unit.

Main applications are for monitoring mechanical and electrical equipment, as well as predictive maintenance.

Description

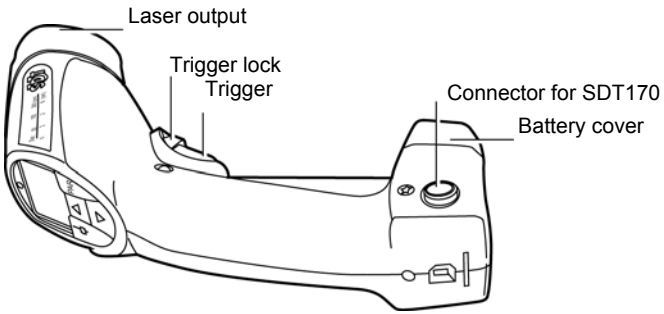
The pyrometer has a measuring range of -32 °C to +550 °C (-25.6 °F to 1022 °F), with a precision of :

- 2 °C below -10 °C (3.6 °F below 14 °F);
- 1 °C between -10 and 100 °C (1.8 °F between 14 and 212 °F);
- 1% of the measurement above 100 °C (212 °F),

if the ambient temperature is between 13 and 33 °C (55.4 and 91.4 °F).

The material, colour and texture of the surface have an influence on infrared measurement. The coefficient of emissivity can be adjusted as a function of the surface parameters from 20 to 100% in 1% steps.

The laser (Class II, < 1mW) shuts off automatically when the ambient temperature is over 50 °C (122 °F).



External view of the non-contact infrared temperature sensor. 067

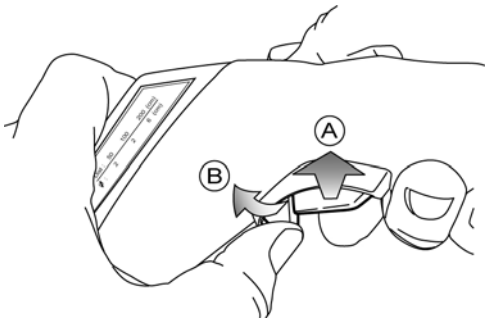
Technical data

Item	Data
Function	Temperature sensor (infrared temperature probe).
Measuring ranges	-32 to 550 °C (-25 to 1022 °F).
Using T°	0 to 55 °C (32 to 131 °F) ambient temperature.
Accuracy	• 2 °C below -10 °C, (3.6 °F below 14 °F), • 1 °C between -10 and 100 °C (1.8 °F between 14 and 212 °F) • 1% of the measurement above 100 °C (212 °F), if the ambient temperature is between 13 and 33 °C (55.4 and 91.4 °F).
Response time	150 ms.
Spectral response	8 to 14 microns nominal.

Emissivity	Adjustable from 20 to 100%.
Power supply	9V alcaline battery.
Dimensions	190 x190 x 50 mm (7.5 x 7.5 x 2") Gun shape.
Weight	340 g (12 oz) without cable.

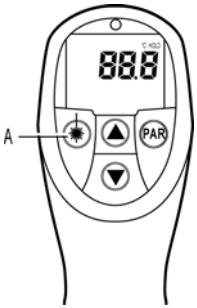
Taking a measurement

1. **Pull the trigger to switch the pyrometer on and display the reading on the screen.**
   After the trigger is released, the reading remains on the screen for 10 seconds before the pyrometer switches off.
2. **To lock the trigger for continuous reading, pull the trigger fully back (rep. A) and push up the lock (rep. B).**



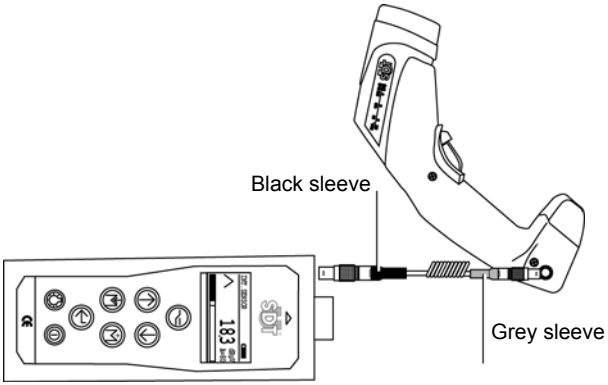
Locking the trigger for a continuous measurement. 103

Note: the star button (rep. A figure below) on the keyboard actives or stops the laser beam.



