REV. 1.0
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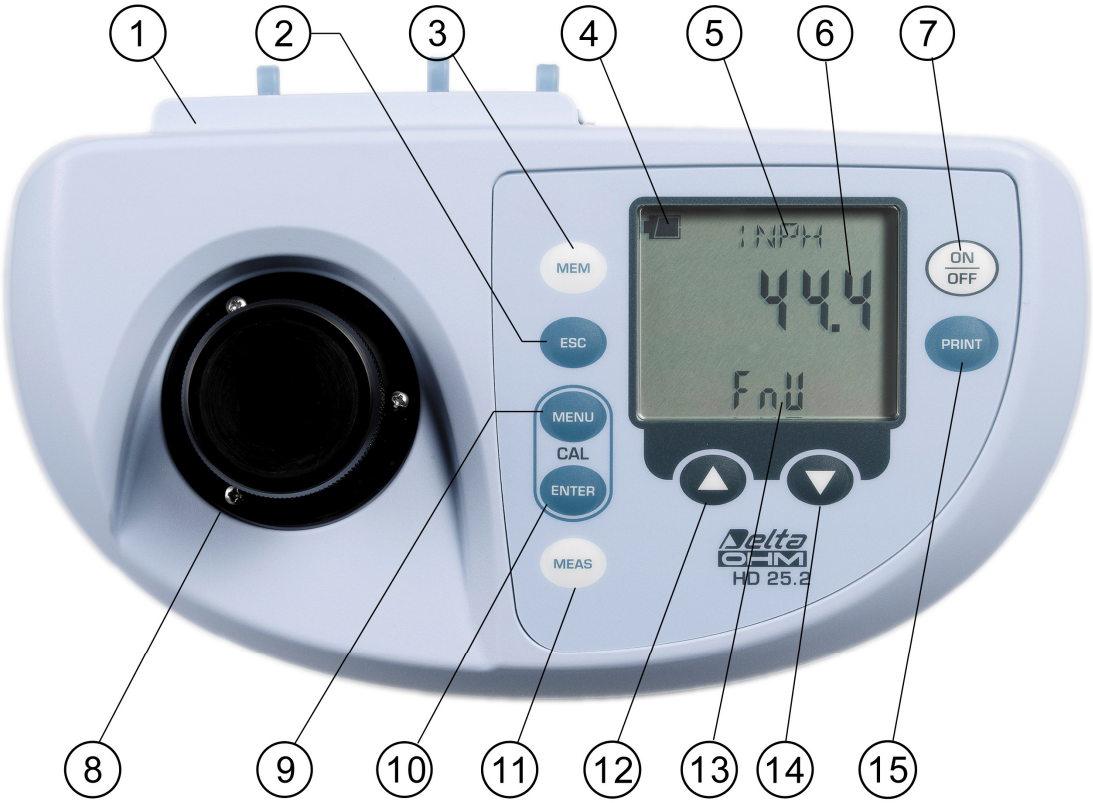
HD25.2

GB

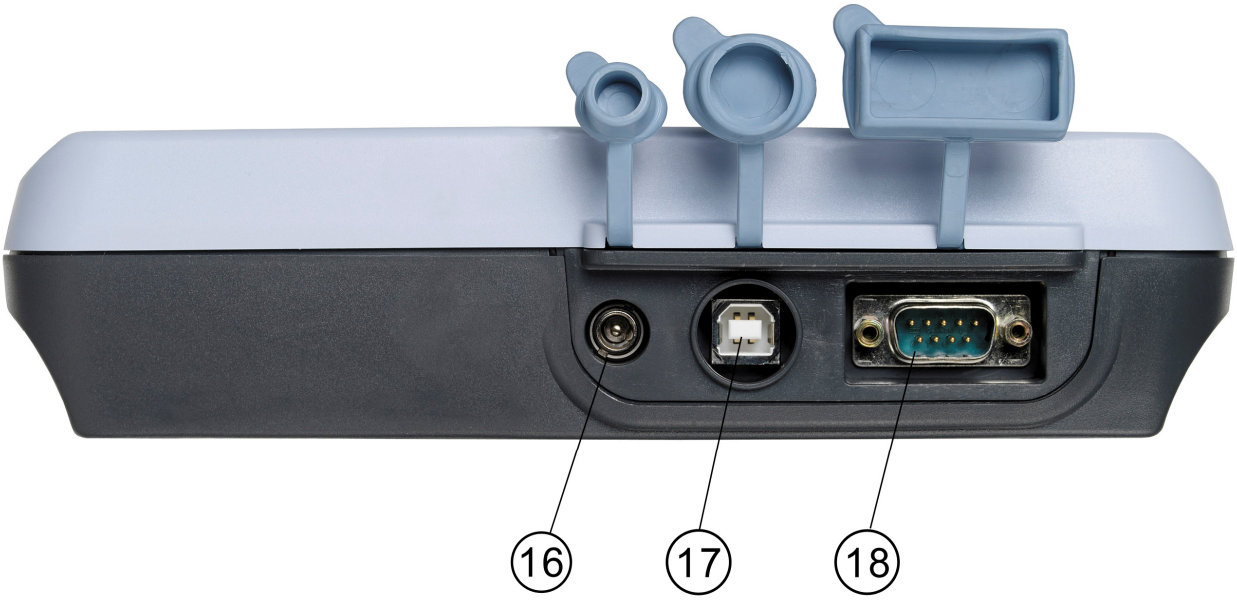
Our instruments' quality level is the results of the product continuous development. This can bring about differences between the information written in this manual and the instrument that you have purchased. We cannot entirely exclude errors in the manual, for which we apologize.
The data, figures and descriptions contained in this manual cannot be legally asserted. We reserve the right to make changes and corrections without prior notice.

HD25.2 - Turbidimeter



1. Connectors
2. **ESC** key: in the menu, cancels the current setting.
3. **MEM** key: stores the currently displayed screen.
4. **Battery** symbol: indicates the battery level. The symbol does not appear when the external power supply is connected.
5. Line for symbols and comments.
6. Main display line.
7. **ON-OFF** key: turns the instrument on and off. When pressed together with the ▲ key, disables the automatic turn off.
8. Measurement piece.
9. **MENU** key: allows access to and exit from the menu. When pressed together with the ENTER key, starts the calibration procedure.
10. **ENTER** key: in the menu, confirms the current selection. When pressed together with the MENU key, starts the calibration procedure.
11. **MEAS** key: performs the selected measurement. Use the arrows (▲ and ▲) to choose the type of measurement before pressing the MEAS key.
12. ▲ key: selects the type of measurement. When pressed together with the ON/OFF key, disables the automatic turn off. In the menu, increases the current value.
13. Secondary display line.
14. ▼ key: selects the type of measurement. In the menu, decreases the current value.
15. **PRINT** key: prints the data on the current screen. It uses the serial communication port RS232C or the USB 2.0 port.

