Ultrasound Solutions

SDT200

USER MANUAL

Version 7 - 2022

SDT International sa-nv • Bd de l'Humanité 415 • B-1190 Brussels (Belgium) • Tel : +32(0)2 332 32 25 • email : info@sdtultrasound.com
SDT North America • 7677 County Road 2 • Cobourg ON K9A 0X4 (Canada) • Phone : 1-800-667-5325 | 1-905-377-1313 • email : hearmore@sdtultrasound.com
www.sdtultrasound.com

WARNING

THE SDT200 IS POWERED BY BATTERY.

BATTERY IS NOT USER SERVICEABLE.

CHARGE IN A NON–HAZARDOUS AREA.

NO USER SERVICEABLE PARTS INSIDE – REFER SERVICING TO QUALIFIED PERSONNEL.

SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

You can download the latest version of this manual by visiting the SDT International website:
sdtultrasound.com

Due to typical self-discharge of NiMH batteries, it is recommended to charge the SDT200 battery at least every 3 months, even if it is not used.

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CE marking

The rear side of the SDT200 ATEX version has a specific ATEX marking

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Built-in pyrometer
Activation of this functionality is optional

1.4. The bottom side

Reset button
Insert a needle to make a reset. (Reset causes a restart of the device but the data stored are not deleted)

2. Laser safety information

The SDT200 is equipped with a laser class 2: Risk of injury to the eye.

Never look directly to the laser beam.

Never point the laser beam at a person' eye.

Do not aim the laser at specular reflection surfaces.

Never view the laser using an optical instrument.

3. Safety precautions for the SDT200 ATEX version

Please read carefully the safety precautions before using the SDT200 - ATEX version in a potentially explosive environment.

- Make sure your SDT200A protection class is suited regarding the environment it will be used.
- Under no circumstances, do not attempt to service or replace SDT200 ATEX version components. In case of malfunction, contact SDT International or SDT local representative.
- Maintenance must always be performed outside potentially explosive environments.
- Battery charge must exclusively be performed outside potentially explosive environments.

- FUBATTR270-02 is the only authorized power source for SDT200 ATEX version.
- The max. permissible room temperature is:
  - -15°C to 48°C for T3.
  - -15°C to 60°C for T2.
- Potential danger of static electricity for the display. Avoid electrostatic charge:
  - Avoid friction.
  - No dry cleaning.
- Do not use USB connectivity in dangerous area.
- Do not use SDT carrying case in dangerous area

4. Getting Started

4.1. Charging the battery

The SDT200 uses an internal NiMH battery. The battery charger outlet will connect to a socket on the bottom side of the SDT200.

	Charging the battery of the SDT200 ATEX version must exclusively be performed outside potentially explosive environments.
	Due to the typical self-discharge rate of NiMH batteries, it is recommended to charge the SDT200 battery at least every 3 months, even if it is not used. ***It is recommended not to store the SDT200 with an uncharged battery for more than a few weeks. This would significantly reduce the battery life span.*** ***Only use the charger provided by SDT.***

The charging time will typically be 6 hours. When the LED of the charger is continuously green, the SDT200 battery is completely charged.

Like most batteries these days, leaving the SDT200 charging after the charger says it is charged does not hurt the battery – in fact it very slowly tops the charge up a little more.

You can charge the SDT200 switched off. You can also trickle charge the SDT200 switched on, so you can be using it to load and unload data, for example, and charge it at the same time.

SDT200 bottom side

SDT Universal charger for SDT200

A fully charged battery will give you about 8 hours of continuous use. This will vary of course depending upon your need to use the backlight and the power drain of certain external sensors that you might be using.

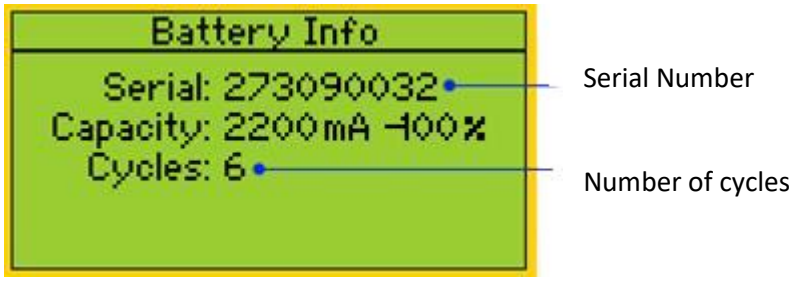
You can increase the autonomy by adjusting the Auto Power Down and the time before switching off the backlight.

