SERIE
8 PRO | 80 PRO

USER MANUAL

MADE IN ITALY

PC 80
pH/mV/Orp/ISE/Cond/TDS/Sal/Resist
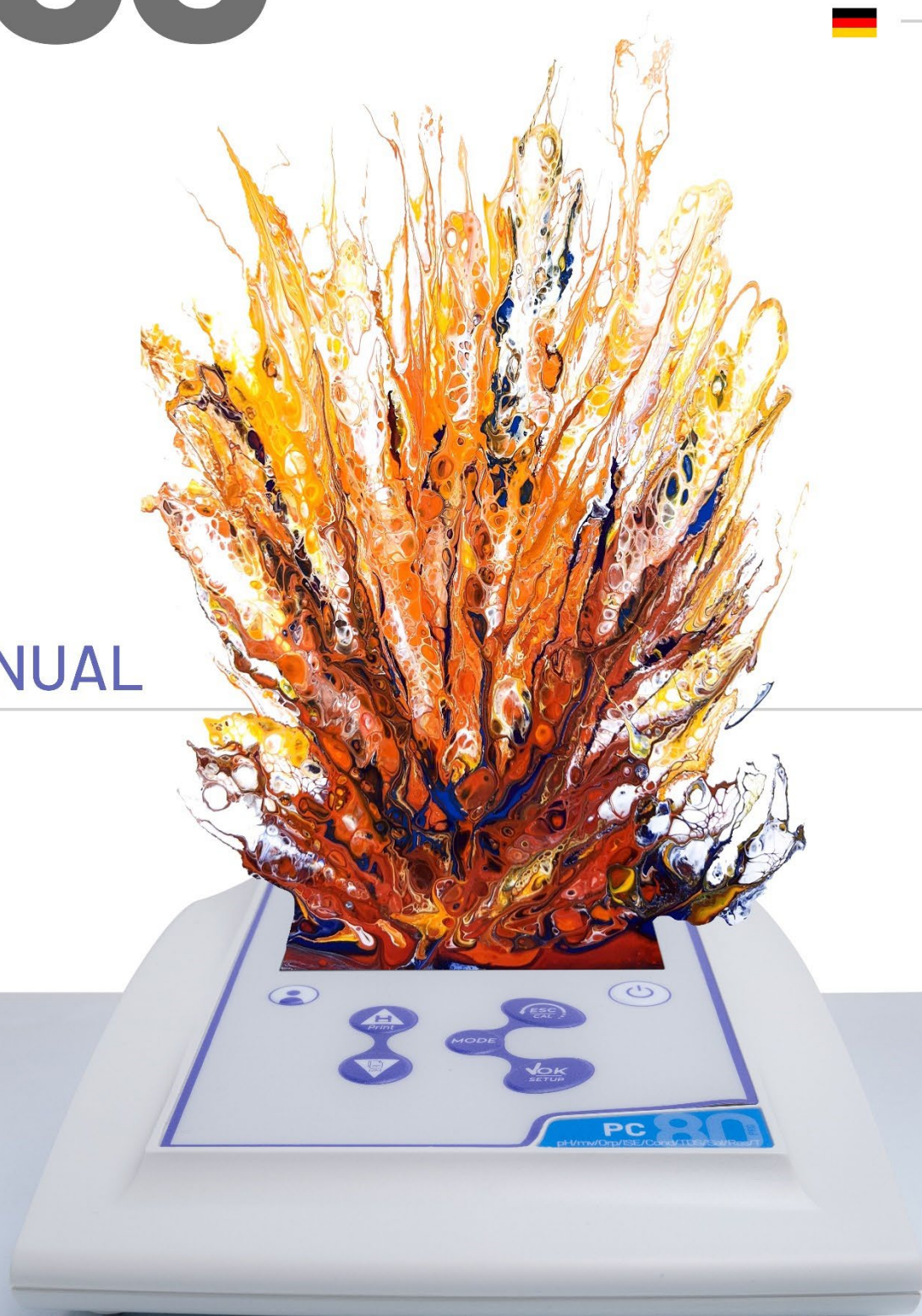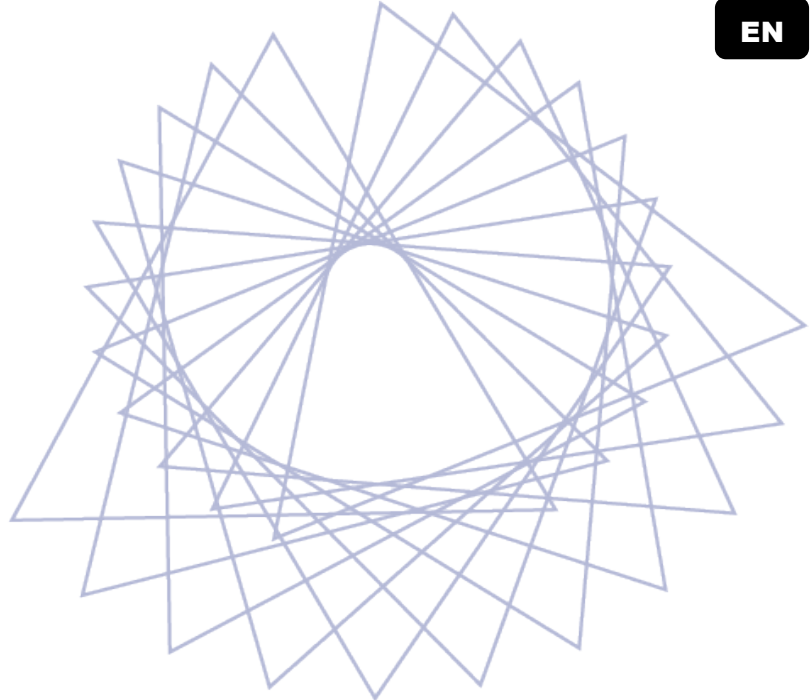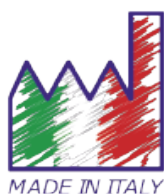
SERIE

8 PRO | 80 PRO

pH   Cond   PC

INSTRUCTION MANUAL

MANUALE DI ISTRUZIONI

MANUAL DE INSTRUCCIONES

MANUEL D'UTILISATION

BETRIEBSANLEITUNG

MADE IN ITALY

Summary

1.Introduction

XS Instruments, globally recognised as a leading brand in the field of electrochemical measurements, has developed the new 8 and 80 PRO line of benchtop instruments completely manufactured in Italy, striking the perfect balance between high performance, attractive design and ease of use.

In particular, for all instruments:

- **Large, simple and intuitive TFT colour display shows all the necessary information.**
- **Instructions for use directly on the display, with multilingual interface.**
- **Automatic pH calibration up to 5 points using different families. Buffers chosen by the operator can also be used.**
- **Automatic calibration of the ORP sensor using a known value or a buffer of the operator's choice.**
- **Automatic calibration of conductivity up to 4 points or with a buffer chosen by the operator; for each cell constant a calibration can be saved and automatically recalled.**
- **Detailed printable and exportable calibration report with innovative graphic representation of pH sensor conditions.**
- **In accordance with good laboratory practice, the calibration deadline with countdown can be set for all parameters. It is also possible to choose whether to receive only a notification or to block the measurement until a new calbration.**
- **Automatic or manual data logger function; values can be stored in different GLP formats on the internal memory on the PC or printed in hard copy.**
- **Possibility of connection to magnetic stirrer with independently controlled electrode holder.**

Furthermore, exclusively for 80 PRO Series instruments:

- **For measuring conductivity in ultrapure water temperature compensation with non-linear coefficient.**
- **Possibility of using a 4-ring conductivity sensor, which allows measurement with high accuracy over the entire range.**
- **Selective Ion measurement with user-settable standards and units.**
- **Unique is the innovative multi-parameter display. The user can choose to display up to 6 parameters simultaneously. The choice of which parameters to display is entirely at the discretion of the instrument user.**
- **Using a special menu and the external keyboard provided, it is possible to enter all the IDentifiers required for proper traceability and data integrity.**
- **Automatic data loggers have the possibility to start as well as manually when a delta or threshold value is reached.**
- **For full customisation of the analysis, up to 4 different print templates can be created by selecting the IDentifiers you wish to print.**
- **With a few intuitive steps, advanced user management can be activated; up to 15 profiles divided into 4 levels with different privileges.**
- **Audit Trail of accesses and activities that can be consulted and exported by software.**

The ideal solution for accurate and precise measurement is to use an electrochemical sensor from the extensive *XS Sensor* range with an XS *Instruments* device and perform calibrations using certified *XS Solution Professional* calibration solutions.

2. Safety Information

- ### *Definitions of warning words and symbols*

This manual contains extremely important safety information, in order to avoid personal injury, damage to the instrument, malfunctions or incorrect results due to failure to comply with them. Read entirely and carefully this manual and be sure to familiarize with the tool before starting to work with it. This manual must be kept near to the instrument, so that the operator can consult it easily, if necessary. Safety provisions are indicated with warning terms or symbols.

- ## *Reporting terms:*

WARNING   for a medium-risk hazardous situation, which could lead to serious injury or death, if not avoided.

CAUTION   for a dangerous situation with reduced risk which can cause material damage, data loss or minor or medium-sized accidents, if not avoided.

NOTICE   for important product information.

NOTE   for useful product information.

Warning symbols:

Attention
This symbol indicates a potential risk and warns you to proceed with caution.

Attention
This symbol draws attention to a possible danger from **electric current.**

Attention
The instrument must be used according to the instructions in the reference manual. Read the instructions carefully.

Notice
This symbol draws attention to possible damage to instruments or instrument parts.

Notes
This symbol highlights further information and tips.

- ## *Additional documents for safety*

Following documents provide the operator with additional information to work safely with the measurement system:
- Operating manual for electrochemical sensors;
- Safety data sheets for buffer solutions and other maintenance solutions (e.g. storage);
- Specific notes on product safety.

- ## *Use according to destination*

This instrument is designed exclusively for electrochemical measurements in an indoor laboratory environment. Pay particular attention to the technical specifications in the table INSTRUMENT CHARACTERISTICS / TECHNICAL DATA. Any other use outside of these is considered unauthorised. This instrument left the factory in perfect technical (see test report in each package) and safety condition. The proper functioning of the device and the safety of the operator are only guaranteed if all normal laboratory safety stamdards are observed and if all specific safety measures described in this manual are followed. All notes, indications and recommendations contained in this manual are also valid for the independently controlled magnetic stirrer that can be found in combination with some instrument sales codes.

- *Basic requirements for a safe use*

The proper functioning of the device and the operator safety are guaranteed only if all of the following indications are observed.
- The instrument may only be used in accordance with the above-mentioned specifications.
- The instrument should only be used with the power supply supplied. If replacement is required, please contact your local distributor.
- The instrument must operate exclusively under the environmental conditions described in this manual.
- Neither the instrument nor the magnetic stirrer must be opened by the user for any reason.