HD25.2 Connectors



16. Power supply input 12Vdc/1A for ∅ 5.5mm - 2.1mm connector.
17. USB2.0 connector - type B.
18. RS232C serial port, sub D 9-pole connector.

INTRODUCTION

The **HD25.2** is a laboratory, portable digital turbidimeter for drinking water, beverage, waste water or process liquid measurements. It operates according to the nephelometric (90°) and ratiometric measurement principles.
It is provided with three photo detectors and two LED light sources (white and infrared) constantly monitored to ensure the response stability with time. The instrument performs measurements in accordance with EPA 180.1, ISO-NEPH (ISO 7027), EBC and ASBC standards. The measurements of the transmittance percentage for white and infrared light are also provided.

The initial factory calibration is based on the Formazine primary standard. For routine calibration a set of stabilised secondary standards STCAL (Turbidity Calibration Standard) is available:

- STCAL 1 turbidity less than 0.05 NTU
- STCAL 2 equal to 8 NTU
- STCAL 3 equal to 80 NTU
- STCAL 4 equal to 800 NTU

User calibration is automatic on one, four or five points, according to the measurement variable.
A stabilized power supply of the sources and advanced electronics guarantee optimum instrument performance over time.
The HD25.2 is a **datalogger**. It memorizes up to 999 samples. The measured data can be transferred from the instrument connected to a PC via the RS232C serial port or the USB 2.0 port.
The RS232C serial port can be used for direct printing of the data using a 24 column printer.
The PRINT function allows printing of a label reporting an automatically increased progressive number and all data concerning the sample under examination.
The **DeltaLog11** dedicated software manages the instrument and the data processing through the PC and the firmware update.

The use of the HD25.2 by multiple users is assisted by the “User Management” function that can, according to the circumstances, lock or enable some instrument's advanced features by using a password.

IP66 protection degree.

MEASUREMENT PRINCIPLE

The most known liquid analysis methods, like pH, conductivity or dissolved Oxygen measurements, express *quantitatively* the parameters that determine the solution's chemical-physical state. Such methods allow measuring the quantity of substances dissolved in the liquid, for example as ions. The substances suspended in the liquids are not measured using these methods.
Suspensions are mainly formed by solid non soluble substances, like metal oxides, grease, algae and micro organisms that do not influence the chemical characteristics of the liquid, but modify, even visually, its physical characteristics. The most visible, even to a simple visual inspection, is *turbidity*. It is an optical characteristic, that is, based on light propagation.

A light ray passing through a fluid is subject to the effects caused by the interaction between the ray and the substances in the liquid. This interaction causes a deviation of the light ray, that is, a path variation. The deviation is caused not only by mat particles, but also by the optical non-homogeneity caused by particles that, despite being transparent, have a different refraction index from that of the liquid.
Due to complex optical phenomena, a part of the light is diffused in different directions and, consequently, the intensity of the ray moving in the original direction is reduced.
In the nephelometric method, the turbidity is calculated from the light detected by a photodiode positioned at 90° compared to the emitted light direction.
Turbidity measurements are influenced by several factors, such as particle size, colour and form, liquid colour, etc.

MEASUREMENT STANDARD

The following table shows the measurement methods supported by the instrument. It contains: measurement standard, unit of measurement and, per each type of measurement, the relevant names as appearing on the display.

Measurement method	Unit of Measurement	Measurement method on display	Unit of measurement on display
EPA 180.1	NTU	EPA	ntu
ISONEPH (ISO7027)	FNU	INPH	FnU
EBC	EBC	EBC	EbC
ASBC	ASBC	ASBC	ASbC
WHITE %T	---	WHTE%	---
IR %T	---	IRT %	---

KEYBOARD DESCRIPTION

ON-OFF key

The instrument is turned on and off using the ON/OFF key. The turning on starts a self test that checks the instrument status.
In the following window you will enter the password identifying the user: press ENTER to access as a non registered user (Anonymous). To access as a registered user (Administrator, User1, User2 or User3), enter the user code assigned by the administrator using the arrows and confirm with ENTER (please see the details concerning user management on page 10).
Finally, the instrument is set for normal measurement.

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Automatic turning off

The instrument has an *AutoPowerOff* function that automatically turns the instrument off after about 8 minutes if no key is pressed during the intervening time. The *AutoPowerOff* function can be disabled by holding the ▲ key pressed down when turning the instrument on: the battery symbol will blink to remind the user that the instrument can only be turned off by pressing the <ON/OFF> key.

The automatic turning off function is disabled when external power is used. On the other hand, it cannot be disabled when the batteries are discharged.

PRINT key

It sends the displayed data to the serial RS232C output or USB output. The **ID** is increased after each **new** measurement (MEAS key). The ID is not increased by repeatedly pressing the PRINT key: in this way it is possible to print multiple labels with the same ID.

See the details on page 22.

Before starting the communication via the RS232C serial port, set the baud rate. To do so, select "System Parameters >> Communication Options >> Baud Rate" and select the maximum value equal to 115200 baud by using the arrows ▲ and ▼. Confirm by pressing ENTER.
The DeltaLog11 software for PC will automatically set the same baud rate value as the instrument one during connection. **If you are using a different program than DeltaLog11, be sure the baud rate is the same for both the instrument and the PC: the communication will only work in this way.**
If the instrument is connected directly to a serial printer, set the recommended baud rate for the printer.
The direct connection between instrument and printer via a USB connector is not allowed.

MEM key

Stores the displayed data using the current unit of measurement. The following is also recorded: measurement method (EBC, NTU, FTU,…), current date, ID and calibration date.

For the details see the chapter dedicated to recording on page 22.

ESC key

In the menu, this key cancels the current setting.

MENU key

To access and exit the menu (please see the menu description on page 8).

When pressed together with the ENTER key, starts the calibration procedure (please see the chapter dedicated to calibration on page 12).

ENTER key

In the menu, the ENTER key confirms the current parameter.

When pressed together with the MENU key, starts the calibration procedure (please see the chapter dedicated to calibration on page 12).

MEAS key

This key starts the measurement of turbidity using the currently displayed type of measurement.

Up Arrow

During normal operation selects the measurement variable; in the menu, increases the currently displayed variable.

Down Arrow

During normal operation selects the measurement variable; in the menu, decreases the currently displayed variable.

MENU DESCRIPTION

To access to the menu press the MENU key: the first item will display. Press ENTER to go to the following items. To modify the item displayed, use the arrow keys (▲ and ▲). The current value is confirmed by pressing the ENTER key and the display moves on to the next parameter. If pressing ESC the setting is cancelled.
To exit the menu, press the MENU key at any time.