This button allows to activate or to stop the laser beam. 105

3. **Connect the pyrometer to the *SDT 170* using the spiral cable (Lemo 7M – Lemo 7M).**
   The connector with the grey sleeve is to be connected on the pyrometer.

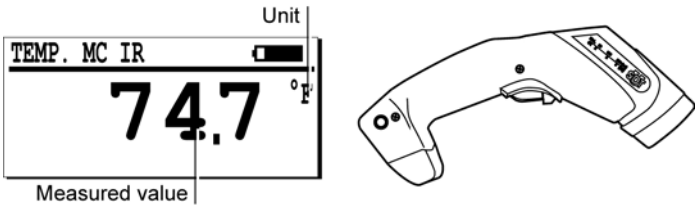


The connector with the grey sleeve is to be connected on the pyrometer. 106

4. **Read the temperature on the SDT 170 screen.**
   The reading can be saved in *SDT 170 M*, *M+* or *MD* memory together with the time and date.

Interpreting the display on the SDT 170

The display (top left) indicates connection of an infrared temperature sensor. The display on the *SDT 170* is as follows:



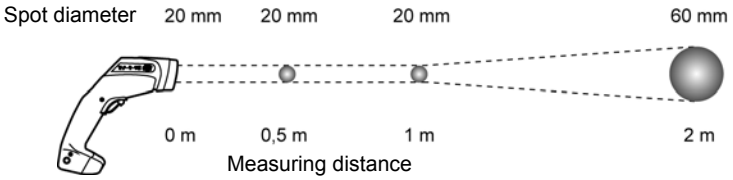
Display with a pyrometer. 059

- The words **`TEMP. MC IR`** indicate that a temperature infrared sensor is connected.
- The unit depends on the setting chosen in the **`Settings`** menu.
- The value indicates the measured temperature.
- The screen displays **`OFF`** if the pyrometer is switched off or not connected.

Additional information

Influence of the measuring distance

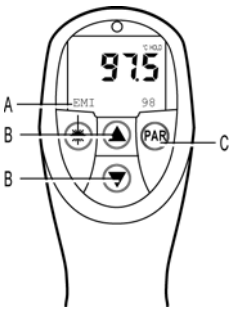
The pyrometer measures the average temperature of a circular surface. The diameter of this surface depends on the distance from the pyrometer. For example, if the pyrometer is located between 20 mm and 1 m away, the spot diameter is about 20 mm.



The spot diameter varies according to the distance. 068

The pyrometer keyboard

- The key **PAR** (rep. C figure below) of the pyrometer selects the parameters (EMI, MAX, MIN, AVG, DIF, HI, etc.) by successive pushes.
- Keys ▲▼ (rep. B figure below) allow the selection of the value of the displayed parameter.



Data on the pyrometer display. 107

The selected parameters (rep. A, figure above) through the PAR key are (rep. C):

- **EMI** (emissivity): can be adjusted from 20 to 100% in 1% steps. For an approximate measurement, an emissivity factor of 95% can be set for all non-reflective surfaces. For more precise measurements, we recommend taking a measurement with a temperature contact probe and then adjusting the emissivity factor accordingly.

- **MAX** and **MIN**: displays the minimum and the maximum value measured since the last time the trigger was pressed, underneath the current reading. These functions can be very useful for determining peak values while scanning a surface or measuring a moving object (response time: 150 ms).
- **AVG** (average): used to increase the accuracy when measuring a temperature which changes over time. The value displayed is the mean value calculated from the measurements taken over the last four seconds.
- **DIF**: indicates the difference between the initial reading (last trigger action) and the current measurement.
- **HI** and **LO**: acoustic alarms. They can be adjusted, in 1 °C (34 °F) steps through the entire measuring range. If the current value is lower than the set «LO» threshold or higher than the set «HI» threshold, the pyrometer emits a beeping sound.
- **CLR, STO, RCL, INT**: not active functions. The recording and processing of readings can be done in the SDT 170 unit and/or using the SDT DATAMANAGER software on a PC.
- **C/F**: switch the unit from °C to °F on the pyrometer display. Readings can also be displayed in °K and °R on the SDT 170 screen (see paragraph «With a thermometer» on page 66).