Only perform this operation if explicitly authorised by the manufacturer. Compliance with the above, and reading this manual before each use, eliminates the residual risk of minor electrocution damage, however unlikely they may be.

- *Unauthorised use*

The instrument should not be put into operation if:
- It is clearly damaged (for example due to transportation);
- It has been stored for a long period of time under adverse conditions (exposure to direct light, heat sources or places saturated by gas or vapours) or in environments with conditions different from those mentioned in this manual.

- *Device Maintenance*

If used correctly and in a suitable environment, the instrument requires no special maintenance procedures. It is recommended to occasionally clean the instrument casing with a damp cloth and a mild detergent . This should be done with the instrument switched off, disconnected from the power supply and only by experienced and authorised personnel. The housing is made of ABS/PC (acrylonitrile butadiene styrene/polycarbonate). This material is sensitive to certain organic solvents, e.g. toluene, xylene and methyl ethyl ketone (MEK). I If liquids get into the housing, they could damage the instrument. In case of prolonged non-use of the device, cover the BNC connectors with the special cap supplied with. Do not open the instrument housing: it does not contain parts that can be maintained, repaired or replaced by the user. In case of problems with the instrument, contact your local distributor. It is recommended to use original spare parts only. Contact your local distributor for information. The use of non-original spare parts can lead to malfunction or permanent damage to the instrument. Moreover, the use of spare parts not guaranteed by the supplier can be dangerous for the user himself. For the maintenance of the electrochemical sensors, refer to the documentation present in their packaging or contact the supplier.

- *Responsibility of the owner of the instrument*

The person who owns and uses the instrument or authorises its use by others is the owner of the instrument and is responsible for the safety of all users of the instrument and third parties. The owner of the instrument must inform users of its safe use at their place of work and manage potential risks, and provide the required protective equipment. When using chemicals or solvents, follow the manufacturer's safety data sheets.

3. Instrumental Characteristics

- *Parameters*

pH 80 PRO
pH – mV – Orp – ISE – Temp

pH 8 PRO
pH – mV – Orp – Temp

COND 80 PRO
Cond – TDS – Sal – Res – Temp

COND 8 PRO
Cond – TDS – Sal – Temp

PC 80 PRO
pH, mV, ORP, ISE, Cond, TDS, Sal, Res, Temp

PC 8 PRO
pH, mV, ORP, Cond, TDS, Sal, Temp

- *Technical Data*

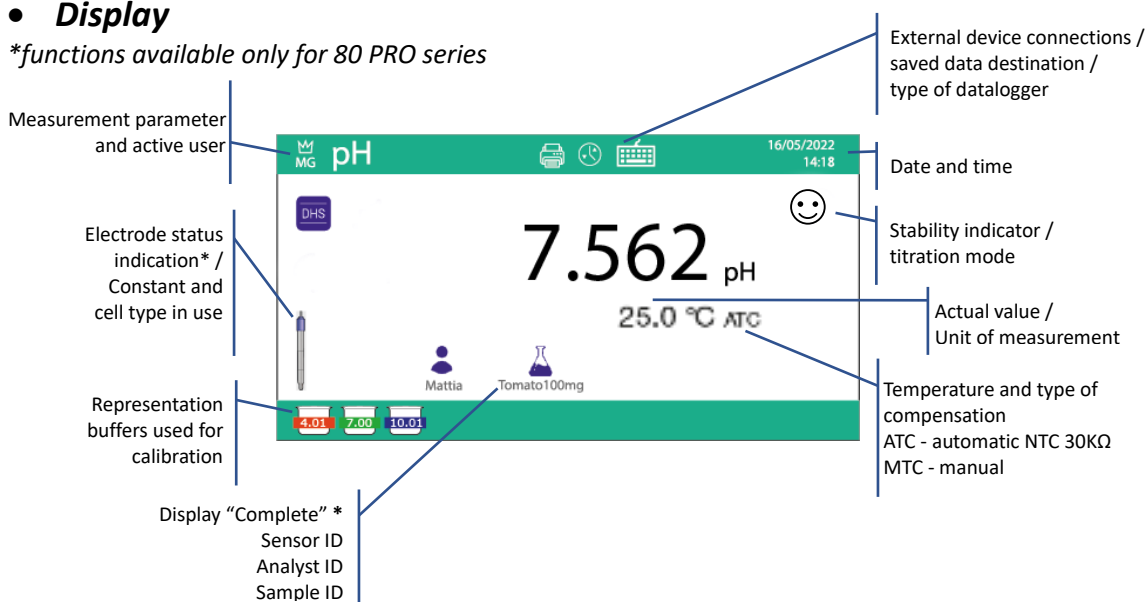|	8 PRO Series	80 PRO Series
pH	**pH 8 PRO - PC 8 PRO**	**pH 80 PRO - PC 80 PRO**
Measuring range	-2...16	-2...20
Resolution / Accuracy	0.1, 0.01, 0.001 / $\pm$0.002	
Recognised calibration points and buffers	AUTO: 1...5 / USA, NIST Tec, DIN 19266 USER: 2 user values	AUTO: 1...5 / USA, NIST Tec, DIN 19266, Mettler Toledo Eu, Merck USER: 5 user values
Indication of buffers	Yes	
Calibration Status Display	Yes, full report and graph	
DHS sensor recognition	Yes	
MIN MAX values alarm	Yes	
Analogue display	Yes	
Stability Criteria	Med - High - Titration	
mV (pH)	**pH 8 PRO - PC 8 PRO**	**pH 80 PRO - PC 80 PRO**
Range / Resolution	$\pm$2000 / 0.1, 1 mV automatic	
ISE	**pH 8 PRO - PC 8 PRO**	**pH 80 PRO - PC 80 PRO**
Resolution	-	0.001 - 0.099 / 0.1 - 19.9 / 20 - 199 / 200 - 19999
Calibration points	-	2...5
Units of Measurement	-	mg/L - g/L - mol/L
ORP	**pH 8 PRO - PC 8 PRO**	**pH 80 PRO - PC 80 PRO**
Range / Resolution	$\pm$2000 / 0.1, 1 mV automatic	
Recognised calibration points and buffers	AUTO: 475 mV USER: 1 user value	
MIN MAX values alarm	Yes	

Conductivity	COND 8 PRO - PC8 PRO	COND 80 PRO - PC80 PRO
Range / Resolution	0.00 - 20.00 - 200.0 - 2000 µS / 2.00 - 20.00 - 500.0 mS Automatic scale	0.00 - 20.00 - 200.0 - 2000 µS / 2.00 - 20.00 - 200.0 - 1000 mS Automatic scale
Accuracy	±1% full scale	±0.5% full scale
Recognised calibration points and buffers	AUTO: 1...4 / 84, 147, 1413 µS, 12.88, 111.8 mS, USER: 1 user value	
Indication of buffers	Yes	
Reference temperature	15...30 °C	
Sensor type	2 rings	2 rings - 4 rings
Cell constant	0.1 - 1 - 10	0.1 - 1 - 10 |0.55
Temperature coefficient	0,00...10,00 %/°C	0.00...10.00 %/°C e Ultrapure Water

TDS	COND 8 PRO - PC8 PRO	COND 80 PRO - PC80 PRO
Measuring Range / Resolution	0.1 - 20.00 - 200.0 - 2000 mg/l / 2.00 - 20.00 - 200.0 g/l Automatic scale	0.1 - 20.00 - 200.0 - 2000 mg/l / 2.00 - 20.00 - 500.0 g/l Automatic scale
Units of Measurement	mg/l - g/l ... ppm - ppt	
Conversion factor / Accuracy	0.4 - 1.00 / ±1% full scale	

Salinity	COND 8 PRO - PC8 PRO	COND 80 PRO - PC80 PRO
Measuring Range / Resolution	0.1 - 200.0 - 2000 ppm / 2.00 - 20.00 - 100.0 ppt Automatic scale	
Units of Measurement	ppm - ppt ... mg/l - g/l	

Resistivity	COND 8 PRO - PC8 PRO	COND 80 PRO - PC80 PRO
Measuring Range / Resolution	-	1.00 - 10.00 - 100.0 - 1000 Ω*cm / 1.00 - 10.00 - 100.0 - 1000 KΩ / 1.00 - 10.00 MΩ Automatic scale

Temperature		
Measuring range	-20 ... 120 °C	-30...120 °C
Resolution / Accuracy	0,1 / ± 0,2°C	
ATC temperature compensation (NTC30KΩ) and MTC	0...100 °C	
Temperature calibration	Yes, for each parameter	

System		
Calibration timer	Yes, for each parameter	
Display	Multicolour dot-matrix display	
Multiview screen	pH / Cond	Up to 6 parameters of your choice
Multilingual	Yes, 6 languages available	
Internal memory	1000 data	8000 data
Creating customised print reports	-	Yes, up to 4 print templates
Password	8 numeric characters	Maximum 10 alphanumeric characters (with a symbol and an UPPERCASE)
Access Profiles	1	4 access levels for 15 users
Events list	-	Yes, downloadable via software
IP degree of protection (stirrer included)	IP 54	
Magnetic stirrer	Yes, independently controlled	
Stirring speed / Capacity	0 ... 3000 rpm / 2 L	
Power supply	AC/DC power supply unit 12V / 1000 mA	
Power supply tolerance	± 10%	
Operating voltage	100 - 240 V	

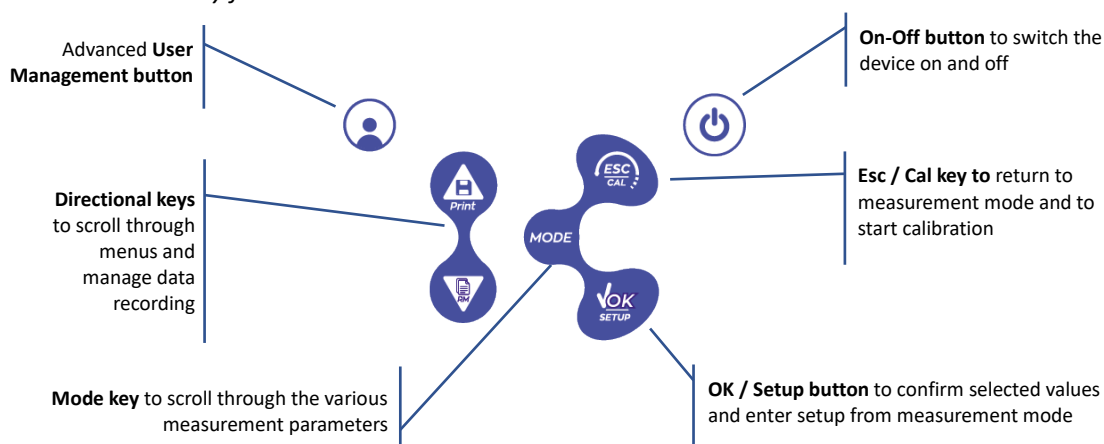| Working frequency	47 - 63 Hz
Maximum absorption	10 W
Sound level during standard operation	< 80 dB
Environmental storage conditions	-25 ... +65 °C
Environmental operating conditions	0 ... +45 °C
Maximum permissible humidity	< 95 % non-condensing
Degree of micro-pollution of the environment in which the product is used	grade 2
Maximum altitude of use	2000 m
System dimensions WxDxH	Vers. Basic: 162 x 185 x 56 mm Vers. Stirrer: 324 x 185 x 56 mm
System weight	Vers. Basic: 709 g Vers. Stirrer: 1255 g