For a device that has been discharged for several days/weeks or in case of a problem encountered during charging, follow the procedure below to force a full charge cycle:

1. Connect the device to the charger;
2. Do a "RESET" by pushing the switch with a paper clip in the small hole above the audio output (see red circle in the "rear side" picture above);

3. Wait at least 4 hours for a full charge before turning the device on again. The green LED should be lit continuously.

When a charge cycle is complete, the counter available in the System Info/Battery Info menu is incremented by +1.



Please note that the device must be turned off to charge the battery.

- When the device is turned on, the charger supplies power directly to the device without charging the battery.

Before storing the device for a long period of time, it is recommended to fully charge the battery.

- There is no specific battery for the "real time clock", and it is powered by the battery pack.

4.2. Turning on & turning off the SDT200

To turn on:
Press the ***Power button*** on the bottom right of the keypad. The status LED will shine dark blue. Then, a few seconds later you will see on the screen the SDT logo and the message “loading”. If you do not see this display your battery might be flat.

To turn off:
Push the ***Power button*** on the bottom right of the keypad. You will see the following display:

Confirm the device shut down by pressing the ***Enter button***.

4.3. Plug & unplug an external sensor

The SDT200 is equipped with a LEMO connector, used to plug external sensors.

It is a commonly used industrial connector, considered for its reliability and robustness. It has a sprung-loaded knurled barrel and mechanical polarization to go only in one way round.

To plug a LEMO connector:

- Line up the red dot on the plug with the red mark on the connector.
- Insert the plug into the connector without any rotating movement.

When an external sensor is connected to the SDT200, it is automatically selected. However, you can switch between available sensors using the ***F1 button***.

To unplug the LEMO connector

- Move up, towards the cable, the ring located on the bottom of the plug.
- Only pull the connector without any rotation.

Please, never pull on the cable itself.

5. Functions reference guide

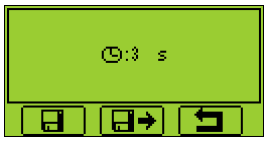
5.1. Taking and storing an ultrasonic measurement

Select the desired ultrasonic sensor using the ***F1 button*** if necessary.

Set up amplification using ***Up and Down arrow buttons***, till the up and down ***amplification adjustment indicators*** disappear.

Activate or deactivate the laser pointer using the ***F2 button***.

Measurement settings
Press the ***F3 button*** to enter the measurement settings menu.



Adjust the acquisition time using ***Up and Down arrow buttons***.

If the acquisition time is set to 0 second, the RMS, Max RMS, Peak and Crest Factor are refreshed every 250 milliseconds. This mode enables the operator to take data on the fly.

If the acquisition time is set at 1 second or more, the RMS, Peak and Crest Factor will be calculated over the complete acquisition time. The Max RMS will be the highest sub RMS reached over the complete acquisition time. Each sub RMS is calculated during 250 milliseconds. The maximum acquisition time is 10 seconds.

Use the ***F1 button*** to save the settings as preferred configuration

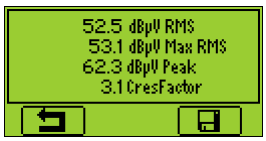
Use the ***F2 button*** to load the settings associated to the preferred configuration

Use the ***F3 button*** to go back to the ultrasound measurement screen using the modified settings. Note that the preferred configuration is reloaded at startup of the SDT200.

Getting data
Press the M button:

- To freeze RMS and Max RMS values when the acquisition time is set to 0 second.
- To start the acquisition when the acquisition time is set to 1 second or more.

  At the end of the acquisition time, a screen detailing RMS, Max RMS, Peak and Crest factor values, is displayed.:



Press the ***F3 button*** or the ***Store button*** to save the data (or the ***F1 button*** to come back to the measurement screen without saving the data)

Then choose the desired memory location using the ***Up and Down arrow buttons*** and confirm by pressing the ***Enter button***.