The menu items are listed in this order:

1. **BAUD_RATE RS232:** indicates the frequency used for the serial RS232 communication with the PC. Values from 1200 to 38400 baud. Use the arrows to modify this parameter and confirm using ENTER. **The communication between instrument and PC (or serial port printer) only works if the instrument and PC baud rates are the same**. If the USB connection is used this parameter value is automatically set (please see the details on page 20).
2. **SMPL ID – MEA = RST (***Sample ID – press MEAS to reset*). The measured sample **ID** (Sample ID) is an automatically increased progressive number associated to the MEAS function: to each new sample obtained using the MEAS key is associated an ID number shown in the printout and in the downloaded data together with date, time and measured value. This number is assigned to each measurement and is increased, from the previous number, only when the measurement is printed or logged. It does not change if the **same** measurement is printed more than once: in this way it is possible to print multiple labels, concerning an unique measurement, with the same identification code.
   To set the value of the first sample, select the menu item "**SMPL ID –MEA = RST**, set the desired number using the arrows and confirm with ENTER. To reset the ID value, select the menu item "**SMPL ID –MEA = RST**, press the MEAS key and confirm with ENTER.
3. **DISP_LAY LOG** (*"Display stored data"*): the message is scrolled in the comment line. By using the arrows ▲ and ▼ the data stored with the MEM key are displayed. Per each datum memory location m001, m002, …, measured value and ID code are shown.
4. **CONFIRM DUMP ALL MEA?** (*"Confirm full memory data dump?"*). This command allows sending all the data contained in the instrument's memory to the PC. Select YES using the arrow and press ENTER to download all the data. Select NO (default) and confirm with ENTER to go to the next step without downloading the data.
5. **CONFIRM ERAS ALL MEA?** (*"Confirm full memory erase?"*). This command allows clearing all the data contained in the instrument's memory. Use the ▲ arrow to select "YES" and confirm with ENTER. To go to the next step without erasing, select NO and confirm with ENTER.
6. **LAST CAL m/d h/m** (*Last calibration date month/day hour/minutes*) reports the date of the last calibration made by the user. This item cannot be modified.
7. **ACTUAL USER** (*Current user*): displays the currently registered user (see the chapter "User Management" on page 10). This item cannot be modified.
8. **CAL EXP TOTA DAY** (*Calibration validity number of days*): sets the calibration validity number of days. When the validity period has expired, upon turning on the "CAL EXPIRED" blinking message appears; the calibration data are still used. The "Expired calibration" message is indicated in the printout. Enter "Number of days" = 0 to disable this feature. This parameter can be changed only by an user registered as "Administrator" (see the chapter "User Management" on page 10).

Note: the day is counted at midnight: by entering 1, at midnight of the same day, the calibration is considered expired.

9. **CAL RESIDUAL DAY** (*Days to calibration expiration*): displays the number of days to the calibration expiration. This item cannot be modified.
10. **MEM ON PRNT** (*Recording upon printing*): if this function is enabled, each time the PRINT key is pressed, the measurement is also recorded in the instrument internal memory. To enable it, select YES and confirm with ENTER.
11. **AUTO LOG IN** (*Automatic login*): if this function is enabled, upon turning on the instrument does not require the input of the password and uses the last registered user. To enable this feature, select YES and confirm with ENTER.
12. **YEAR**: to set the current year. Use the arrows to modify this parameter and confirm using ENTER.
13. **MNTH (month)**: to set the current month. Use the arrows to modify this parameter and confirm using ENTER.
14. **DAY**: to set the current day. Use the arrows to modify this parameter and confirm using ENTER.
15. **HOUR**: to set the current hour. Use the arrows to modify this parameter and confirm using ENTER.
16. **MIN – MEA = ZERO SEC (Minutes – Press MEAS to clear the seconds)**: to set the current minutes. In order to correctly synchronize the minute, it is possible to reset the seconds by pressing the MEAS key. Use the arrows to set the current minute plus one, and as soon as that minute is reached press MEAS: this synchronizes the time to the second. Press ENTER to go onto the next item.

USER MANAGEMENT

Upon turning on the instrument, the user must identify himself or herself by entering a password: each password is associated to a registered user indicated in the **printing** and **recording** operations.
The available users are: *administrator*, *user_1*, *user_2*, *user_3* and *anonymous user*. The *Administrator* is enabled to use all of the instrument functions and assigns the password to the other users. The anonymous user does not need a password.
If you wish the instrument to request the user selection upon turning on, disable the menu item **AUTO LOG IN (=OFF)**: in this case, upon turning on the instrument requires a password.
If **AUTO LOG IN** is enabled (=ON), upon turning on the instrument does not require the input of the password and uses the last registered user.
To access as an anonymous user, just confirm the "00000" password prompted by the instrument by pressing ENTER, without changing anything.

When the instrument comes out of the factory, the passwords associated to the registered users are the following:

User	Factory password
Administrator	00123
User_1	00456
User_2	00789
User_3	00012

Upon turning on the instrument, after the automatic test, you are requested to enter a password: "ENTER LOG_IN CODE". Use the arrows to enter the password and confirm with ENTER.
All password creation, modification and update operations are managed by the DeltaLog11 software through the PC.
To modify a password you need to access the instrument as an administrator. Connect the instrument to the PC and use the function "MODIFY PASSWORD" in the DeltaLog11 software: you can assign a new password to one of the users or to the administrator.
Please note that **the password identifies the type of user and not vice versa**, for example, the number 00456 identifies the user as User_1 and the number 00012 as User_3. Upon turning on you are not requested to choose a user but only to enter a numeric code.

MEASUREMENT PROCESS

The following steps outline how to carry out a turbidity measurement.

- The cell must be accurately cleaned with distilled water and a non aggressive detergent. Before measurement check that the cell is clean and that no fingerprints are present.
- Pour the liquid under examination in the cell: in order to perform a correct measurement, the liquid must reach at least the white position indicator.
- Wait until the liquid reaches the environment temperature.
- Make sure that no air bubbles are trapped in the liquid.
- Close the cell with the cap, wipe any possible dirt trace using the supplied cloth.
- Holding the cell by the cap, insert it in the measurement compartment.
- Screw the measurement compartment cap on, to avoid any external lights distorting the measurement.
- Select the desired unit of measurement using the arrows (▲ and ▲).
- Press MEAS to start the measurement: after a few seconds the result is shown on the display.

Now the measurement result can be (see the chapter on page 22):

- recorded in the instrument internal memory by pressing MEM,
- printed using a printer connected to the RS232C serial port,
- sent to a PC connected to the RS232C serial port or the USB 2.0 port.