Low battery

A low battery will indicated by this flashing symbol in the top left corner of the pyrometer display.

20.5 MASS AIR FLOW SENSOR

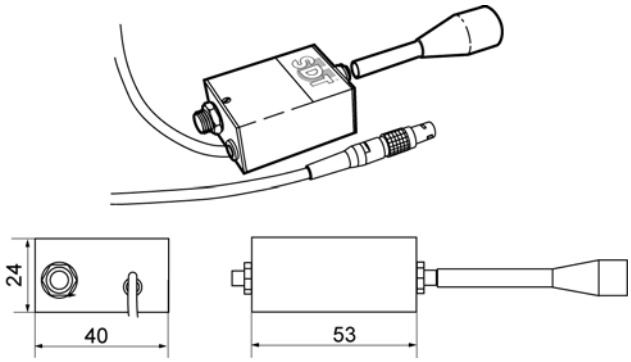
Main applications

Fitted with a tip made of flexible rubber, this sensor allows to measure the flow (sccm/scfm) of a compressed air leak. For an accurate measurement, the nozzle must be set so that all the air leakage goes trough the sensor. The leak measuring range is between -75 till +1 000 SCCM (-0.0025 till 0.035 SCFM).

Description

This is a thermal based Mass Flow Sensor fitted with an incorporated conditioning and temperature compensation electronics.

The flow rate can be readout in either SCCM (Standard Cubic Centimeters per Minute) or in SCFM (Standard Cubic Feet per Minute).



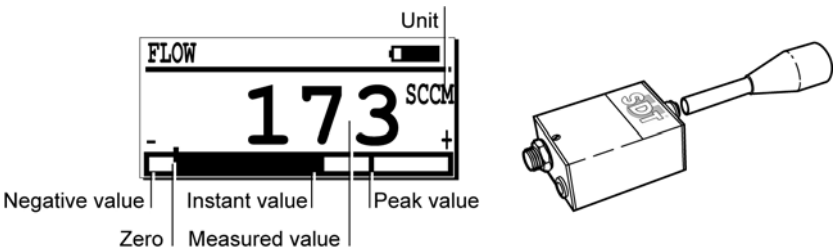
External view of the mass air flow sensor. 046

Technical data

Item	Data
Function	Leak flow rate
Operating pressure	1 Bar max (common mode)
Measuring ranges	-75 till +1000 SCCM (-0.0025 till 0.035 SCFM)
Resolution	1 SCCM
Measuring unit	- SCCM: Standard Cubic Centimeter Minute - SCFM: Standard Cubic Feet Minute

How to read the displayed data

The display indicates:



The Sensor options menu with mass air flow sensor. 047

The display indicates (above left) the connection of a flow sensor. The display is as follows:

- Unit: SCFM or SCCM according to the unit chosen (Settings menu).
- Negative value: when a (vacuum) is measured.
- Zero: any pressure/depressure applied.

21. Cables

Concerning the plugging and unplugging, see the recommendations on next page.

21.1 BNC TO LEMO 7 PIN CABLE

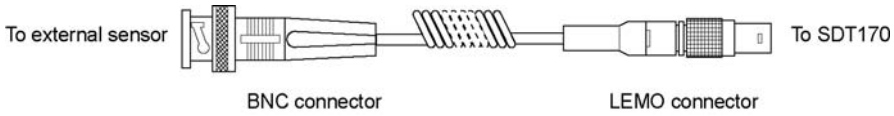
Use

This cable is used to connect, to the *SDT 170*, the following ultrasonic devices:

- Flexible sensors.
- Magnetic sensor.
- Threaded sensor.

Description

0.5 to 2 m coiled cable fitted with a BNC connector and a LEMO 7 pin connector.



View of the BNC to LEMO 7-pin cable. 078

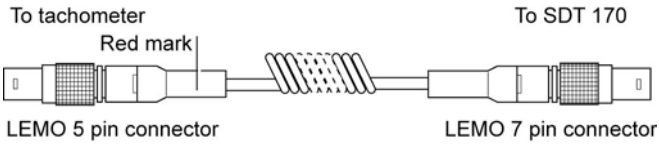
21.2 LEMO 7 PIN TO LEMO 5 PIN CABLE

Use

This cable is used to connect the *SDT 170* with the tachometer:

Description

0.5 to 2 m coiled cable fitted with a LEMO 5 pin connector and a LEMO 7 pin connector.