5.2. Taking and storing a temperature measurement

This feature is optional.

Select the built-in pyrometer by highlighting the ***T*** in the upper left corner of the display with the ***F1 button***.

Activate or deactivate the laser pointer using the ***F2 button***

Measurement settings

Press the ***F3 button*** to enter the Measurement Settings menu.

You can:

- Adjust the emissivity coefficient from 1 to 0.01
- Switch between Celsius, Fahrenheit and Kelvin physical units

To modify the parameters of the selected setting:

- Use the ***Up and Down arrow buttons*** to switch form one field to another.
- Use the ***Left and Right arrow buttons*** to modify the value of the selected field.
- Use the ***Enter button*** to save the changes and return to the previous menu.

Use the ***F1 button*** to save the settings as preferred configuration

Use the ***F2 button*** to load the settings associated to the preferred configuration

Use the ***F3 button*** to go back to the temperature measurement screen using the modified settings.

Note that the preferred configuration is reloaded at startup of the SDT200.

Freeze measurement

Press the ***M button*** to freeze the measurement.

Store measurement

Press the ***Store button*** to save the measurement.

Then highlight the chosen memory location using the ***Up and Down arrow buttons*** and confirm by pressing the ***Enter button***, or the ***F1 button*** to cancel measurement storage.

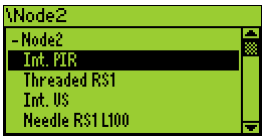
5.3. Review measurements stored in the SDT200

- From the Measurement screen press the ***Enter key*** to access the Main Menu.

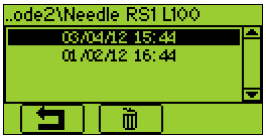
- Use the ***arrow buttons*** to highlight the Node Tree icon: 
- Press the ***Enter button*** to display the list of memory locations:

Note: the "+" sign placed before a memory location means it contains recorded measurements.

- Select the desired memory location using ***Up and Down arrow buttons***. Expand the memory location using the ***Right arrow button***. The saved measurements are filtered regarding the sensor used:

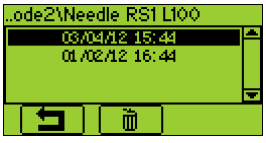


- Select the desired sensor using ***Up and down arrow buttons***. Display the list of saved measurements by using the ***Right arrow button***. The data are filtered according to the recording time stamp:



- Select a time stamp by using the ***Arrow Buttons***, then and press the ***Enter button*** to visualize the data:

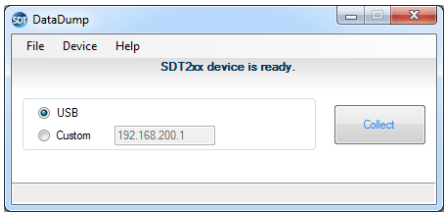
- Press the ***F1 button*** to come back to the list of recording timestamps:



- To delete a recording, select its timestamp using the ***Up and down arrow buttons*** and press the ***F2 button***.
- To come back to the measurement screen, press a few times the ***F1 button***.

5.4. Download data to PC using SDT DataDump

> ***Before continuing this section, you must have installed and activated the DataDump software.***



Your SDT200 must be switched on with the Measurement screen loaded. Then connect the SDT200 to a USB socket of your computer using the Mini-USB/USB cable provided by SDT

Start the SDT DataDump application on your computer.

The SDT DataDump window appears.

Verify the ***USB radio button*** is ticked then click on ***Collect***.

The following screen appears.

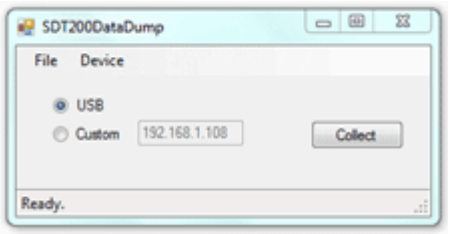
You can choose, by clicking on ''Save as type field'', to save the report as an xml file (open by your web browser) or as an xls file (open by MS Excel).

You can also choose the name of the report and its destination.