Comply with the following precautions to increase the measurement accuracy, particularly with low turbidity measurements:

- Align the cell reference notch with that on the measurement compartment.
- Do not leave the measurement compartment open without the cap when the instrument is not in use.
- Do not insert wet cells in the measurement compartment.
- Do not use cells with imperfections, scratches, …
- Apply a light layer of silicon oil to hide possible glass imperfections using the supplied cloth.
- Remove any fingerprint on the glass: insert and extract the cell holding it by the cap.
- Before filling the cell, rinse it using the same liquid being measured.

CALIBRATION

HD25.2 has 6 different turbidity measurement methods: EPA 180.1, ISO NEPH according to norm ISO7027, EBC, ASBC, percentage of white light transmitted (WHITE %T) and percentage of infrared light transmitted (IR %T).
As some quantities are directly correlated to each other, it is only necessary to calibrate one to get the others calibrated too: e.g. by calibrating the EPA180.1 measurement scale also the ASBC scale will be calibrated.
The table shows the measurement methods divided by calibration group, and the relevant standard to be used.

Measurement method	**STCAL…**	EPA 180.1 ASBC	ISONEPH EBC	WHITE %T	IR %T
Calibration Standard (*)	…1 …2 …3 …4	0 NTU 8 NTU 80 NTU 800 NTU	0 NTU 8 NTU 80 NTU 800 NTU	0 NTU	0 NTU

(*) By "0 NTU" is meant a liquid having a very low turbidity, less than 0.05 NTU.

As you can see, a total of four calibration procedures is needed: the EPA180.1 and ASBC scales, the ISONEPH and EBC scales require four calibration standard, WHITE %T and IR %T only need the 0 NTU standard.

The HD25.2 must be calibrated before using it for the first time, and when a check using the calibration standards detects an error exceeding ±10%.

To carry out the calibration you should have the standard solutions outlined in the previous table.

Calibration of the EPA 180.1 and ASBC scales

The following steps are performed to calibrate the EPA180.1 and ASBC scales.

1. Select the EPA180.1 measurement method using the arrows. If the ASBC measurement is selected, the instrument changes it automatically in EPA180.1 by entering calibration function; at the end of the calibration it comes back to the ASBC measurement.
2. Press simultaneously MENU and ENTER to start the calibration procedure.
3. The "H2O_INSERT" message appears: insert the standard cell STCAL 1 equal to 0 NTU in the measurement compartment and screw the cap.
4. Press ENTER: the MEAS message is shown in the comment line. After a few seconds the "UP DOWN TO CHNG VAL" message appears and the next standard will be STCAL 2 equal to 8 NTU.
5. Insert the standard cell STCAL 2 equal to 8 NTU. If the turbidity value is slightly different from 8, correct it using the arrows.
6. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the "UP DOWN TO CHNG VAL" message appears and the next standard will be STCAL 3 equal to 80 NTU.
7. Insert the standard cell STCAL 3 equal to 80 NTU. If the turbidity value is slightly different from 80, correct it using the arrows.

8. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the “UP DOWN TO CHNG VAL” message appears and the next standard will be STCAL 4 equal to 800 NTU.
9. Insert the standard cell STCAL 4 equal to 800 NTU. If the turbidity value is slightly different from 800, correct it using the arrows.
10. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the “CAL END” message appears to indicate the procedure was successful.

Calibration of the ISONEPH and EBC scales

The following steps are performed to calibrate the ISONEPH and EBC scales.

1. Select the ISONEPH or EBC measurement method using the arrows. If the EBC measurement is selected, the instrument changes it automatically in ISONEPH by entering calibration function; at the end of the calibration it comes back to the EBC measurement.
2. Press simultaneously MENU and ENTER to start the calibration procedure.
3. The “H2O_INSERT” message appears: insert the standard cell STCAL 1 equal to 0 NTU in the measurement compartment and screw the cap.
4. Press ENTER: the MEAS message is shown in the comment line. After a few seconds the “UP DOWN TO CHNG VAL” message appears and the next standard will be STCAL 2 equal to 8 NTU.
5. Insert the standard cell STCAL 2 equal to 8 NTU. If the turbidity value is slightly different from 8, correct it using the arrows.
6. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the “UP DOWN TO CHNG VAL” message appears and the next standard will be STCAL 3 equal to 80 NTU.
7. Insert the standard cell STCAL 3 equal to 80 NTU. If the turbidity value is slightly different from 80, correct it using the arrows.
8. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the “UP DOWN TO CHNG VAL” message appears and the next standard will be STCAL 4 equal to 800 NTU.
9. Insert the standard cell STCAL 4 equal to 800 NTU. If the turbidity value is slightly different from 800, correct it using the arrows.
10. Press ENTER to continue. The MEAS message is shown in the comment line. After a few seconds the “CAL END” message appears to indicate the procedure was successful.

Calibration of the WHITE %T scale

The following steps are performed to calibrate the WHITE %T scale.

1. Select the WHITE %T measurement method using the arrows.
2. Press simultaneously MENU and ENTER to start the calibration procedure.
3. The “H2O_INSERT” message appears: insert the standard cell STCAL 1 equal to 0 NTU in the measurement compartment and screw the cap.
4. Press ENTER: the MEAS message is shown in the comment line. After a few seconds the “CAL END” message appears to indicate the procedure was successful.

Calibration of the IR %T scale

The following steps are performed to calibrate the IR %T scale.

1. Select the IR %T measurement method using the arrows.
2. Press simultaneously MENU and ENTER to start the calibration procedure.
3. The "H2O_INSERT" message appears: insert the standard cell STCAL 1 equal to 0 NTU in the measurement compartment and screw the cap.
4. Press ENTER: the MEAS message is shown in the comment line. After a few seconds the "CAL END" message appears to indicate the procedure was successful.

NOTES:

- If an error is made during calibration, the ERR blinking message appears. It is possible to repeat the current point by entering the correct standard and pressing ENTER.
- Press ESC to quit the calibration without making changes before carrying out the last step.
- The instrument quits the calibration procedure without making changes if you do not use the keyboard for at least 2 minutes.

DAILY CHECK

It is better to check daily if the instrument is calibrated, before doing the measurements. Perform a measurement using the standard STCAL 1 and a second measurement using the standard solution that is closest to the values being measured. If the measurement error for the 0 NTU is greater than 0.1 NTU and/or the error of the second standard is higher than ±10%, you need to do a new calibration.

BATTERY REPLACEMENT

The HD25.2 is supplied by three 1.5V, AA batteries or by external power supply (12Vdc/1A).

The battery symbol on the display constantly shows the battery charge status. To the extent that batteries have discharged, the symbol "empties". When the charge decreases still further it starts blinking…

In this case, batteries should be replaced as soon as possible.
If you wish to continue using the instrument, remove the flat batteries and supply it using the external power supply. Data stored on memory are maintained even without power supply.
If the battery charge level is insufficient, and the external power supply is not connected, the following message appears when you turn the instrument on:

BATT TOO LOW
CHNG NOW

The instrument issues a long beep and turns off. In this case, replace the batteries or use the external power supply, in order to turn the instrument back on.