View of the LEMO 5 pin to LEMO 7 pin cable. 079

See important note next page.

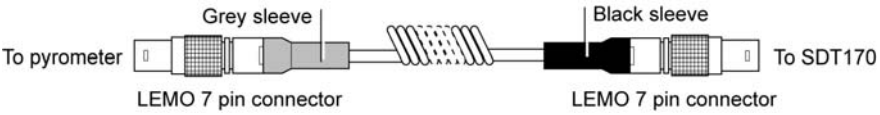
21.3 CÂBLE LEMO 7 PIN TO LEMO 7 PIN

Use

This cable is used to connect the *SDT 170* to the pyrometer.

Description

0.5 to 2 m coiled cable fitted with two LEMO 7 pin connector.



View of the LEMO 7 pin cable. 099

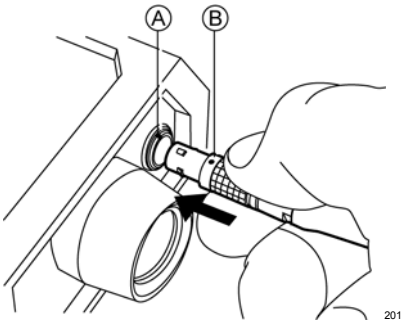
Important note concerning the plugging to the connector

Connection to the connector

All external sensors are to be connected onto the *SDT 170* connector through a LEMO 7 pin cable.

Plugging of the LEMO plug into the connector

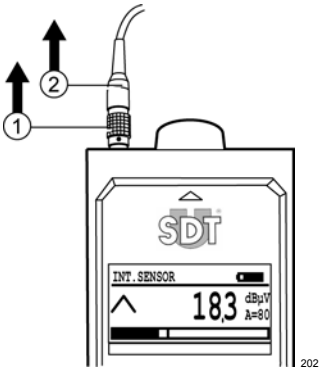
1. Line up the red dot of the plug (B) with the red mark of the connector (A).
2. Insert the plug into the connector **without any rotating movement**.



201

Unplugging of the LEMO plug from the connector

1. Move up, towards the cable, the ring located on the bottom of the plug.
2. Only pull the plug **without any rotation**.



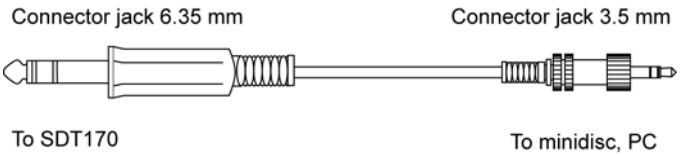
21.4 CABLE STEREO JACK 6,35 MM TO 3,5 MM

Use

This cable is used to connect the *SDT 170* audio output to an audio recording device (recorder, *minidisc*, PC).

Description

One meter shielded audio cable fitted with a 6.35 mm stereo jack connector and a 3.5 mm stereo jack connector.



View of the cable stereo jack 6.35 mm to 3.5 mm. 101

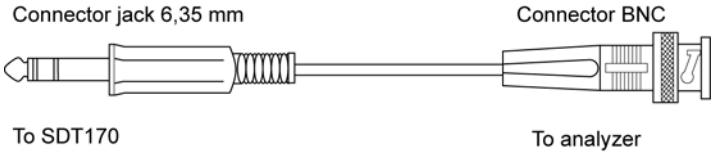
21.5 CABLE STEREO JACK 6,35 MM TO BNC

Use

This cable is used to connect the *SDT 170* audio output to an analyzer input AC (scope, etc.).

Description

Coaxial cable (0.50 m) fitted with a 6.35 mm stereo jack connector and a BNC connector.