The report is automatically stored on your computer using the format: "report dd-mm-yy.xml". By default, the path is: C:\Users\Public\Documents\SDT\SDT270DataDump\Reports\504 or 505xxxxxx or 505xxxxxx which is the serial number of your SDT200 device.

5.5. Other SDT DataDump functions

5.5.1. Erasing the SDT200 memory



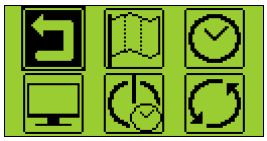
Verify the ***USB radio button*** is ticked, then click on ***Device*** (menu) and ***Delete all device data***. You can also use the keyboard shortcut CTRL+U.

5.5.2. Updating the SDT200 firmware

Select the menu "***Device / Update Firmware***". On the Device update window, tick the radio button "***USB***" and then click "***Check for updates***". Note that this requires an internet connection. Updating the SDT200 firmware is possible during the warranty period.

5.6. Changing device settings

- To access the Main menu, press the ***Enter button***.
- Use the ***arrow buttons*** to highlight the Settings icon: 
- Press the ***Enter button*** to access the Settings menu:



- Use the ***arrow buttons*** to select the desired icon and the ***Enter button*** to select the desired setting.
  -  Language icon: change device interface language (English, Nederlands, Français, Deutsch, Italiano or Español).
  -  Date and time icon: set date, time and their format
  -  LCD icon: adjust the screen contrast and the operating time of the backlight
  -  Auto power down icon: adjust the time before device auto power down when it is unused.
  -  Reset icon: force a factory reset of the SDT200 device. Note that this does not erase saved measurements.
  -  Escape icon: to get back to the main menu. In the main menu, to get back to the measurements screen, press the ***F1 button.***
- To modify the parameters of the selected setting:
  - Use the ***Up and Down arrow buttons*** to switch form one field to another.
  - Use the ***Left and Right arrow buttons*** to modify the value of the selected field.
  - Use the ***Enter button*** to save the changes and return to the previous menu.
  - Use the ***F1 button*** to go back to the previous menu without saving the changes.

5.7. Device Info

- From the Measurements screen press the ***Enter Button*** to access the ***Main Menu***
- Use the ***arrow buttons*** to highlight the Device Info icon: 
- Press the ***Enter Button*** to display device information:
  - The version of your instrument (screen 1)
  - Its calibration date (screen 2)
  - The serial number of the battery and its remaining capacity (screen 4)
  - The device and PCB serial numbers, the firmware version (screen 5)
- Use the ***Up and down arrow buttons*** to switch between the different screens. Push the ***F1 button*** to go back to the main menu and push once again the ***F1 button*** to go back to the measurements screen.

6. Technical Specifications

6.1. SDT200 technical specifications

6.1.1. Technical specifications for all SDT200 versions

For SDT200 ATEX version specific technical specifications, please see next page

Function	Multifunction detector
Display	Graphic LCD with backlighting (128 x 64)
Keyboard	12 function keys
Built-in sensors	Ultrasonic sensor Pyrometer (according to the version)
External sensors	Through specific connector (Lemo 7 pin connector)
Data Logger	- 100 Measurement Nodes (measurement points) - Total 4000 Measurements (measurements data)
Communication	USB interface
Software for transferring data to PC	DataDump Application
Battery pack (*)	Rechargeable battery type: 8 cell, 4.8 V, NiMH (Nickel Metal Hydride) Nominal capacity: 4.4 Ah Life span: 500 to 1,000 charge/discharge cycles Autonomy: 6 to 7 hours Protections: short-circuit, reverse polarity and temperature protected
Auto power down	Auto power down after preset time
Operating temperature	-15 °C to +48 °C / 5 °F to 118 °F noncondensing
Housing	Extruded aluminum
Weight	±770 g / 27 oz.
Dimensions	226 x 90 x 40 mm / 8.90 x 3.54 x 1.57 inches (L x W x H)
Headphones	Noise isolating, NRR 25 dB (tested in an accredited NVLAP laboratory)

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

6.1.2. Specific technical specifications for the SDT200 ATEX version

The SDT200 ATEX version is certified ATEX II 1 G Ex ia IIC T3/T2 Ga, according to IEC 60079-0, 60079-11 and 60079-26.