The battery symbol turns off when the external power supply is connected.

To replace the batteries, switch the instrument off and unscrew the two screws on the battery cover counter clockwise. Put the new batteries in making sure the polarity is correct. After replacing the batteries, close again the cover and fasten the two screws clockwise.

After replacing the batteries, the date, time and baud rate **must be set again**. To go to the next item press ENTER; to return to measurement mode, press MENU.
In order to avoid losing the menu settings, before removing the batteries, connect the external power supply.

Malfunctioning upon turning on after battery replacement

After replacing the batteries, the instrument may not restart correctly; in this case, repeat the operation. After disconnecting the batteries, wait a few minutes in order to allow circuit condensers to discharge completely; then reinsert the batteries.

Warning About the Use of Batteries

- Batteries should be removed when the instrument is not used for an extended time.
- Flat batteries must be replaced immediately.
- Avoid loss of liquid from batteries.
- Use waterproof and good-quality batteries, if possible alkaline. Sometimes on the market, it is possible to find new batteries with an insufficient charge capacity.

INSTRUMENT STORAGE

Instrument storage conditions:

- Temperature: -25…+65°C.
- Humidity: less than 90%RH without condensation.
- During storage avoid locations where:
  humidity is high,
  the instrument may be exposed to direct sunlight,
  the instrument may be exposed to a source of high temperature;
  the instrument may be exposed to strong vibrations;
  the instrument may be exposed to steam, salt or any corrosive gas.

The instrument case is made of ABS plastic: do not use any incompatible solvent for cleaning.

INSTRUMENT SIGNALS AND FAULTS

The following table lists all error indications and information displayed by the instrument and supplied to the user in different operating situations:

Display indication	Explanation
ERR	This appears during calibration if a wrong standard is inserted.
OVER	Measurement overflow: this appears when the measurement value exceeds the expected measurement range, or when the instrument has not been calibrated on that scale.
MEM FULL	Memory full; the instrument cannot store further data, the memory space is full.
SYS ERR #	Instrument management program error. Contact the instrument's supplier and communicate the numeric code # reported by the display.
CAL EXPIRED	This calibration has expired: the calibration validity number of days, set in the menu item “CAL EXP TOTA DAY”, has been exceeded.
ALREADY MEM	The measurement was already stored.
COVR VIAL	This appears if the measuring chamber lid was left open.
ERR1	This appears when an user who is not an administrator tries to modify, from the menu, the calibration validity interval.
OVL_R90 UFL_R90 OFL_R0 UFL_R0 OVF_MON	When the instrument detect a functioning anomaly, these items are displayed: contact the instrument supplier and specify which kind of error is displayed.

SERIAL INTERFACE AND USB

The HD25.2 is fitted with an electrically isolated RS-232C serial interface, and an USB 2.0 interface. The instrument can be connected using a serial cable with sub D 9-pole female connectors (code **9CPRS232**) and a cable with USB2.0 connectors (code **CP22**).

The USB connection requires the previous installation of a driver contained in the DeltaLog11 CD-Rom. **Install the driver before connecting the USB cable to the PC** (please see the details on page 20).

Standard parameters of the instrument serial transmission are:

- Baud rate 38400 baud
- Parity None
- N. bit 8
- Stop bit 1
- Protocol Xon/Xoff

It is possible to change the RS232C serial port baud rate by setting the "*Baud Rate*" parameter in the menu (please see page 8). The possible values are: 38400, 19200, 9600, 4800, 2400 e 1200. The other transmission parameters are fixed.

The USB 2.0 connection does not require the setting of parameters.

The selection of the port (serial or USB) is carried out directly by the instrument: if the USB port is connected to a PC, the RS232 serial port is automatically disabled.

The instruments are provided with a complete set of commands and data queries to be sent via the PC.

All the commands transferred to the instrument must have the following structure:
XY CR+LF where: **XY** is the command code and **CR+LF** is the Carriage Return (ASCII 0D) + Line Feed (ASCII 0A).

COMMAND	*ACTION*	*RESPONSE*	*NOTES*
AA	Model request	HD25-2 Turbidimeter	
AG	Firmware version	Firmware 1.00.100	
AH	Firmware date	Firm.Date=2006/01/09	
AS	Serial number	Ser.Number=12345678	
AU	User identification	Operator = Administrator Operator = User_1 Operator = User_2 Operator = User_3 Operator = Anonymous	
DA	Input date-time	&/?	DA0501010F2615 hexadecimal. IT REJECTS ANY INCORRECT DATE
FA	Clock date request	&050101002431	Hexadecimal
FD	Instrument calibration request	&0501010F2615	Hexadecimal
K1	Current measurement print		Increases ID

COMMAND	*ACTION*	*RESPONSE*	*NOTES*
KX	Start measurement	&	
LDxxxx	Send sample no. xxxx+1	Dump or ?	Xxxx from 1 to 1000
LE	Clear memory	&	
LN	No. of next memory location request	Next avail. Memory =0001	
MR	Type of measurement reading	&n	n = see MW command
MW0..5	Type of measurement selection		0 = EPA 180 1 = ISO NEPH 2 = EBC 3 = ASBC 4 = WHITE % 5 = IR %
P0	Ping & lock keys	&	
P1	Ping & unlock keys	&	
RH		Shows the calibration validity number of days	
RI		Sample ID= 00000001	
RL		Print&mem = 0	0 = free print, 1 = print & store, (see the MEM ON PRNT command in the menu)
RP	Battery voltage reading	&nnn	Nnn = hundredths of Volt
SH	Calibration status reading	calibration status = valid calibration status = expired!	
T3Do35	User calibration reset, return to factory calibration	&	
T4Do35nnnnn xxxxx	Enable user to change its password	&/?	Nnnnn = current administrator password Xxxxx = user password being changed
WI	Enter sample identification number	&/?	00000000 ... 00019999
WL	Choice of print-memory connection mode	&/?	0 = free print, 1 = print and forced storing
WUnnnnn	Set new password of user previously selected with command T4Do35	&/?	

Command characters are exclusively upper case characters. Once a correct command is entered, the instrument responds with "&"; when any wrong combination of characters is entered, the instrument responds with "?". The instrument response strings end with the sending of the “|”+CR+LF command (| + Carriage Return + Line Feed). Before sending commands to the instrument via the serial port, locking the keyboard to avoid functioning conflicts is recommended: use the P0 command. When complete, restore the keyboard with the P1 command.