View of the cable stereo jack 6.35 mm to BNC. 102

Technical data

22. Technical specifications

22.1 MEASUREMENT UNIT

Function	Multifunction detector.
Display	Graphic LCD with backlighting.
Keyboard	8 function keys.
Ultrasonic sensor	Built-in.
External sensors	Through specific connector (LEMO 7 pin connector)
Data Logger	**SDT 170 M and M+**: up to 1000 points, each can store up to 4 measurement data. The newest data pushes the oldest one (FIFO); this unit cannot memorize any route. **SDT 170 MD**: 128 routes, each route up to 1,000 points. Each point can memorize up to 4 measurements.
Communication	RS 232 C communication interface (19,2 kB). Software's for transferring the data from the device to the PC : - *MPlus*: for the *SDT 170 M+* - *DataManager*: for the *SDT 170 MD*.
Battery pack	Rechargeable NiMH (Nickel Metal Hydrate). Autonomy of 8 to 10 hours without backlighting. Recharge time: 5 to 6 hours. Nominal Capacity: 1.5 Ah. Life span: 500 to 1,000 charge/discharge cycles. Recharge only with appropriate SDT charger.
Auto power down	Auto power down after preset time.
Operating temp.	-15 °C to +60 °C / 14 °F to 140 °F.
Housing	Extruded aluminum.
Weight	750 g / 26.45 oz. (with battery and holster included).
Dimensions	225 x 90 x 40 mm / 8.86 x 3.54 x 1.57inches (L x W x H).
Holster	Rubber resistant to hydrocarbons (fluor silicone).
Headphones	130 dB, noise isolating.

22.2 INTERNAL ULTRASONIC SENSOR

Refer to *Chapter 16 - Internal ultrasonic sensor*.

22.3 CONTACT PROBE

Refer to *Chapter 17 - External ultrasonic sensors*.

22.4 BATTERY PACK

For optimum performance, this battery pack is equipped with an electronic management system (includes digital serial number, capacity and temperature management).

Battery type	6 cell, 7.2 V, 1500mAh, NiMH battery pack.
Dimensions	106 x 52 x 18 mm / 4.17 x 2 x 0.71 inches (L x W x H).
Protections	Short-circuit, reverse polarity and temperature protected.
Weight	190 g / 6.7 oz.
Housing	Glass fiber reinforced polyamide / FR4 Epoxy (contact area).

22.5 BATTERY CHARGER

For optimum performance, this charger is microprocessor controlled.

Charger type	Specific for *SDT 170*, NiMH battery pack.
Power supply	230 or 110 VAC +15% / -10% - 50/60 Hz.
Output voltage	7.2 or 9.0 V DC (depending on the operating mode).
Current	500 mA max.
Recharge time	5 to 6 hours typical in fast mode. 12 to 14 hours typical in slow mode.
Protections	Temperature limitation at 60 °C / 140 °F.
Status indicator	Two color LED type.
Isolation	Double isolation.
Weight	425 g. / 15 oz.
Housing	PPE.

Appendix

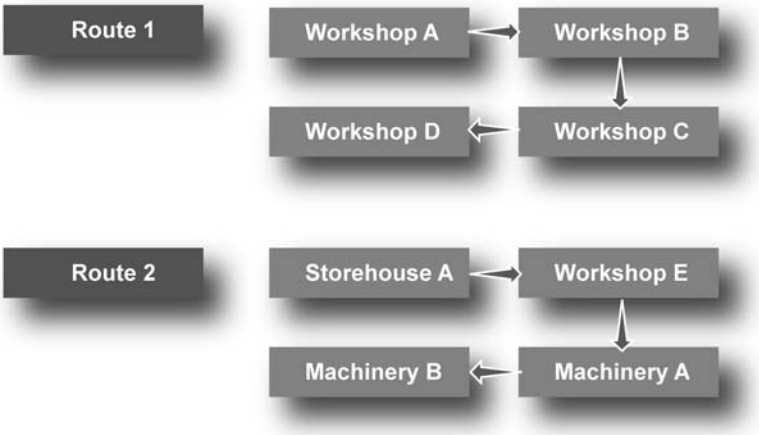
23. Specificities of the SDT 170 M, M+ and MD

23.1 WHAT IS A ROUTE

This concerns only the *SDT 170 MD*.

Definition

A route consists of several different physical locations that are to be monitored with the various sensors available to the *SDT 170 MD* equipment. The order and sequence of these locations are defined by the user, and mapped out within his *SDT 170 - DataManager*.



Example of a route maps. 009

Up to 128 routes can be transferred to the collector (*SDT 170 MD*).