4. Description of the Instrument

- ## *Display*
functions available only for 80 PRO series

Measurement parameter and active user

External device connections / saved data destination / type of datalogger

Date and time

Electrode status indication* / Constant and cell type in use

7.562 pH

25.0 °C ATC

Stability indicator / titration mode

Actual value / Unit of measurement

Representation buffers used for calibration

Temperature and type of compensation
ATC - automatic NTC 30KΩ
MTC - manual

Display "Complete" *
Sensor ID
Analyst ID
Sample ID

- ## *Keyboard*
functions available only for 80 PRO series

Advanced **User Management button**

On-Off button to switch the device on and off

Directional keys to scroll through menus and manage data recording

Esc / Cal key to return to measurement mode and to start calibration

Mode key to scroll through the various measurement parameters

OK / Setup button to confirm selected values and enter setup from measurement mode

Keyboard for 8 PRO series

Keyboard for 80 PRO series

- *Key Functions*

Key	Pressure	Function
ON/OFF	Short	Press to switch the device on or off.
MODE	Short	In measurement mode, press to scroll through the different parameters: **pH meter:** pH →mV (pH) → analog pH → *ISE** → ORP →*MultiView** **Conductivity meter:** Cond → TDS → Sal →*Res** → *MultiView** **Multi-parameter**: pH/Cond → pH →mV (pH) → analog pH → *ISE** →ORP → Cond → TDS →Sal → *Res** → *MultiView** ** parameters available only for 80 PRO series*
ESC/CAL	Short	In calibration, setup and memory recall mode, press to return to measurement mode.
	Long press (3s)	In measurement mode, press and hold to start calibration.
OK/SETUP	Short	In measurement mode, press to enter setup. In the setup menus, press to select the desired programme and/or value. During calibration, press to confirm value.
UP ARROW/PRINT DOWN ARROW/RM	Short	In the setup and sub-set-up menus, press to scroll. In the setup submenus, press to change the value. In memory recall mode, press to scroll through saved values. In MTC and custom calibration mode, press to change the value. **UP ARROW/PRINT**: In measurement mode press to save or print the data (manual data logger) or start and stop recording (automatic data logger with push-button start, Min/Max and Delta). **DOWN ARROW /RM**: In measurement mode press to recall saved data.
	Long press (3s)	In measurement mode, press and hold either button to change the temperature in MTC mode (manual compensation, without probe). When two arrows appear next to the value, as described above, use the arrow keys to enter the correct value .
	Short	Press to activate Advanced User Management or in case it is already active to change the profile.

The correct use of the function keys and the care when pressing them, given their small size, eliminate the residual risk of slight damage, not likely, caused by pressing the keys simultaneously; before each use, check that pressing the keys corresponds to the relative effect on the display.

5.Installation

- *Supplied Components*

In the BASIC versions, it is always present inside the package:
Instrument, 12V/1000mA power supply, electrode holder stand, 1m S7/BNC connection cable, NT55 temperature probe, buffer solutions in single-dose bottle, USB cable, (external keyboard for 80 Pro series), multilingual user manual and test report.

In the STIRRER versions, it is always present inside the package:
Instrument, 12V/1000mA power supply, independently controlled magnetic stirrer with connection cable, metal anchors, electrode holder arm, 1m S7/BNC connection cable, NT55 temperature probe, buffer solutions in single-dose bottle, USB cable, (external keyboard for 80+ series), multilingual user manual and test report.
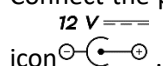
- *Start up*

- Place the instrument on a flat, stable laboratory bench with adequate front and side accessibility. It is recommended to place the instrument at a distance of no less than 20 cm from overhead and surrounding parts.
- The positioning carried out in this way eliminates the residual risk of possible minor damages caused by manual handling of the loads.
- Make sure that the instrument and the surrounding space are correctly illuminated.
- In the STIRRER versions, using a Phillips screwdriver, unscrew the metal brackets located underneath the stirrer and use these to fasten it to the device. Then insert the electrode holder arm on the pin. Connect the instrument ("Stirrer" connector) to the stirrer using the cable provided.
- In the BASIC versions, assemble the holder next to the instrument by inserting the electrode holder arm into the base pin.
- The instrument is not to be used in atmospheres containing hazardous materials for which it was not designed.

- *Power connection*

Check that the electrical *standards of the line on which the equipment is to be installed comply with the voltage and operating frequency of the power supply unit (*see *Technical Data).* Use only the original power supply.
- Connect the plug of the power supply to the connector on the rear panel of the instrument marked with the icon $12\,V\!=\!=\!=$ $\ominus\!-\!\!\big(\!\cdot\!-\!\ominus$.
- Connect the power supply to a main socket that is not difficult to reach.
- The instrument is equipped with an external power supply that has no protection against the infiltration of liquids, so when using it, keep all electrical cables and connections away from any liquids and moisture, and do not use the instrument in a wet room such as a bathroom or laundry room.

WARNING - Risk of death or serious injury due to electric shock. Contact with live components can lead to injury and death.
- Use only the supplied adapter.
- Do not place the power supply in contact with liquids or in a condensing environment. Avoid thermal shock.
- All electric cables and connections must be kept away from moisture or liquids.
- Check cables and plugs for damage, otherwise replace them.
- During use, do not cover the power supply unit and/or place it inside boxes.
- In the event of a loss of power during operation of the device, there is no dangerous condition when the device is powered up again. It will then have to be restarted as it will not restart automatically.

- *Switching on and off, updating date, time and language*

Once all the above-mentioned preliminary operations have been performed, switch on the system by pressing the *ON/OFF* button. An acoustic signal will sound and the following screens will appear on the display:
- Device model and software.
- Settings for the most important parameters and any info on the DHS sensor.

When using the device for the first time, it is recommended to update the date, time and language by performing the following steps:
- Press *OK/SETUP* to enter the setup menu.
- Press *DOWN ARROW /RM* until **Configuration** is selected and enter with *OK/SETUP*.
- Press *DOWN ARROW /RM* until **Date Setting is** selected and enter with *OK/SETUP*.
- Using the *DOWN ARROW/RM* and *UP ARROW/PRINT* buttons update the **year** value, press *OK/SETUP* to confirm and change to **month**, repeat the operation also for **day**; automatically the device updates the date and returns to the setup menu.
- Press ARROW *DOWN /RM* until **Time Setting is** selected and enter with *OK/SETUP*, using the ARROW *DOWN /RM* and *ARROW UP/PRINT* buttons and confirming with *OK/SETUP* update **hours**, **minutes** and **seconds**.

- Press ARROW *DOWN /RM* until **Select Language is** selected and enter with *OK/SETUP*, move with *ARROW DOWN /RM* to the desired language and activate with *OK/SETUP*.
- Use the *ESC/CAL* key to return to measurement mode.
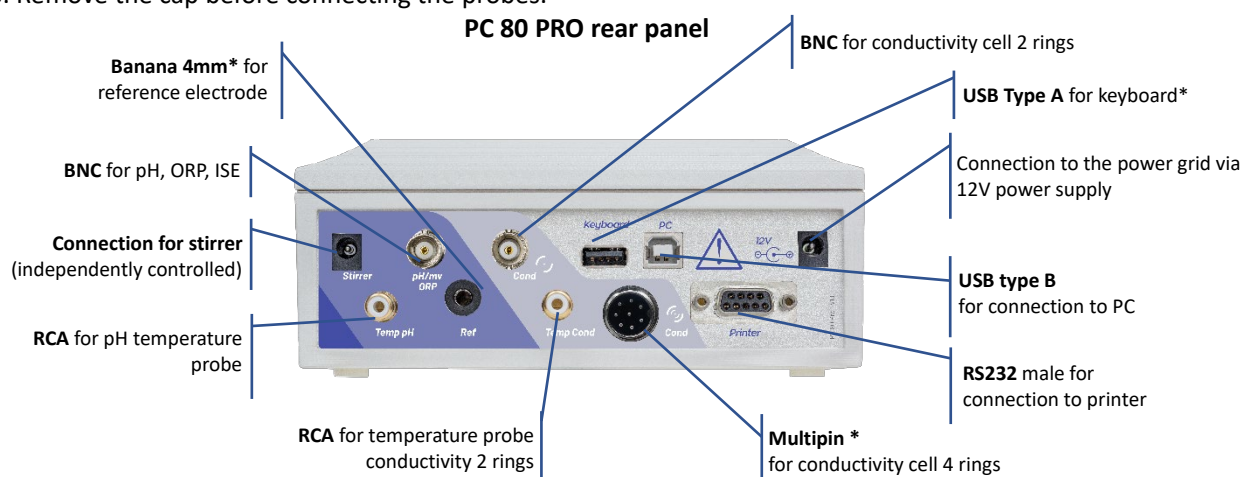- To switch the instrument off, press the *OK/SETUP* button in measurement mode.

• *Instrument transportation*

To move the instrument to a new location, transport it carefully to avoid damage; the instrument can be damaged if it is not transported correctly. Disconnect the instrument from the power supply and remove all the connection cables. Remove the electrode arm. To avoid damage to the instrument during long distance transport, use the original packaging. If the original packaging is no longer available, choose a package that guarantees safe transport.

• *Connections Inputs / Outputs*

Only use original accessories guaranteed by the manufacturer.

If required, please contact your local distributor. The BNC connectors at the time of sale are protected by a plastic cap. Remove the cap before connecting the probes.

PC 80 PRO rear panel

Banana 4mm* for reference electrode

BNC for pH, ORP, ISE

Connection for stirrer (independently controlled)

RCA for pH temperature probe

RCA for temperature probe conductivity 2 rings

BNC for conductivity cell 2 rings

USB Type A for keyboard*

Connection to the power grid via 12V power supply

USB type B for connection to PC

RS232 male for connection to printer

Multipin * for conductivity cell 4 rings

IMPORTANT: Read the manual before connecting probes or peripherals.