Check room temperature for use of the SDT200 ATEX version in potentially explosive environments. The max. permissible room temperature is:

- -15°C to 48°C (T3).
- -15°C to 60°C (T2).

The SDT200 ATEX version has the following marking on the rear side:

6.1.3. Electrical specification for non SDT sensors used with the SDT200 ATEX version

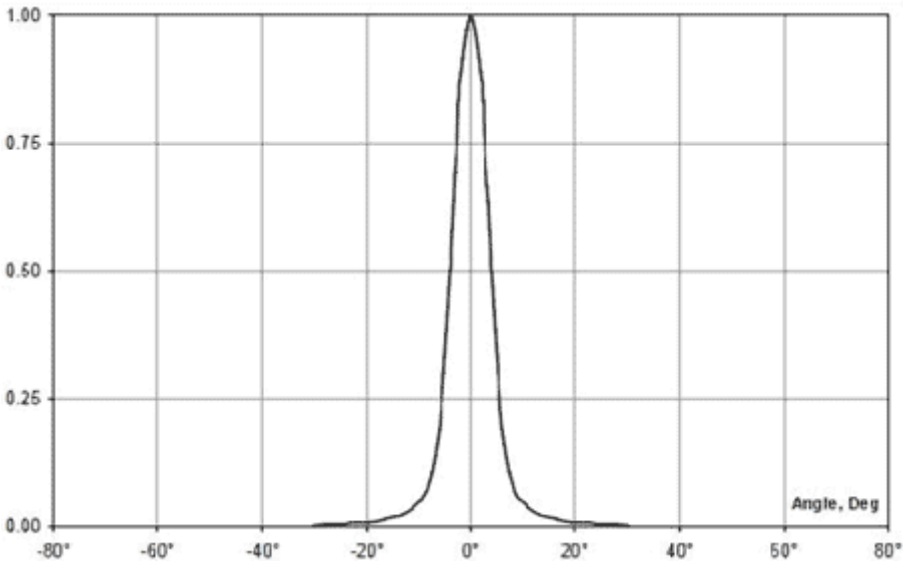
Check electrical compatibility of non SDT sensors, for use in potentially explosive environments, before connecting them to the SDT200 ATEX version.

Max. outer voltage V_0	20.4V
Max. outer current intensity I_0	68.7mA
Max. outer effective capacitance C_0	96nF
Max. outer effective inductance L_0	1mH

6.2. Built-in ultrasound sensor

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

6.3. Built-in pyrometer



Field of view

Sensor type	Infrared temperature sensor
Temperature calibration range	sensor temperature:-40…+125 °C object temperature: -10… +380 °C
Measurement resolution	0.1°C
Temperature precision (for ambient temperature between 0 and 50°C – for emissivity = 1)	• For measured temperature between -70°C and -40 °C: ±2°C • For measured temperature between -40°C and 0°C: ±1°C • For measured temperature between 0°C and 60°C: ±0.5°C • For measured temperature between 60°C and 120°C: ±1°C • For measured temperature between 120°C and 180°C: ±2°C • For measured temperature between 180°C and 240°C: ±3°C • For measured temperature between 240°C and 380: ±4°C
Field of view at 50% of attenuation	10°

6.4. Battery charger

Charger type:	Specific for SDT170, SDT200 and SDT270 NiMH battery pack

Use:	Indoor use only; ambient temperature: min 0°C, max 45°C. Mode of operation: continuous. Environment pollution: max degree 2. Altitude during operation: max 2000 m.
Power supply:	230 VAC or 110 VAC +6 % / -10 %, 50/60 Hz, 25 VA, max branch fuse 20 A
Status indicator:	• Green LED is continuously lit: battery is fully charged • Green LED flashes evenly: normal charge • One red flash every 5 seconds: Battery Voltage error • Two red flashes every 5 seconds: Over temperature error • Three red flashes every 5 seconds: Timeout full charge • Four red flashes every 5 seconds: Timeout Rapid charging • Five red flashes every 5 seconds: Timeout Activate charging • Six red flashes every 5 seconds: Communication error
Input fuse:	T1.6 A (intern, not user replaceable)
Protection:	Temperature protected, limit set at 60°C / 140°F
Output voltage:	Between +4.0 and 14.5 V DC (depending on the operating mode)
Output Current:	Max 1 A
Output Power:	Max 7 W
Isolation:	Class II double isolation
Main supply transformer:	Class II, switching mode regulation
Overvoltage Category:	II
EMC:	EN 61000-4, EN 61000-3, EN 61010-1
Electrical safety (LVD): C US	EN 60950-1:2007 UL 60950-1, ed2(2005)
Weight:	300 grams / 10.6 ounces
Housing:	PPE
Protection Class:	IP40