CONNECTION TO A PC

There are two ports for connecting the instrument to the PC:

- RS232C serial port with null modem cable code 9CPRS232. The cable has two sub D 9-pole female connectors.
- USB 2.0 port with the cable code **CP22**. The cable has a USB type A connector for PC connection and a USB type B connector for connection to the instrument.

The instruments are supplied with the DeltaLog11 software that manages the PC connection, data transfer, and printing operations of the captured or logged measurements.
The DeltaLog11 software is complete with "On-line Help" (also in PDF format) describing its characteristics and functions.

The instruments are also compatible with the HyperTerminal communication program supplied with the Windows operating systems (from Windows 98 to Windows XP).

CONNECTION TO THE RS232C SERIAL PORT

1. The measuring instrument has to be switched off.
2. Using the Delta Ohm 9CPRS232 cable, connect the measurement instrument to the first free serial port (COM) of the PC.
3. Turn on the instrument and set the baud rate to 38400 (MENU >> “Baud Rate” >> select 38400 using the arrows >> confirm with ENTER). The parameter remains in the memory.
4. Launch the DeltaLog11 application and press CONNECT. Wait for the connection to occur and follow the indications on the screen. For a description of the DeltaLog11 application, please refer to its On-line Help.

CONNECTION TO THE USB 2.0 PORT

The USB connection requires the installation of the drivers. They are contained in the DeltaLog11 CD-Rom.

Proceed as follows:

1. **Do not connect the instrument to the USB port until you are expressly requested to do it.**
2. Insert the DeltaLog11 CD-Rom and select the "*Install/Remove USB driver*" item.
3. The application checks the presence of the drivers on the PC: the installation starts if they are not present; if they are already installed, the drivers are removed by pressing the key.
4. The installation wizard prompts the software user license: to proceed, the software usage terms must be accepted - click on YES.
5. On the next page the folder where the drivers will be installed is indicated: confirm without modifying.
6. Complete the installation by clicking on *Finish*. Wait few seconds until the DeltaLog11 page appears.
7. Close DeltaLog11.

8. Connect the instrument to the PC USB port. When Windows detects the new device, the "*New software installation wizard*" is started.
9. If you are asked for the authorization to search an updated driver, answer *NO* and continue.
10. In the installation window, select "*Install from a list or specific location*".
11. In the next window select "*Search for the best driver in these locations*" and "*Include this location in the search*".
12. Using *Browse*, indicate the installation folder provided at point 5:

    C:\Program Files\Texas Instruments\USB-Serial Adapter

    Confirm with *OK*.
13. If you get the message that the software did not pass the Windows Logo testing, select "*Continue*".
14. The USB driver are installed: at the end, click on "*Finish*".
15. **The installation wizard requests the files location once more**: repeat the just described steps and provide the location of the same folder (see point 12).
16. **Wait**: the operation could take a few minutes.
17. The installation procedure is now complete: the device will be detected on each new connection automatically.

In order to check if the entire operation was successful, in CONTROL PANEL double click on SYSTEM. Select "Device Manager" and connect the instrument to the USB port.
The following items should appear:

- "*UMP Devices >> UMP3410 Unitary driver*" and "*Porte (COM e LPT) >> UMP3410 Serial Port (COM#)*" for Windows 98 and Windows Me,
- "*Schede seriali Multiport >> TUSB3410 Device*" and "*Porte (COM e LPT) >> USB-Serial Port (COM#)*" for Windows 2000, NT and XP.

When the USB cable is disconnected, these two items disappear and come back when it is connected again.

Notes.

1. If the instrument is connected to the USB port **before** installing the drivers, Windows signals the presence of an unknown device: in this case, cancel the operation and repeat the procedure illustrated at the beginning of this section.

2. In the documentation supplied with the DeltaLog11 CD-Rom, is included a detailed version of this chapter with pictures. Moreover, the necessary steps to remove the USB drivers are reported.

STORING AND TRANSFERRING DATA TO A PC

The HD25.2 instrument can be connected to a personal computer via an RS232C serial port or USB port, and exchange data and information through the DeltaLog11 software running in a Windows operating environment. It is possible to print the measured value on a 24 column printer (PRINT key) and store it in the internal memory using the logging function (MEM key). The stored data can be recalled to be viewed directly on the instrument display and then printed or transferred to the PC (menu command "*CONFIRM DUMP ALL MEA?*").

THE RECORD FUNCTION

The instrument allows the recording of up to 999 samples in its internal memory. After having performed a measurement (MEAS key), press **MEM**: a counter displays for a few seconds the data memory location: "m###". If the measurement was already recorded, the "**ALREADY MEM**" error message appears.

The data stored in the memory can be transferred to a PC using the DeltaLog11 software: please see the software help for the details.

To display the recorded data directly on the instrument display, use the "*DISPLAY LOG*" menu command (please see the details on page 8).

To print the current screen, press the **PRINT** key.

CLEARING THE MEMORY

To clear the memory, open the menu and select the item "**CONFIRM ERAS ALL MEA?**". Use the ▲ arrow to select "YES" and confirm with ENTER.
The instrument starts clearing the internal memory; at the end of the operation, it goes back to normal display.
Warning: the cleared data cannot be recovered.

NOTES:
- The data transfer carried out using the DeltaLog11 software does not cause the memory to be erased; the operation can be repeated as many times as required.
- The recorded data remain in the memory even if the instrument is turned off, disconnected from the mains or if the batteries are removed.
- In order to print the data to a parallel interface printer, you must use a parallel-serial adaptor (not supplied).

THE PRINT FUNCTION

Press PRINT to send the displayed page directly to the RS232 or USB port.

A printer with serial input can be connected to the RS232C port (e.g. the Delta Ohm 24 column printer code **S'print-BT**). The RS232C and USB ports can be connected to the corresponding ports on the PC using the appropriate cables: **9CPRS232** for the RS232C serial, **CP22** for the USB.

The instrument detects automatically the presence of a connection to the USB port: in this case the RS232C serial port is disabled.

To print all the data contained in the memory or to send them to a PC, use the menu command "**CONFIRM DUMP ALL MEA?**".

NOTES:

- The print out is formatted across 24 columns.
- **The direct connection between instrument and printer via a USB connector does not work.**

*Example of a printout obtained using the **S'print-BT** printer*

	NOTES
HD25.2 model	Instrument model
Turbidimeter	
SN= 12345678	Instrument serial number
Cal.=2005/11/23 15:22:53	Calibration date
Calibr. status= expired!	Calibration status: *Valid* or *Expired!*
PRINTOUT IMMEDIATE MODE	
Date 2005/11/24 16:47:57	Current date and time
Sample ID=00002	Number of the sample (see the menu on page 8)
Operator = Administrator	Current user (see the chapter "User Management" on page 10)
Mode= ISO-NEPH	Measurement mode
Measure= 0.04 FNU	Measurement

"Sample ID" is a progressive number indicated in the printed data (e.g. **labels**) and in the stored data. This number is assigned to each measurement and is increased, from the previous number, only when the measurement is actually printed or logged. It does not change if the **same** measurement is printed more than once: in this way it is possible to print multiple labels, concerning an unique measurement, with the same identification code.
To set the value of the first sample, select the menu item "**SMPL ID –MEA = RST**, set the desired number using the arrows and confirm with ENTER. To reset the ID value, select the menu item "**SMPL ID –MEA = RST**, press the MEAS key and confirm with ENTER (please see the details on page 8).