• *Symbols and icons on the display*

Symbol	Description	Symbol	Description
	Number of data stored in data logger mode on instrument memory	Tit	Stability criterion Titration (continuous measurement)
	Data logger with data transmission to printer		Measurement Stability Icon
	External keyboard connected *	HOLD	HOLD mode, read locked
	Data logger with data transmission to PC		Sample ID*
	Data logger with data transmission to instrument memory		User ID*
	Automatic data logger mode (when flashing it is recording)		Sensor ID*
	Automatic data logger mode with start via MIN/MAX values (when flashing is active)*		2-ring conductivity cell*

⚠ (clock triangle)	Automatic data logger mode with start via Delta values (when flashing is active)*	(4-ring symbol)	4-ring conductivity cell*
(M+)	Manual data logger mode	CAL DUE	Calibration deadline
⊢·····⊣	MIN/MAX value alarm active	(temp symbol)	Temperature compensation for non-linear conductivity*.

functions available only for 80 PRO Series

6. Device operation

- When the device is switched on, the instrument enters measuring mode in the last parameter used.
- To scroll through the different parameter screens, press the MODE button, the current measurement parameter is shown on the upper left display.

pH 8PRO | 80PRO
- pH
- mV (pH)
- pH analogico
- ORP
- ISE *
- Multiview *

COND 8PRO | 80PRO
- Conducibilità
- TDS
- Salinità
- Resistività *
- Multiview *

PC 8PRO | 80PRO
- pH / Cond simultanea
- mV (pH)
- pH analogico
- ORP
- ISE *
- Conducibilità
- TDS
- Salinità
- Resistività *
- Multiview *
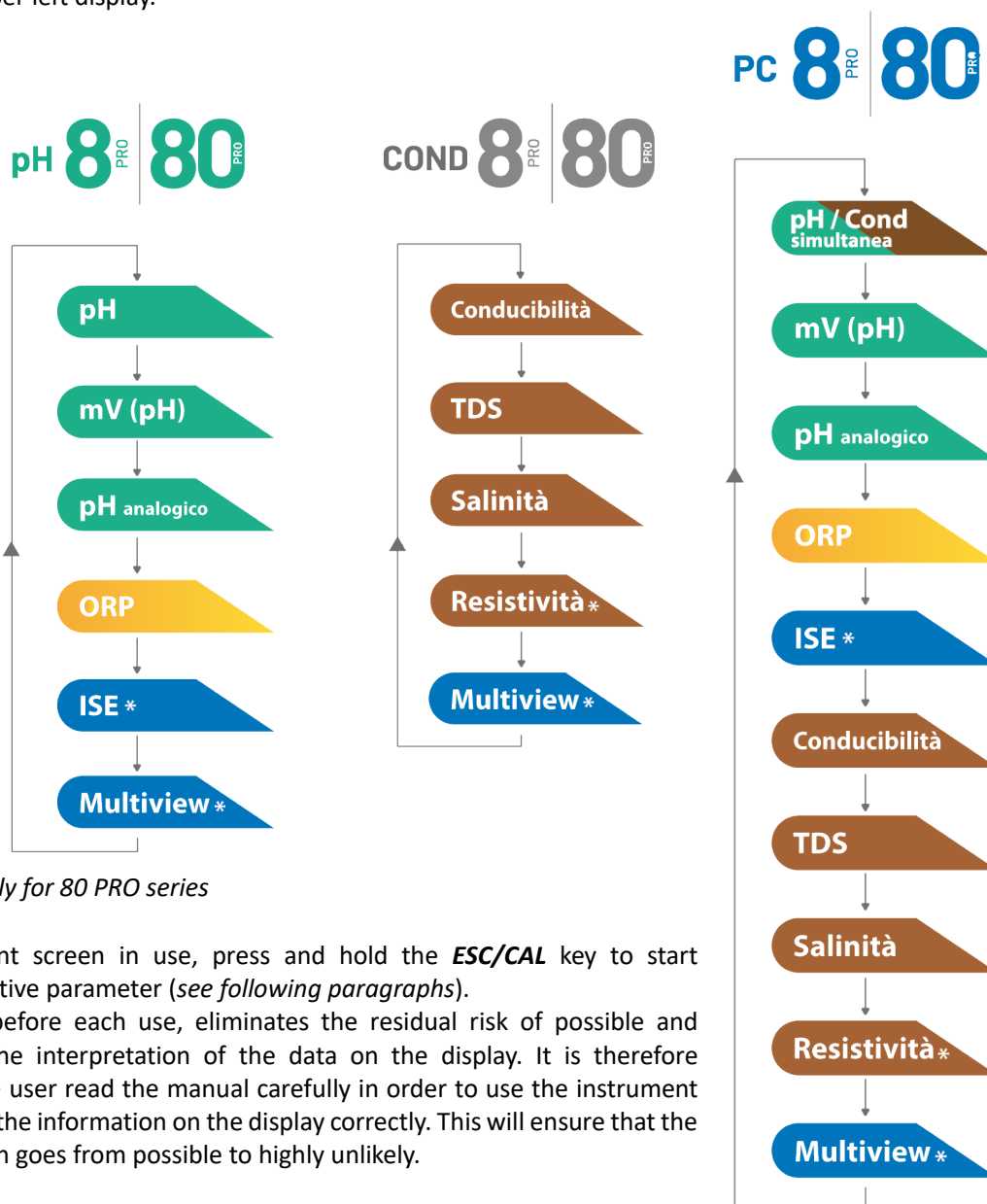
functions available only for 80 PRO series

- In the measurement screen in use, press and hold the **ESC/CAL** key to start calibration of the active parameter (*see following paragraphs*).

Reading this manual before each use, eliminates the residual risk of possible and significant, errors in the interpretation of the data on the display. It is therefore recommended that the user read the manual carefully in order to use the instrument correctly and interpret the information on the display correctly. This will ensure that the risk of misinterpretation goes from possible to highly unlikely.
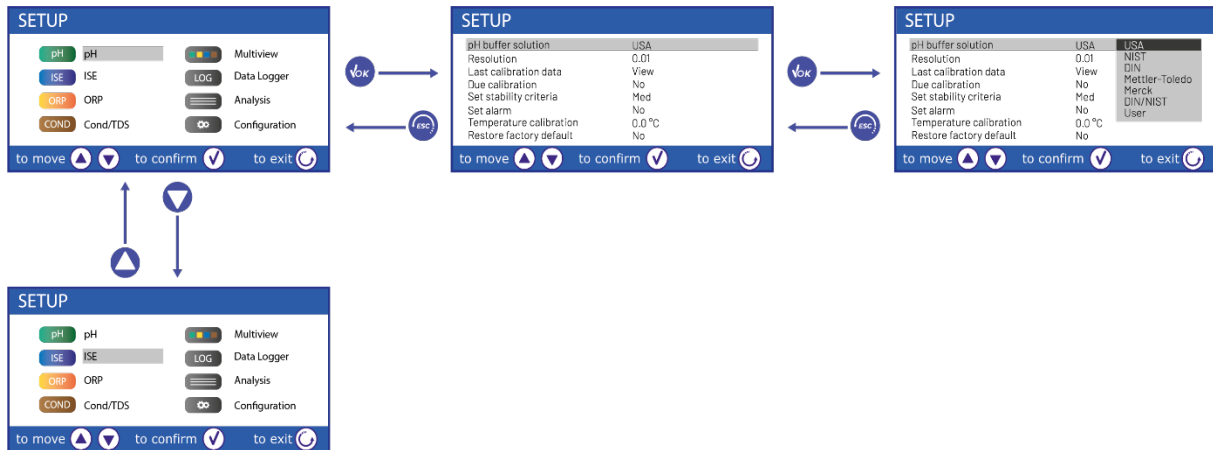
7.Setup Menu

In measurement mode, press the *OK/SETUP* button to enter SETUP mode, choose the parameter you want to change by moving with the directional keys and confirm with *OK/SETUP*.

pH 8 PRO

- pH — pH
- ORP — ORP
- LOG — Data Logger
- ⚙ — General settings

COND 8 PRO

- COND — EC / TDS
- LOG — Data Logger
- ⚙ — General settings

PC 8 PRO

- pH — pH
- ORP — ORP
- COND — EC / TDS
- LOG — Data Logger
- ⚙ — General settings

pH 80 PRO

- pH — pH
- ISE — ISE
- ORP — ORP
- LOG — Data Logger
- ▯▯▯ — Multiview
- ☰ — Menu Analysis
- ⚙ — General settings

COND 80 PRO

- COND — EC / TDS
- LOG — Data Logger
- ▯▯▯ — Multiview
- ☰ — Menu Analysis
- ⚙ — General settings

PC 80 PRO

- pH — pH
- ISE — ISE
- ORP — ORP
- COND — EC / TDS
- ▯▯▯ — Multiview
- LOG — Data Logger
- ☰ — Menu Analysis
- ⚙ — General settings

SETUP		16/05/2022 14:18
pH	pH	▯▯▯ MultiView
ISE	ISE	LOG Data Logger
ORP	Orp	☰ Analysis
COND	Cond/TDS	⚙ Configuration
to move ▲ ▼	to confirm ✓	to exit ☺

Possible options	
(Print)	⬆
(RM)	⬇
(ESC CAL)	**Back in size**
(OK SETUP)	**Access**

- Within the selected menu, move between the different programmes using the directional buttons and press *OK/SETUP* to select the one you wish to change.
- **Using the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons, choose the desired option or change the numerical value and confirm with *OK/SETUP*.**
- Press the *ESC/CAL* key to return to measurement mode.

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- **_Setup menu structure for PC 80 PRO Series_**

pH buffer selection
Resolution
Last calibration data
Due calibration
Set Stability criteria
Set Alarm
Temperature calibration
Restore Factory default

Measuring unit
Select low standard
Set Stability criteria
Last calibration data
Due calibration
Temperature calibration
Restore Factory default

ORP buffer selection
Last calibration data
Due calibration
Set Alarm
Temperature calibration
Restore Factory default

COND stadium
Cell Constant
Calibration solution
Last calibration data
Calibration deadline
Reference temperature
Temp compensation factor
TDS measure unit
TDS factor
Salimnity measure unit
Temperature calibration
Restore Factory default

14

 Select which parameters to display on the MULTIVIEW screen

 Send data to
Data logging type
Log Setting
Print format
Template
Delete data in memory

 Various IDs to be filled in via external keyboard
Notes
Restore Factory defaullt

 Select Parameters
Display information
Reading with HOLD
Date Format
Date Setting
Time Format
Time setting
Temperature unit option
Select language
Buzzer Mode
Due calibration mode
Restore Factory default

8. Temperature measurement ATC - MTC

- **ATC**: The direct measurement of the sample temperature for all parameters is carried out via the 30KΩ NTC probe, which can be either integrated in the sensor or external.
- **MTC**: If no temperature probe is connected, this must be entered manually. Press and hold *UP ARROW/PRINT* or *DOWN ARROW/RM* *until* two arrows appear next to the value, then adjust it by using the arrow keys, then press *OK/SETUP* to confirm.

For multi-parameters, the temperature set or measured in a particular measurement channel will be used for all parameters related to it.