7. Miscellaneous

7.1. Recommended calibration intervals

SDT recommends annual recalibration of SDT instruments and annual verification of sensors. This periodicity is coherent with the observed long-term stability of SDT electronic equipment's.

However

- For new equipment leaving the factory the initial period is extended to 15 months instead of 12 (to avoid any possible discrimination between users due to transportation time, customs clearance, etc.).

- SDT recognizes that each customer may have their own Quality Assurance Standards and internal requirements. If a customer has established a Quality Assurance Program that includes a documented procedure for measurement deviations, and if an instrument and the relevant sensor show acceptable deviations and do not show signs of physical damage, then calibration periodicity could be extended to two years.

- Third party organizations having more authority (Class, or State Administrations) may have defined their own regulations for example 6 months, or 2 years calibration interval: by evidence, local legally applicable regulations supersede SDT rules.

For these reasons, SDT Calibration Certificates do no more mention a "calibration due date", but simply the "last calibration date".
For user convenience, the date of the last calibration of an SDT200 or 270 instruments can also be found in the menu screens.

This text refers to SDT document DC.QUAL.005[1].

7.2. EU directives and Standards

SDT200 Multifunction Detector (standard FUR200 and ATEX version FUR200A) has been designed and tested to meet the following directives and standards. The declaration of CE conformity is available on SDT website at https://sdtultrasound.com/support/downloads/certificates/

This product meets the following essential requirements of the applicable European Directives:

- 2014/30/EU; Electromagnetic Compatibility Directive (EMC);
- 2011/65/EU; Restriction of Hazardous Substances (RoHS);

[1] This document is part of SDT's quality management system (ISO-9001 certified).

- 2014/34/EU; Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX) (applied to FUR200A).

EC type examination certificate nr ISSeP11ATEX008X delivered by ISSeP, notified Body nr 0492

ATEX type examination certificate of conformity nr 20/BE/4608-0 in accordance with Annex IV-Module D "Quality Assurance of the Production Process" delivered by APRAGAZ notified Body nr 0029

The equipment hence displays the CE logo of being compliant to the current 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 SDT200 does not radiate electromagnetic waves (EMC)
- The SDT200 is immunized against external electromagnetic radiation (EMI)
- The SDT200 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.

7.3. Warranty and responsibility limits

7.3.1. Warranty

SDT International guarantees the SDT200 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.

Warranty does not include shipping, handling and importation.

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.

7.3.2. 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 SDT200 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.

7.4. Destruction and recycling of waste equipment

In conformance with European Union (EU) Directives and in particular with Directive 2006/66/EU "Batteries" and Directive 2012/19/EU "WEEE – Waste Electrical and Electronic

Equipment", SDT International is organizing the management of waste equipment. However local legal regulations have precedence.

Thus, SDT Customers may:

- Either transfer a waste apparatus to a local company that will recycle it in accordance with applicable local laws;
- Or return the waste apparatus to SDT International or to a SDT Dealer
  For an apparatus that contains a battery, SDT International will transfer the battery to a local company that will recycle it in accordance with EU "Batteries" Directive and Belgian laws.

SDT International will transfer the rest of the apparatus to a local company that will recycle it in accordance with EU "WEEE" Directive and Belgian laws.

7.5. Copyright

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.

Revision table:

07	CMA 29/03/2022	Clarifications sur l'utilisation de la batterie	CGI
06	CMA 22/07/2021	Section 7.2 declaration of CE conformity replaced by Standards + link to the DOC Specification table	CGI
05	CMA 04/02/2021	Temperature ATEX T3 updated + nobo number	CGI
Revision	**Writer**	**Nature of modification**	**Approved**