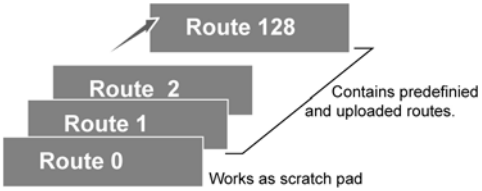
Once a route is defined on the PC, it can be uploaded to the *SDT 170 MD* device by means of the RS232 interface. Up to 128 independent routes can be stored in the unit at once.

The tasks of the user is thus perfectly defined and simplified. No measurement is forgotten, or stored in the wrong memory location.

Usage

The routes are defined and uploaded in the equipment by the means of a specific *SDT 170 Data Management software* installed on a personal computer. The conventions are:

- **Route 0**: is a non predefined route, and gives the possibility to the user to store an optional, or non planned measurement or control point as needed. This route is also called a scratch pad.
- **Others routes**: predefined and uploaded routes (up to 128) from a personal computer.



The route map. 011

Loading routes from the PC to the SDT170 MD

When delivered, the *SDT 170 MD* contains only the **`STD 0`** route. So, the menu **`Route choice`** is not available. The specific information of the routes is defined by means of the *SDT 170 - Data Management software*, which is delivered with the *SDT 170 MD* version. This software has to be installed on a personal computer running *Windows*®. Refer to this manual to learn how to define and store a route in the *SDT 170 MD*.

23.2 WHAT IS A MEMORY NUMBER

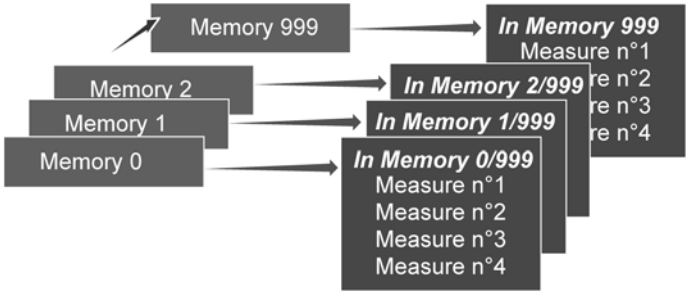
This concerns only the *SDT 170 M*, M+ and *MD*.

Definition

A memory number is an electronic page, where data from any of the sensors is stored.

A maximum of 1,000 independent storage locations, numbered from 0 to 999 are available.

For each storage location, the *SDT 170 M, M+* or *MD* stores the data (measured value, unit, type of sensor used, time and date) of the last four measurements made. The memory works on the theory of first in first out (FIFO), so the fifth oldest measurement is automatically deleted.



The SDT 170 M, M+ and MD contain 1,000 memory locations and each memory location can store up to 4 measurements. 010

Usage

A memory number is generally attached to a physical location. For example, '*Workshop 3 – waste water return pump*' could define memory location one.

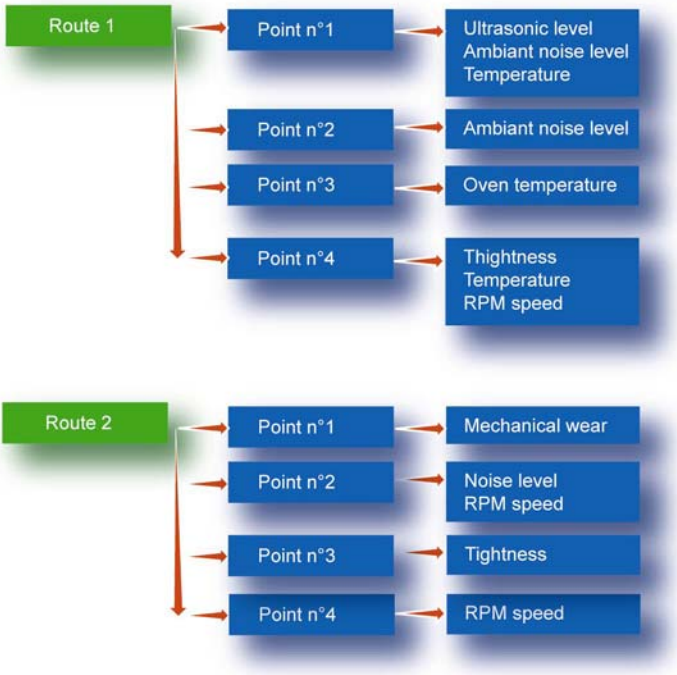
For each memory location (the physical location in reality), the user defines the type of sensor to be used. For example, the ultrasonic sound level on the front pump bearing, the pumps rotation speed and temperature is to be measured.