Example: *The temperature probe connected in the measurement channel for pH will detect the temperature for the parameters pH, mV, ORP and ISE.*

9. pH parameter

pH8 PRO, pH80 PRO, PC8 PRO, PC80 PRO
On this series of devices it is possible to use pH sensors with integrated temperature probe or to connect two different sensors. Connect the pH electrode to the BNC type connector marked yellow/light blue and the temperature probe to the RCA/CINCH Temp/pH connector. The instrument can also recognise the DHS sensor, an innovative electrode which can store calibration data for immediate use on any enabled instrument.

- ● *pH parameter setup*
- In measurement mode, press *OK/SETUP* to enter the SETUP menu.
- Scroll using the arrow buttons to the **pH** menu `pH` and access by pressing *OK/SETUP.*
- Move with the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons and select the programme you want to change.

The table below shows the structure of the setup menu for the pH parameter, for each programme the options the user can choose and the default value:

	Description	Options	Factory Settings
pH	pH buffer selection	USA - NIST - DIN - Mettler Toledo* - Merck* - DIN/NIST* - User	USA
	Resolution	0.1 - 0.01 - 0.001	0.01
	Last calibration data	View - Print	View
	Due calibration	No - Hours - Days	No
	Set Stability criteria	Med - High - Tit	Medium
	Set Alarm	No - MIN - MAX	No
	Temperature calibration	-	0.0 °C
	Restore Factory default	Yes - No	No

* functions available only for 80 Pro Series

pH buffer selection
- Access this setup to select the buffer family with which to calibrate the electrode.
- The instruments allow the execution of pH calibration from **1 to 5 points.**
- During calibration press *ESC/CAL* to exit and save the points calibrated up to that moment (*see section on* **automatic pH calibration**).
- The buffer families automatically recognised by the instruments are as follows:

US buffers: 1.68 - 4.01 - **7.00**** - 10.01 - 12.45 (Factory setting)
NIST buffers: 1,68 - 4,00 - **6,86**** - 9,18 - 12,46
DIN buffers: 1,68 - 4,01 - **6,86**** - 9,18 - 12,45
Mettler Toledo* buffers: 2.00 - 4.01 - **7.00**** - 9.21 - 11.00
Merck* buffers: 2,00 - 4,00 - **7,00**** - 9,00 - 12,00
NIST/DIN* buffers: 1,679 - 4,005 - **6,865**** - 9,180 - 12,454

* functions available only for 80 Pro Series.
**The neutral point is always required as the first point.

In addition, the user can perform a **manual** calibration up to 5 points with customisable values (2 points for **8 PRO Series**). In measurement mode in the lower left-hand corner of the display a series of beakers indicates the buffers with which the last calibration was carried out either automatically or manually. Inside the beaker, the number represents the exact value of the buffer, and a colour scale has been added for quick and intuitive understanding.

Beaker colour	pH value of buffer
Brown	< 2.5
Red	2.5 ~ 6.5
Green	6.5 ~ 7.5
Blue	7.5 ~ 11.5
Black	> 11.5

Resolution
Access this menu to choose the resolution you wish to have in the pH parameter reading:
- **0.1**
- **0.01** - Factory setting -
- **0.001**

Last pH calibration data

Access this menu to obtain information on the last calibration performed.

- "**View**" -factory settings-, a report with the following information about the calibration currently in use appears on the display:
DATE CALIBRATION / TIME CALIBRATION / TEMPERATURE / DHS MODEL IF PRESENT / OFFSET / SLOPE % for each range.
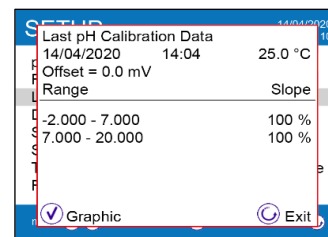
Press the *OK/SETUP* button to access the innovative **graphical representation of** the calibration conditions, which allows an intuitive understanding of the sensor status.

The graphical calibration report is designed to provide the user with an immediate view of the calibration conditions, indeed, the closer are the blue lines (calibration data) to the outside of the graph, the closer you are to the ideality of calibration and electrode conditions; conversely, the condition worsens the more you approach the red rectangle which represents the limit of acceptability.

The graph shows the offset, average slope %, sensor settling time and how many hours have elapsed since the last calibration.
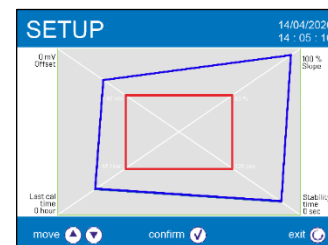
- "**Print**": connect the printer to the device via the RS232 port (*see* **connections inputs/outputs**) in order to print the calibration report directly on paper.

Last calibration data

Access this menu to set the calibration deadline; this option is crucial in GLP protocols.

No calibration deadline is set by default; use the arrow buttons to choose the days or hours that must elapse between two calibrations and confirm with *OK/SETUP*. The icon ![icon] appears on the display with a time indication of the time remaining until the calibration deadline.

IMPORTANT: In the **Setup** *menu → **Calibration deadline mode***, *the user can decide if the calibration has expired:*

- *Display notification with option to continue working.*
- *Freeze measurement until recalibration.*

Note: With an active DHS sensor, the calibration deadline refers to the electrode.

Set stability criteria

In order to consider the reading of a value to be true, it is advisable to wait for the measurement stability, which is indicated by the icon ![icon] . Access this menu to change the measurement stability criterion.

- **"Medium"** (default value): readings within 0.6 mV.
- **'High":** choose this option for a more rigorous reading, readings within 0.3 mV.
- **"Tit"**(titration): no stability criterion is activated, the reading will therefore be "continuous".

With this option active, the icon ![icon] will appear on the display and the measurement will hardly stabilise, but the instrument's response time is minimised as it is a simultaneous measurement.

IMPORTANT: In the **Setup** *menu → **Reading with HOLD** the* *user can decide to lock the measurement on the display once stability is reached.*

Set Alarms

The user can set an alarm in the **Minimum and/or Maximum pH** value.

This option is indicated by the appearance of the ![icon] icon on the display.

When the set threshold is exceeded, the instrument will signal the alarm to the user as follows:

- The measured pH value turns red.
- Acoustic signal (**Setup** *Menu →* **Buzzer**).

Temperature Calibration

All instruments in these series are pre-calibrated for a correct temperature reading. If, however, a difference between the measured and actual temperature is evident, an offset adjustment of $\pm$ 5°C can be made.

- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to correct the temperature offset value and confirm with *OK/SETUP*.

Restore factory default

If the instrument does not work optimally or incorrect calibrations have been performed, confirm **Yes** with **OK/SETUP** to reset all pH parameters to default settings.

• *Automatic pH calibration*

*Example for three-point calibration with US-type buffer*

• In **pH** measurement mode press and hold the **ESC/CAL** key for 3 seconds to enter calibration mode.
*In multi-parameters, pH calibration can also be accessed from the simultaneous measurement screen and then selecting **pH**.*

• Rinse the electrode with distilled water and gently dab with absorbent towels.
Press **OK/SETUP** and immerse the electrode in pH buffer 7.00 (as indicated by the beaker on the display).
The first calibration point is always neutral pH while the rest are at the operator's discretion.

• When the icon ☺ appears, confirm the first point by pressing **OK/SETUP** .

The actual measured value flashes on the display and then the beaker icon pH 7.00 7.00 appears at the bottom left, indicating that the instrument is calibrated to the neutral point.

• Remove the electrode, rinse with distilled water and gently dab with absorbent towels.
• Press **OK/SETUP** to continue calibration and immerse the electrode in pH buffer 4.01.
All pH values that the instrument is able to recognise flow through the beaker.

• When the beaker stabilises at pH 4.01 and the icon ☺ appears, confirm by pressing **OK/SETUP**.
The display flashes the actual measured value and then the pH 7.00 beaker icon appears next to the pH 4.01 beaker

4.01 , the instrument is calibrated in the acid range.
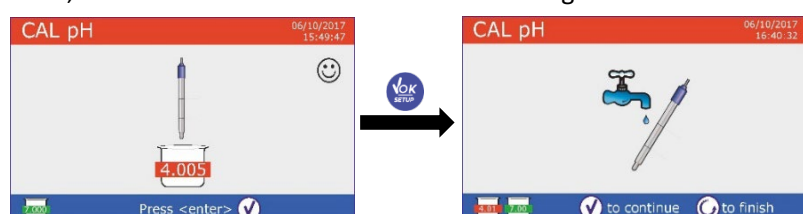
*For a calibration curve of two values, press **CAL/ESC** to end the calibration process and return to measurement mode.*

• Remove the electrode, rinse with distilled water and gently dab with absorbent towels.
• Press **OK/SETUP** to continue calibration and immerse the electrode in pH buffer 10.01.
All pH values that the instrument is able to recognise flow through the beaker.

• When the beaker stabilises at pH 10.01 and the icon ☺ appears, confirm by pressing **OK/SETUP.**
The transition from an acid to a basic pH may take a few seconds longer to reach stability.


• The display flashes the actual measured value and then the icon for the pH 7.00 and pH 4.01 beakers appears

next to the pH 10.01 beaker 10.01 : the instrument is also calibrated in the alkaline range.
• Although the device can accept two more calibration points, we interrupt and confirm this three-point curve by pressing **OK/SETUP**.
The calibration report and graphical representation appears on the display, press **OK/SETUP** or **ESC/CAL** to exit and return to measurement mode.

The buffers used for the last calibration are displayed at the bottom left:
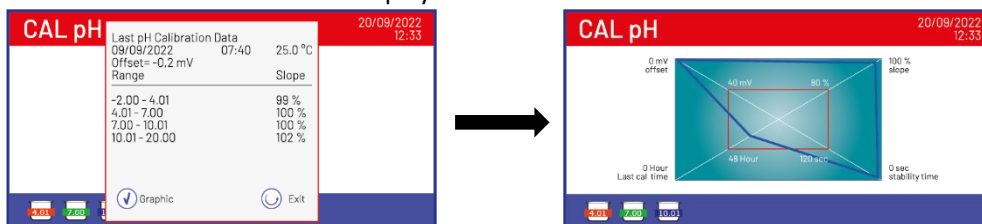
Note: calibration of the electrode is a fundamental operation for the quality and veracity of a measurement. Therefore, ensure that the buffers used are new, unpolluted and at the same temperature. After a long time or after reading particular samples, it is necessary to renew the calibration; the graphical report can help the user in making this decision.

IMPORTANT: *For highly accurate results the instrument manufacturer recommends the use of **XS** Solution buffer solutions and **XS Sensor** pH electrodes. Please contact your local distributor for supply.*

CAUTION: *Before proceeding with calibration operations, carefully consult the safety data sheets of the substances involved:*

- *Calibration buffer solutions.*
- *Storage solution for pH electrodes.*
- *Filling solution for pH electrodes.*

Careful reading of the safety data sheets of the solutions used favours the elimination of residual risks associated with skin contact, ingestion, inhalation or eye contact with them, which may generate possible but not probable minor damage.