FUNCTIONING NOTES AND OPERATING SECURITY

Authorized use

The instrument has been designed exclusively for laboratory measurements.
Comply with the technical specifications outlined in the chapter TECHNICAL DATA on page 25.
Its use is authorized only in conformity with the instructions written in this manual. Any different use is considered improper.

General instructions on security

This instrument has been manufactured and tested according to safety regulation EN 61010-1 concerning electronic measurement instruments and was delivered ex factory in perfect security conditions.
Its regular functioning and operating security can be ensured only if all the normal safety measures as well as the specifications described in this manual are complied with.
Its regular functioning and operating security can be ensured only within the climatic conditions specified in the chapter TECHNICAL DATA on page 25.

If the instrument is moved from a cold to a hot environment, the condensation can disturb its functioning. In this case, you need to wait for the instrument to reach the environment temperature before using it.

User obligations

The user of the instrument must ensure that the following regulations and directives concerning the handling of hazardous materials are complied with:

- CEE directives on job safety
- National laws on job safety
- Accident prevention regulations
- Security data from the manufacturers of chemical substances.

TECHNICAL CHARACTERISTICS

Instrument

Dimensions (Length x Width x Height)	220x120x55mm
Weight	400g (batteries included)
Materials	ABS
LCD Display	4½ digits plus symbols Visible area: 52 x 42 mm

Operating conditions

Operating temperature instrument alone	0…50°C
Warehouse temperature instrument alone	-25…65°C
Working relative humidity	0…90%RH without condensation
Calibration standards storage	5…25°C (not to higher temperatures, protect the standards from light)
Protection degree	**IP66**

Power

Batteries	3 1.5V type AA batteries
Autonomy	100 hours with 1800mAh alkaline batteries
Mains (cod. **SWD10**)	Mains adaptor 100-240Vac/12Vdc-1A

Measurement methods

Standard	EPA180.1, ISO-NEPH (ISO 7027), EBC, ASBC, WHITE %T and IR %T
Light source	IR LED (850nm) and white LED (470nm)
Receivers	Silicon photodiodes
Sample cell	∅ 24mm – height 68mm, 20cc

Turbidity measurement

Method / measurement range	EPA180.1	(0…1000 NTU)
	ISO-NEPH	(0…1000 FNU)
	EBC	(0…250 EBC)
	ASBC	(0…9999 ASBC)
	WHITE %T	(0…100 %T)
	IR %T	(0…100 %T)
Resolution	0.01 NTU (0…9.99 NTU) 0.1 NTU (10.0…99.9 NTU) 1 NTU (100…1000 NTU)	
Accuracy	±2% reading + 0.01 NTU (0…500 NTU) ±3% reading (500…1000 NTU)	
Repeatability	±2% reading or 0.01 NTU (the higher)	

Security of stored data	Unlimited

Time

Date and time	Schedule in real time

Accuracy	1min/month max departure
Measured values memorization	
Quantity	999 samples
RS232C serial interface	
Type	RS232C electrically isolated
Baud rate	Can be set from 1200 to 38400 baud
Data bit	8
Parity	None
Stop bit	1
Flow Control	Xon/Xoff
Serial cable length	Max 15m
USB interface	
Type	1.1 - 2.0 electrically isolated
Connections	
Serial interface	DB9 connector (male 9-pole)
USB interface	USB connector type B
Mains power supply	2-pole connector (positive at centre)
EMC Standard Regulations	
Safety	EN61000-4-2, EN61010-1 level 3
Electrostatic discharges	EN61000-4-2 level 3
Fast electric transients	EN61000-4-4 level 3, EN61000-4-5 level 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B

ORDER CODES

HD25.2	The kit is composed of: HD25.2 instrument, 4 empty cells, 4 calibration standards STCAL, 3 1.5V alkaline batteries, lubricating cloth, silicon oil 25cc, operating manual, case and DeltaLog11 software for operating systems Windows 98 to XP.

Accessories

9CPRS232	Connection cable with sub D 9-pole female connectors for RS232C.
CP22	Connection cable USB 2.0 connector type A - connector type B.
SWD10	Stabilized power supply at 100-240Vac/12Vdc-1A mains voltage.
S'print-BT	Portable, serial input, 24 column thermal printer, 58mm paper width.
PL	Lubricating cloth
OS1	Silicon oil - 25cc
KCV	4 empty sample cells ∅24x68mm.

Turbidity Calibration Standard

STCAL 1	Calibration standard to Formazine low turbidity (<0.05 NTU) - 20cc.
STCAL 2	Calibration standard to Formazine 8 NTU - 20cc.
STCAL 3	Calibration standard to Formazine 80 NTU - 20cc.
STCAL 4	Calibration standard to Formazine 800 NTU - 20cc.
KS	Kit of 4 standard cells to Formazine STCAL 1, STCAL 2, STCAL 3, STCAL 4.

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CONDIZIONI DI GARANZIA

Tutti gli strumenti DELTA OHM sono sottoposti ad accurati collaudi, sono garantiti per 24 mesi dalla data di acquisto. DELTA OHM riparerà o sostituirà gratuitamente quelle parti che, entro il periodo di garanzia, si dimostrassero a suo giudizio non efficienti. E'esclusa la sostituzione integrale e non si riconoscono richieste di danni. La garanzia DELTA OHM copre esclusivamente la riparazione dello strumento. La garanzia decade qualora il danno sia imputabile a rotture accidentali nel trasporto, negligenza, un uso errato, per allacciamento a tensione diversa da quella prevista per l'apparecchio da parte dell'operatore. Infine è escluso dalla garanzia il prodotto riparato o manomesso da terzi non autorizzati. Lo strumento dovrà essere reso in PORTO FRANCO al vostro rivenditore. Per qualsiasi controversia è competente il foro di Padova.

Le apparecchiature elettriche ed elettroniche con apposto questo simbolo non possono essere smaltite nelle discariche pubbliche. In conformità alla Direttiva UE 2002/96/EC, gli utilizzatori europei di apparecchiature elettriche ed elettroniche hanno la possibilità di riconsegnare al Distributore o al Produttore l'apparecchiatura usata all'atto dell'acquisto di una nuova. Lo smaltimento abusivo delle apparecchiature elettriche ed elettroniche è punito con sanzione amministrativa pecuniaria.