For each memory location (measurement point) a 12 characters label can be defined and uploaded from a personal computer in the *SDT 170*'s memory (MD version only). See the corresponding user manual of the *SDT 170 - Data Management software* for more information.

In this example, on memory location number 2, four measurement type have been done (T°, dBµV, RPM and dBA). 013

Example of a route

This example shows the utilization of routes and memory numbers.



The hierarchy of the different storage levels. 012

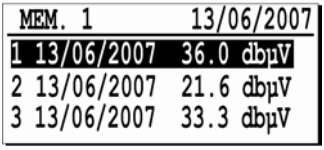
This example shows the creation of routes build on to the base of the localizations to be controlled. It is also possible to build routes based onto the type of sensors used.

23.3 WHAT IS A MEASUREMENT

This concerns only the *SDT 170 M*, M+ and *MD*.

A measurement is a numerical value (example 250 °C) stored in the unit.

For each memory number, the last four measurements are stored (numerical values) and are retrievable any time regardless of the sensor type used.



The last four measurements are stored in the equipment. 014

- ***SDT 170 M*** and ***SDT 170 M+***: the internal memory capacity of theses equipments permits storage up to 4,000 (1,000 points x 4 measurements) time dated measurements of any sensor type.
- ***SDT 170 MD***: the internal memory capacity of the *SDT 170 MD* equipment permits therefore storage of time dated measurements of any sensor type (128 routes and 1,000 points x 4 measurements).

23.4 DATA TRANSFERT TO THE PC

- ***SDT 170 M+***: see paragraph 5.14, page 23.
- ***SDT 170 MD***: refer to the *DataManager* leaflet.

24. Declaration of conformity in the European Union

Manufacturer

SDT International n.v. s.a.
Boulevard de l'Humanité 415
B - 1190 BRUSSELS
BELGIUM

declares that

SDT 170 Multifunction Detector

making the object of this declaration, is built in conformity with the applicable European Directives:

- Electrical equipment for measurement IEC EN 61010-1
- EMC Directive 2004/108/CE
- Low voltage Directive 2006/95/CE

The equipment hence displays the CE logo of being compliant to the current CE regulations.

To be able to operate by state of the art rules, as stipulated in the directive, it has been designed by the following rules:

- The *SDT 170* does not radiate electromagnetic waves (EMC);
- The *SDT 170* is immunized against external electromagnetic radiation (EMI);
- The *SDT 170* is protected against electrostatic discharges (ESD).

Note: the owner is obliged to preserve the present users manual with the obligation to pass it on to future users, or been resold to another user.

Brussels, September 2009.

The Manager.

25. Warranty and responsibility limits

25.1 WARRANTY

SDT International guarantees the *SDT 170* unit against manufacturing faults for a period of 2 (two) years, with the exception of the battery and accessories (charger, headphones, sensors, etc.) these are guaranteed for a period of 6 (six) months. The warranty covers all material supplied and implies the free replacement of all parts that contain a manufacturing fault.

The warranty period begins on the day that the unit is delivered to the end-user. In case of failure, the manufacturing shipment date will be used as a reference.

The warranty is void if misused, or accident damages the product, if the product is altered in any way, if an unauthorized party attempts repair, or the unit is opened without written authorization of *SDT International*.

In the event of a defect, contact your local *SDT* representative or *SDT International*.

25.2 RESPONSIBILITY LIMITS

Neither the company *SDT International*, nor any related company, will in any circumstances be liable for any damages, including, without limitation, damages for loss of business, business interruption, loss of information, defect of the *SDT 170* unit or its accessories, bodily harm, loss of time, financial or material loss or any other indirect or consequential loss arising out of the use, or inability to use this product, even when it has been warned of possible damages.

25.3 BIENNIAL CALIBRATION)

The SDT 170 detector is a measuring instrument. *SDT International* recommends a recalibration every two years. A Calibration Certificate will be delivered after this control. The accuracy and calibration of the instrument are traceable through reference standards that are compared, at planned intervals, to national or international standards.

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