• *Calibration with manual values*

Example of two-point calibration pH 6.79 and pH 4.65

- Access the Setup menu for **pH** and select in **pH Buffer Selection → user,** press *ESC/CAL* to return to measurement and enter **pH** mode.
- Press and hold the *ESC/CAL* button for 3 seconds to enter calibration mode.

- Rinse the electrode with distilled water and gently dab with absorbent towels.
- Press *OK/SETUP* and immerse the electrode in the first buffer solution (e.g. pH 6.79).

- Wait for the pH value on the display to stabilise; when the icon ☺ appears, use the arrow keys to adjust the value by entering the buffer value (e.g. pH 6.79).
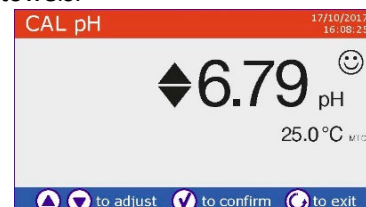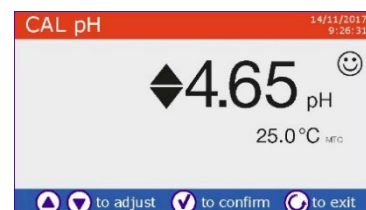
Note: Check the buffer value against temperature

- When the icon ☺ appears again, press the button to confirm the first point; the actual measured value flashes on the display and the beaker icon with identification colour and buffer value U 6.79 appears at the bottom left (the letter U stands for 'User value').

- Remove the electrode, rinse with distilled water and gently dab with absorben towels. Press *OK/SETUP* to continue calibration and immerse the electrode in the next buffer (e.g. pH 4.65).

- Wait for the pH value on the display to stabilise; when the icon ☺ appears, use the arrow keys to adjust the value by entering the buffer value (e.g. pH 4.65).

- When the ☺ icon appears, press the *OK/SETUP* button to confirm the second point, the actual measured value flashes on the display and the beaker icon appears at the bottom left U 4.65 .

- Although the device can accept three more calibration points, we interrupt and confirm this calibration by pressing *ESC/CAL* (**Series 8 Pro** after two points will terminate automatically).

- The calibration report and graphical representation appear on the display, press *OK/SETUP* or *ESC/CAL* to exit and return to measurement mode. The beakers related to the calibration will be displayed at the bottom left side. The value is preceded by the letter 'U' indicating that the value was entered manually.

Note*: If you are working with manual temperature compensation (MTC), update the value before calibrating the instrument.*
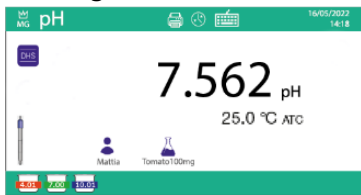
• *Carrying out a pH measurement*

- In measurement mode, press the *MODE* button to scroll through the different parameter screens until you reach pH (*see* **Device Operation**).
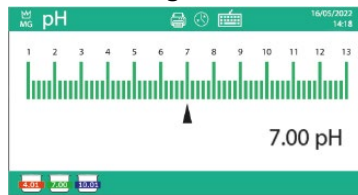
The pH measurement is available in four different screens:

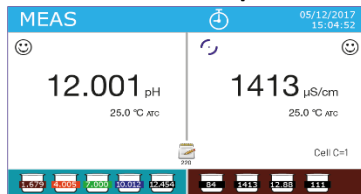**pH 8 PRO / PC 8 PRO / pH 80 PRO / PC 80 PRO**

Digital Traditional	Analog

PC 8 PRO / PC 80 PRO
Simultaneous pH/Cond

pH 80 PRO / PC 80 PRO
Multiview

- Connect the electrode to the pH/mV/ORP BNC of the instrument.
- If the user does not use an electrode with a built-in temperature probe or an external probe NTC 30KΩ it is advisable to manually update the temperature value (MTC).
- Remove the electrode from its protection cap, rinse with distilled water and gently dab with absorbent towels.
- Check for and remove any air bubbles in the membrane bulb by shaking in a vertical direction (as with the clinical thermometer). If present, open the side cap.
- Immerse the electrode in the sample while gently stirring.

- Only consider the measurement to be true when the stability icon appears ☺ .
  To eliminate any errors due to user interpretation, the **HOLD** function can be used (*see* **Setup - > Reading with HOLD**), which allows the measurement to be stopped as soon as it reaches stability.
- **When the measurement is finished, wash the electrode with distilled water and store it in the appropriate storage solution.**
- **Never store sensors in distilled water.**

In **Full Display** mode (*see* **Setup - > Display Information**) the graphical representation of the electrode indicates the slope% of the current calibration. **Having immediate access to and management of all information regarding calibration and sensor status allows the user to work while maintaining high quality standards.**

IMPORTANT: The use of the wide range of XS Sensor electrodes is preferred and is the manufacturer's recommended solution for highly accurate analysis.

Carefully read the instructions and recommendations for use and maintenance that are always inside the XS Sensor electrode packages.
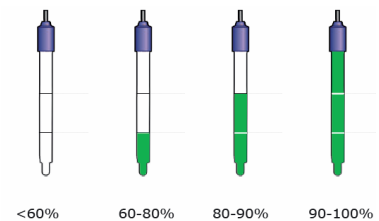
- ### *Sensors with DHS technology*

Electrodes equipped with DHS technology are able to save a calibration curve in their memory. The calibrated sensor is automatically recognised by any DHS-enabled instrument and acquires its calibration.

- Connect the DHS electrode to the BNC and RCA connectors of the instrument.

- The device automatically recognises the chip; the display shows information on the sensor model and batch, and the date of the last calibration (if the electrode was already calibrated).
- From the moment the DHS electrode is recognised, the active calibration on the instrument becomes that of the sensor (visible with the beaker at the bottom left of the display or *see menu* **pH -> Last Calibration Data).**
- If the calibration is satisfactory (see report view data and graphical representation), the electrode is ready to start measurements. If not, recalibrate the electrode. The data will be updated automatically.
- The DHS electrode calibrated with a Series 8 PRO or Series 80 PRO device is ready to be used on any DHS-enabled pH meter and vice versa.
- When the electrode is disconnected, a message on the display informs the user that the sensor has been deactivated; the instrument regains its previous calibration and no data is lost!
- The DHS electrode does not require batteries and when used on pH meters that are not chip-recognition enabled, it functions as a normal analog electrode.
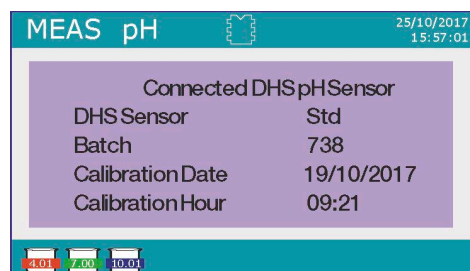
- ### *Errors reported during calibration*

- **Error 1**: Unstable reading during calibration, wait for stability ☺ before pressing *OK/SETUP*.
- **Error 2**: The device does not recognise the buffers used for calibration.
- **Error 3**: Calibration has exceeded the time limit: only the points calibrated up to that point will be retained.

10. Parameter mV

pH8 PRO, pH80 PRO, PC8 PRO, PC80 PRO
- In measurement mode, press *MODE* and move to the **mV** parameter.
- The display shows the mV measurement of the pH sensor.

- Only consider the measurement to be true when the stability icon appears ☺ .
Note: This measurement is recommended for assessing the efficiency of the sensor.

11. Measurement with Ion-Selective Electrodes (ISE)

pH80 PRO, PC80 PRO
This series of devices can measure the concentration of ions such as ammonium, fluorides, chlorides, nitrates etc. using an ion-selective electrode specific to the ion of interest. Connect the electrode to the BNC connector in the pH / mV / ORP measuring channel. Connect any reference electrode to the **Ref** connector.

- ### *Setup for the parameter ISE*

- In measurement mode, press *OK/SETUP* to enter the SETUP menu.
- Scroll using the arrow buttons to the **ISE** ISE menu and select by pressing *OK/SETUP*.
- Move with the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons and select the programme you want to change.

The table below shows the structure of the setup menu for the ISE parameter; for each programme, the options the user can choose and the default value are shown.

Programme	Description	Options	Factory Settings
ISE	Measuring unit	mg/L - g/L - mol/L	mg/L
	Select low standard	0.001 ... 19999 ppm	0.001
	Set Stability Criteria	Stability / Seconds	Stability
	Last calibration data	View / Print	View
	Due calibration	No - Hours - Days	No
	Temperature calibration	-	0.0 °C
	Restore Factory default	Yes - No	No

Measuring unit
Access this menu to choose the unit of measurement to be used for instrument calibration and sample reading.
- **mg/L** -default-
- **g/L**
- **mol/L**

Note: Use the same unit in calibration and measurement.
If the unit of measurement is changed, the calibration is automatically deleted.

Select low standard
Access this menu to select the concentration of the first point of the calibration curve (most diluted standard). Automatically the other points will be identified by the software by multiplying the concentration by a factor of **10** *(example: Low standard 0.050 mg/L, the other calibration points expected by the instrument will be 0.5 / 5 / 50 / 500 mg/L).* The device can accept a **minimum of 2** and a **maximum of 5** calibration points; once the second calibration point has been completed, the user can abort the calibration by pressing **ESC/CAL** and saving the points performed up to that point.

Set Stability Criteria
Access this menu to choose which stability criterion to use in calibration and measurement.
- Stability: Equivalent to the 'Medium' stability criterion for pH.
- **Seconds (0**...**180)**: Using the **UP ARROW/Print** and **DOWN ARROW/RM** buttons, select the seconds after which the device fixes the measurement (Useful function for volatile compounds).
  When this option is used, the countdown is activated on the display.
- To restart the time, press **ESC/CAL**.

Last calibration data
Access this menu to obtain information on the last calibration performed.
- Select **View by** pressing **OK/SETUP** to display the calibration report.
- Connect the printer to the RS232 port and select **Print** to print the calibration report.

Due calibration
Access this menu to set a calibration deadline; this option is essential in GLP protocols.
No calibration deadline is set by default; use the arrow buttons to choose the days or hours that must elapse between two calibrations and confirm with **OK/SETUP**.

The icon ![CAL DUE] appears on the display with a time indication of the time remaining until the calibration deadline.
IMPORTANT: In the **Setup** *menu →* **Calibration deadline mode,** *the user can decide whether the calibration has expired:*
- *Display notification with option to continue working.*
- *Freeze measurement until recalibration.*

Temperature Calibration
All instruments in these series are pre-calibrated for a correct temperature reading. If, however, a difference between the measured and actual temperature is evident, an offset adjustment of $\pm$ 5°C can be made.

Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to correct the temperature offset value and confirm with *OK/SETUP*.

Restore Factory default

If the instrument does not work optimally or incorrect calibrations have been performed, confirm **'Yes'** with *OK/SETUP* to reset all **ISE** parameters to default settings.
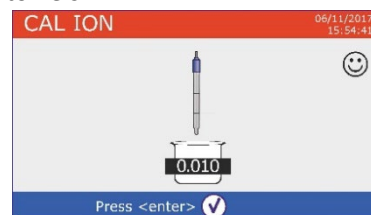
- ### *Calibration with ion-selective electrodes*

Two-point calibration example 0.01 and 0.1 mg/l

- Go to the **ISE** Setup menu [ISE] and select in the parameter **Unit of Measurement → mg/L** and in **Standard Low Selection → 0.010.**

Automatically, the device multiplies the lower standard by a factor of 10 to locate the other points on the calibration line.

- Connect the appropriate ISE electrode for the ion you wish to determine to the pH/mV/ORP connector.

IMPORTANT: If the ISE electrode is not combined, the specific reference electrode must be connected. For possible filling electrolytes for the reference electrode and for possible ionic strength adjusters (ISA) refer to the operating manual of the ISE electrode.

- Press *ESC/CAL* to return to measurement mode and with *MODE* move to the **ISE** page**.**
- Press and hold the *ESC/CAL* button for 3 seconds to enter calibration mode.

- Rinse the electrode with distilled water and gently dab with absorbent towels.
- Press *OK/SETUP* and immerse the electrode in the most diluted standard (**Low Standard Selection**) as indicated by the beaker icon [0.010] .
- When the icon ☺ appears (or when the time expires if you have chosen **Seconds** as the stability criterion) confirm the first point by pressing *OK/SETUP.*

- Remove the electrode, rinse it with distilled water and gently dab it with absorbent towels.
- Press *OK/SETUP* and dip the electrode into the next standard (**Low Standard X 10**) as indicated by the beaker icon [0.100] .
- When the icon ☺ appears, confirm the second point by pressing *OK/SETUP.*
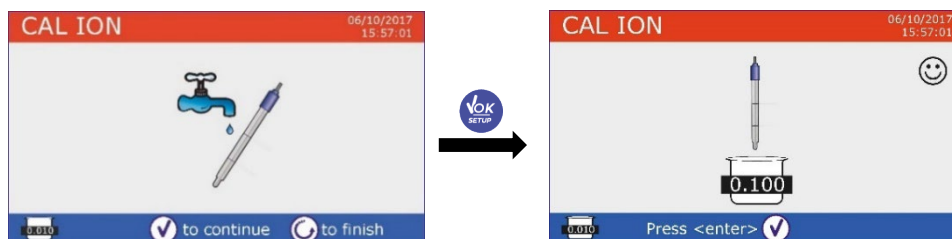
- At the end of the second point, the user has the option of exiting the calibration by pressing the *ESC/CAL* key; instead, press *OK/SETUP* to continue with the remaining points.
- At the end of calibration, the calibration report appears on the display with DATE AND TIME, TEMPERATURE, UNIT OF MEASUREMENT, SENSOR ID and SLOPE % for each RANGE.
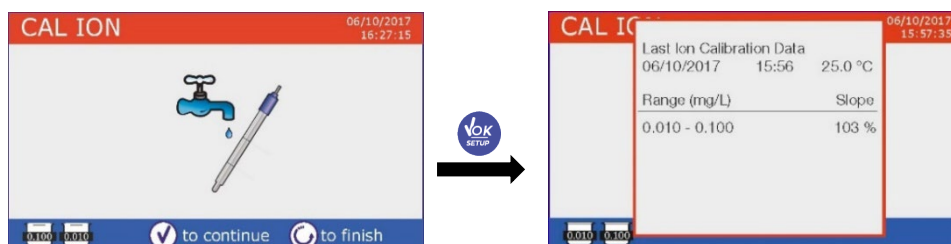
*IMPORTANT: Perform at least two calibration points. If **ESC/CAL is** pressed after the first point, the display shows the error **Use at least two standards** and the calibration is invalidated.*

WARNING: Before proceeding with sensor calibration operations, carefully consult the safety data sheets of the substances involved:

- *Standard calibration solution.*
- *Storage solution for ISE electrodes.*
- *Filling solution for ISE electrodes.*

• *Measurement with Ion-selective electrodes*

- Enter the **ISE** setup menu to check the correctness of the calibration and instrument parameters, return to measurement mode by pressing **ESC/CAL** and go to the **ISE** screen.
- Correctly connect the ISE sensor to the pH/mV/ORP connector, rinse it with distilled water, dab it gently and insert it into the sample.
- The display shows the **measurement in mV until** stability is reached.
- When the measurement stabilises, the mV measurement is replaced by the analyte **concentration** in the unit of measurement chosen by the user.
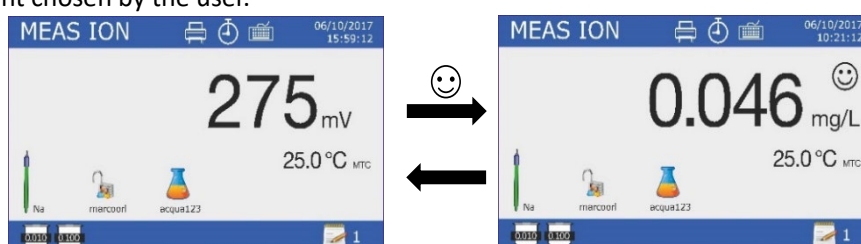
IMPORTANT: If the device is not calibrated in reading mode, only mV is displayed.

Note: If the seconds countdown is used as the stability criterion, press ESC/CAL to restart the time.

12. ORP (Oxide-Reduction Potential) parameter

pH8 PRO, pH80 PRO, PC8 PRO, PC80 PRO

ORP sensors can be used on this series of devices for measuring the Redox potential. Connect the Redox electrode to the BNC-type connector in the pH/ mV / ORP measuring channel; connect the temperature probe to the appropriate RCA/CINCH Temp connector instead. The sensor offset can be calibrated automatically to a predefined point. The instrument automatically recognises the **Redox** solution **475 mV / 25 °C**; or in **user** mode any other value of your choice. **The instrument is capable of correcting the sensor offset by + 75 mV.**

• *Setup for ORP parameter*

- In measurement mode, press **OK/SETUP** to enter the SETUP menu.
- Scroll using the arrow buttons to the **ORP** menu ORP and access by pressing **OK/SETUP**.
- Use the **UP ARROW/PRINT** and **DOWN ARROW/RM** buttons to select the programme you wish to access.

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The table below shows the structure of the setup menu for the ORP parameter; for each programme, the options the user can choose and the default value are shown:

Programme	Description	Options	Factory Settings
ORP	ORP buffer selection	475 mV - User	475 mV
	Last calibration data	View - Print	View
	Due Calibration	No - Hours - Days	No
	Set Alarm	No - MIN - MAX	No
	Temperature calibration	-	0.0 °C
	Restore Factory default	Yes - No	No

ORP buffer selection

Access this menu to select automatic or manual recognition of the standards to be calibrated.
- **475 mv** (default value): The instrument automatically recognises the +475 mV buffer.
- **User**: The device can be calibrated to a manually entered value.

IMPORTANT: The instrument can perform calibrations with a maximum tolerance of +/- 75 mV.

Last calibration data

Access this menu to obtain information on the last calibration performed.
- Select **View by** pressing *OK/SETUP* to display the calibration report.
- Connect the printer to the RS232 port and select **Print** to print the calibration report.

Due Calibration

Access this menu to set a calibration deadline; this option is essential in GLP protocols.
No calibration deadline is set by default; use the directional keys to choose the days or hours that must elapse

between two calibrations and confirm with *OK/SETUP*. The icon appears on the display with a time indication of the time remaining until the calibration deadline.

IMPORTANT: In the **Setup** *menu →* **Calibration deadline mode,** *the user can decide whether the calibration has expired:*
- *Display notification with option to continue working.*
- *Freeze measurement until recalibration.*

Set Alarm

The user can set an alarm in the **ORP Minimum and/or Maximum** value.
This option is indicated by the appearance of the icon on the display.
When the set threshold is exceeded, the instrument will signal the alarm to the user as follows:
- The measured ORP value turns red.
- Acoustic signal (*See* **Setup** *menu →* **Buzzer**).

Temperature Calibration

All instruments in these series are pre-calibrated for a correct temperature reading. If, however, a difference between the measured and actual temperature is evident, an offset adjustment of + 5°C can be made.
- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to correct the temperature offset value and confirm with *OK/SETUP*.

Restore Factory default

If the instrument is not working optimally or incorrect calibrations have been made, confirm '**Yes'** with *OK/SETUP* to reset all **ORP** parameters to default settings.

- ***Automatic ORP calibration***

Automatic calibration with 475 mV solution

- Press and hold the ***ESC/CAL*** button for 3 seconds to enter calibration mode.

- Rinse the electrode with distilled water and gently dab with paper towels.
- Press ***OK/SETUP*** and immerse the electrode in the 475 mV Redox buffer solution.
- When the stability icon appears, confirm by pressing ***OK/SETUP***.
- The actual measured value flashes on the display and then the calibration report appears.
- Press the ***OK/SETUP*** button to return to measurement mode. The 475 icon at the bottom left of the display indicates that the sensor has been calibrated using the 475 mV redox buffer solution.
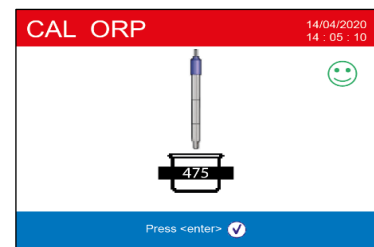
WARNING: Before proceeding with sensor calibration operations, carefully consult the safety data sheets of the substances involved:

- *Standard Redox solution.*
- *Redox electrode storage solution.*
- *Redox electrode filling solution.*

Having immediate access to and management of all information regarding calibration and sensor status allows the user to work while maintaining high quality standards.

IMPORTANT: The use of ORP XS Sensor electrodes is preferred and is the manufacturer's recommended solution for highly accurate analysis. The manufacturer can supply a wide range of sensors to cover different fields of application. For calibration with buffer chosen by the user:

- *Select **User** in ORP Buffer Selection Menu.*
- *In the calibration phase, adjust the value with the directional keys until the correct value is selected.*

13. Conductivity parameter

COND8 PRO, PC8 PRO, COND80 PRO, PC80 PRO

Connect the two-ring conductivity probe to the BNC type connector identified **Cond** while the temperature probe should be connected to the RCA/CINCH Temp/Cond connector. Series 80 PRO instruments can also handle the 4-ring conductivity probe. To use this sensor, connect the cell to the Multipin connector identified with symbol

. Conductivity is defined as the ability of ions in a solution to conduct an electric current. This parameter provides a quick and reliable indication of the amount of ions in a solution.