GB **GUARANTEE CONDITIONS**

All DELTA OHM instruments have been subjected to strict tests and are guaranteed for 24 months from date of purchase. DELTA OHM will repair or replace free of charge any parts which it considers to be inefficient within the guarantee period. Complete replacement is excluded and no request of damages are recognized. The guarantee does not include accidental breakages due to transport, neglect, incorrect use, incorrect connection to voltage different from the contemplated for the instrument. Furthermore the guarantee is not valid if the instrument has been repaired or tampered by unauthorized third parties. The instrument has to be sent to the retailer without transport charge. For all disputes the competent court is the Court of Padua.

The electric and electronic devices with the following symbol cannot be disposed in the public dumps. According to the Directive UE 2002/96/EC, the European users of electric and electronic devices are allowed to give back to the Distributor or Manufacturer the used device at the time of purchasing a new one. The illegal disposing of electric and electronic devices is punished by a pecuniary administrative penalty.

F **CONDITIONS DE GARANTIE**

Tous les instruments DELTAOHM ont été soumis à des essais sérieux et sont couverts par une garantie de 24 mois de la date d'achat. DELTA OHM réparera ou remplacera gratuitement les parties que, dans le période de garantie, à son avis ne fonctionnent pas d'une manière efficace. Le remplacement complet de l'instrument est exclu et nous ne reconnaissons pas les demandes de remboursements. Les ruptures accidentelles dues au transport, à négligence, à une utilisation incorrecte, à un branchement sur tension différente de celle qui est prévue pour l'appareil sont exclus de la garantie, ainsi que le produit réparé ou faussé par des tiers non autorisés. L'instrument doit être envoyé au revendeur sans frais de transport. Tout litige sera soumis à la compétence du Tribunal Judiciaire de Padoue.

Les appareils électriques et électroniques avec cet symbole ne peuvent pas être écoulés dans les déchetteries. Selon la Directive UE 2002/96/EC les usagers européens des appareils électriques et électroniques peuvent rendre au Distributeur ou Producteur l'appareil utilisé au moment de l'achat d'un nouveau appareil. L'écoulement abusif des appareils électriques et électroniques est puni par une sanction administrative pécuniaire.

D **GARANTIEBEDINGUNGEN**

Alle DELTA OHM Geräte werden genauesten Qualitätsprüfungen unterworfen und sind ab Kaufdatum 24 Monate lang garantiegeschützt. DELTAOHM verpflichtet sich innerhalb dieser Garantiezeit, kostenlos die Teile zu reparieren oder zu ersetzen, welche sich ihrem Urteil nach schadhaft erweisen. Der völlige Ersatz und Schadensersatzleistungen aus Folgeschäden sind ausgeschlossen. Der DELTA OHM Garantieschutz deckt ausschließlich die Reparaturkosten und entfällt in Falle von Schäden die durch Transport, Nachlässigkeit oder unsachgemäße Behandlung entstanden sind, ebenso bei Schäden die durch falsche Versorgungsspannung von Seiten des Benutzers verursacht sind oder durch Reparaturen und Eingriffe von Seiten Unberechtigter. Die Einsendekosten zum Händler sind vom Absender zu tragen. Gerichtsstand für Streitfälle ist Padova.

Mit der Umsetzung des Elektro- und Elektronikgesetzes dürfen mit diesem Symbol gekennzeichnete Elektrogeräte nicht mehr zusammen mit dem Hausmüll entsorgt werden. Gemäß der EG Richtlinie 2002/96/EC sind Händler, Hersteller und Importeure zur Rücknahme verpflichtet. Europäische Benutzer von Elektrogeräten haben daher die Möglichkeit, Altgeräte bei Neukauf zurückzugeben. Die rechtswidrige Entsorgung kann durch Geldbuße geahndet werden.

E **CONDICIONES DE GARANTIA**

Todos los instrumentos DELTA OHM están sometidos a pruebas rigurosas y se garantizan durante un periodo de 24 meses a partir de la fecha de compra. DELTA OHM reparará o reemplazará gratuitamente aquellas partes que, dentro del periodo de garantía, no resulten eficientes a su juicio. Se excluye la sustitución integral y no se reconocen daños. La garantía DELTA OHM cubre exclusivamente la reparación del instrumento. La garantía caduca en caso de que el daño derive de roturas accidentales durante el transporte, negligencia, uso indebido, conexión a una tensión distinta de la prevista para el equipo por parte del operador. Finalmente, la garantía no cubre el producto reparado o alterado por terceros no autorizados. El instrumento se devolverá a PORTES PAGADOS a su distribuidor. Para cualquier controversia será competente el fuero de Padova.

Los aparatos eléctricos y electrónicos que llevan el símbolo no se pueden eliminar en los vertederos públicos. De acuerdo con la Directiva UE 2002/96/EC, los usuarios europeos de aparatos eléctricos y electrónicos tienen la posibilidad de devolver al Distribuidor o al Fabricante los aparatos usados al comprar otros nuevos. La eliminación abusiva de los aparatos eléctricos y electrónicos está sujeta a sanción administrativa pecuniaria.

GARANZIA
GARANTIE

GUARANTEE
GARANTIA

Questo certificato deve accompagnare l'apparecchio spedito al centro assistenza.
IMPORTANTE: La garanzia è operante solo se il presente tagliando sarà compilato in tutte le sue parti.

This guarantee must be sent together with the instrument to our service centre.
N.B.: Guarantee is valid only if coupon has been correctly filled in all details.

Le certificat doit porter le cachet du revendeur et la date d'achat. A défaut, la garantie sera comptée à partir de la date de la sortie d'usine.
ATTENTION: Pour bénéficier de la garantie, le présent certificat doit obligatoirement accompagner l'appareil présumé défectueux.

Dieser Garantieschein muss der Spedition beigelegt werden, wenn das Gerät an das Kundendienstzentrum gesandt wird.
WICHTIG: Die Garantie ist nur gültig, wenn dieser Abschnitt bis ins Einzelne ausgefüllt ist.

Este certificado debe acompañar al aparato enviado al centro de asistencia.
IMPORTANTE: La garantía es válida solo si el presente cupón ha sido completado en su totalidad.

Instrument type ❑ **HD25.2**

Serial number _____

RENEWALS

Date _____	Date _____
Inspector _____	Inspector _____
Date _____	Date _____
Inspector _____	Inspector _____
Date _____	Date _____
Inspector _____	Inspector _____

CE CONFORMITY	
Safety	EN61000-4-2, EN61010-1 LEVEL 3
Electrostatic discharge	EN61000-4-2 LEVEL 3
Electric fast transients	EN61000-4-4 LEVEL 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B