- ***...how do you get to conductivity?***

Ohm's first law of Ohm expresses the direct proportionality in a conductor between the current intensity (I) and the applied potential difference (V) while the resistance R represents the constant of proportionality. Specifically: *V= R x I*, resistance is accordingly *R = V / I*, where *R=resistance* (ohms) V=voltage (volts) *I=current* (amperes). The inverse of resistance is defined as conductance (G) *G = 1 / R* and is expressed in Siemens (*S*). The measurement of resistance or conductance requires a measuring cell, which consists of two poles of opposite charge. The reading depends on the geometry of the measuring cell, which is described by the cell constant parameter *C = d/A* expressed in cm^{-1} where *d* represents the distance between the two electrodes in cm and *A* their surface area in cm^2 . The conductance is converted into specific conductivity (*k*), which is independent of the cell configuration, by multiplying it by the cell constant. *k = G x C* is expressed in S/cm although the units mS/cm are in common use (1 S/cm -> 10^3 mS/cm) and μS/cm (1 S/cm -> 10^6 μS/cm).

- ### *Setup for the conductivity parameter*
- In measurement mode, press *OK/SETUP* to enter the SETUP menu.
- Scroll using the directional keys to the **Cond / TDS** menu COND and access by pressing *OK/SETUP*.
- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to select the programme you want to access.

The table below shows the structure of the setup menu for the COND / TDS parameter; for each programme, the options the user can choose and the default value are shown:

Programme	Description	Options	Factory Settings
COND	COND stadium *	2 Rings - 4 Rings	2 Rings
	Cell constant	2 Rings: 0.1 - 1 - 10	1
		4 Rings: 0.55 *	
	Calibration solution	Standard / User	Standard
	Last calibration data	View - Print	View
	Due Calibration	No - Hours - Days	No
	Reference temperature	15 ... 30 °C	25 °C
	Temp compensation factor	0.0...10.0 %/°C - Ultra-pure water*.	1.91 %/C°
	TDS measure unit	mg/l - g/l / ppm - ppt	mg/l - g/l
	TDS factor	0.40 ... 1.00	0.71
	Salinity measure unit	ppm - ppt / mg/l - g/l	ppm - ppt
	Temperature calibration	-	0.0 °C
	Restore Factory default	Yes - No	No

* Function available only for 80 PRO Series

COND stadium*

Use this menu to select the type of sensor you are using.
- **2 Rings**: Connect the sensor to the BNC and RCA connectors, then select the nominal cell constant in the next menu "*Cell constant*".
- **4 Rings**: Connect the sensor to the Multipin connector. The sensor cell constant is 0.55.

In measuring mode, the selected cell type is indicated on the display by the following symbols:

- **2 Rings:**

- **4 Rings**:

IMPORTANT: *It is recommended to use original XS Sensor. Please contact your local authorised dealer for information.*

Cell constant (*for 2-ring sensors*)

Choosing the right conductivity cell is a decisive factor in obtaining accurate and reproducible measurements.
One of the key parameters to consider is to use a sensor with the right cell constant in relation to the solution under analysis. The following table relates the cell constant of the sensor to the measuring range and the standard to which it is preferable to calibrate.

Sensor type	2 RINGS			
Cell constant	0.1	1		10
Standard (25°)	84 - 147 µS	1413 µS	12.88 mS	111.8 mS
Measuring range	0 - 500 µS	500 - 5000µS	5 - 50 mS	50 - f.s. mS
Display symbol	84.0 - 147	1413	12.88	111.8

Access this setup menu to select the cell constant for the sensor you are using

- **0.1**
- **1** -default-
- **10**

The cell constant in use appears in the lower left-hand display. For each of the 3 selectable cell constants, the instrument stores the calibrated points. Selecting the cell constant then automatically recalls the previously performed calibration points. Exclusively for the 80 PRO Series it is possible to work with the 4-ring conductivity probe. This probe has a fixed nominal constant 0.55 over the entire measuring range.

Sensor type	4 RINGS			
Cell constant	0.55			
Standard (25°)	84 - 147 µS	1413 µS	12.88 mS	111.8 mS
Measuring range	0 - 500 µS	500 - 5000µS	5 - 50 mS	50 - f.s. mS
Display symbol	84.0 - 147	1413	12.88	111.8

Calibration solutions

Access this setup menu to select automatic or manual recognition of calibration standards.

- **Standard**: -default- the device automatically recognises a maximum of 4 of the following standards:
  84.0 µS/cm, **147** µS/cm, **1413** µS/cm, **12.88** mS/cm and **111.8** mS/cm.
- **User**: the device can be calibrated to a point with a manually entered value.

Note: *For accurate results, it is advisable to calibrate the device with buffers whose value is close to the theoretical value of the solution to be analysed.*

Last calibration data

Access this menu to obtain information on the last calibration performed.

- Select **View by** pressing *OK/SETUP* to display the calibration report.
- Connect the printer to the RS232 port and select **Print** to print the calibration report.

Due Calibration

Access this menu to set a calibration deadline; this option is essential in GLP protocols.

No calibration deadline is set by default; use the directional keys to choose the days or hours that must elapse

between two calibrations and confirm with ***OK/SETUP***. The icon appears on the display with a time indication of the time remaining until the calibration deadline.

IMPORTANT: *In the* **Setup** *menu →* **Calibration deadline mode,** *the user can decide whether the calibration has expired:*

- *Display notification with option to continue working.*
- *Freeze measurement until recalibration.*

Temperature compensation in conductivity measurement is not to be confused with pH compensation.

- **In a conductivity measurement, the value shown on the display is the calculated conductivity at the reference temperature. Thus, the temperature effect on the sample is corrected.**
- **In pH measurement, on the other hand, the pH value at the displayed temperature is shown on the display. Here, temperature compensation involves adjusting the slope and offset of the electrode to the measured temperature.**

Reference temperature

The measurement of conductivity is highly dependent on temperature.

If the temperature of a sample increases, its viscosity decreases, resulting in an increase in ion mobility and measured conductivity, although the concentration remains constant.

For each conductivity measurement, the temperature to which it refers must be specified, otherwise it is a worthless result. Generally, 25 °C is referred to as the temperature or, more rarely, 20 °C.

This device measures conductivity at actual temperature (ATC or MTC) and then converts it to the reference temperature using the correction algorithm chosen in the programme:

Compensation factor Temp.

- Access this setup menu to set the temperature to which you want to refer the conductivity measurement.
- The device is capable of reporting conductivity from **15 to 30** °C. The factory setting is **25 °C**, which is fine for most analyses.

Temp compensation factor

It is important to know the temperature dependence (% change in conductivity per °C) of the sample being measured. Different compensation methods can be used to simplify the complex relationship between conductivity, temperature and ion concentration.

- **Linear coefficient 0.00...10.0 %/°C** -default 1.91 %/°C - For compensation of medium and high conductivity solutions, linear compensation can be used. The default value is acceptable for most routine measurements.

Compensation coefficients for special solutions and groups of substances are given in the following table.

Solution	(%/°C)	Solution	(%/°C)
NaCl Saline solution	2.12	1.5% Hydrofluoric acid	7.20
5% NaOH Solution	1.72	Acids	0.9 - 1.60
Diluted ammonia solution	1.88	Bases	1.7 - 2.2
10% Hydrochloric acid solution	1.32	Salts	2.2 - 3.0
5% Sulphuric acid solution	0.96	Drinking water	2.0

Compensation coefficients for calibration standards at different temperatures for T_{ref} 25°C are shown in the following table:

°C	0.001 mol/L KCl (147µS)	0.01 mol/L KCl (1413 µS)	0.1 mol/L KCl (12.88 mS)
0	1.81	1.81	1.78
15	1.92	1.91	1.88
35	2.04	2.02	2.03
45	2.08	2.06	2.02
100	2.27	2.22	2.14

The following formula is used to determine the calibration coefficient of a particular solution:

$$tc = 100x \frac{C_{T2} - C_{T1}}{C_{T1}(T_2 - 25) - C_{T2}(T_1 - 25)}$$

Where *tc* is the temperature coefficient to be calculated, C_{T1} and C_{T2} are the conductivity at temperature 1 *(T1)* and temperature 2 *(T2)*.

Every "corrected" temperature result is plagued by an error caused by the temperature coefficient. The better the temperature correction, the smaller the error. The only way to eliminate this error is not to use the correction factor, acting directly on the sample temperature.

Select 0.00%/°C as temperature coefficient to deactivate compensation. The displayed conductivity value refers to the temperature value measured by the probe and not to a reference temperature.

- **Ultra-pure water***: Select this option when working with conductivities **LESS than 10 µS/cm**.

The NON LINEARITY icon ⌐ on the display in the top left informs the user that this compensation mode is active.
IMPORTANT: When this threshold is exceeded, this option is automatically disabled and linear compensation is activated.

* Function available only for 80 PRO series.

The temperature coefficient in ultrapure water varies strongly. The main reason for this is that the self-ionisation of water molecules is more temperature-dependent than the conductivity caused by other ions.

***Note**: Low conductivity measurements (<10 µS/cm) are strongly influenced by atmospheric carbon dioxide. In order to obtain reliable results, it is important to prevent contact between the sample and air and this can be achieved by using a flow cell or chemically inert gases such as nitrogen or helium that isolate the sample surface.*

TDS measure unit
Access this menu to select which unit of measurement to use for the TDS parameter:
- **mg/l - g/l**   (default)
- **ppm - ppt**

TDS factor
Access this setup menu to set the conversion factor from conductivity to TDS.
- **0.4...1.00** -default 0.71-
See section: **Other measurements made with the conductivity cell .**

Salinity measure unit
Access this menu to select which unit of measurement to use for the Salinity parameter:
- **ppm - ppt**   (default)
- **mg/l - g/l**

Temperature Calibration

All instruments in these series are pre-calibrated for a correct temperature reading. If, however, a difference between the measured and actual temperature is evident, an offset adjustment of $\pm$ 5°C can be made.

- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to correct the temperature offset value and confirm with *OK/SETUP*.

Restore Factory default

If the instrument is not working optimally or incorrect calibrations have been performed, confirm "Y**es**" with *OK/SETUP* to reset all **Cond / TDS** parameters to default settings.

• *Automatic conductivity calibration*

Example of a one-point calibration (1413 µS/cm) using a 2-ring sensor with cell constant 1 or a 4-ring sensor (select sensor type in advance).

- In **Cond** measurement mode, press and hold the *ESC/CAL* button for 3 seconds to enter calibration mode.
- *In multi-parameters, conductivity calibration can also be accessed from the simultaneous measurement screen and then selecting* **Cond**.

- Rinse the cell with distilled water and gently dab with absorbent towels. Start with a few mL of standard solution.
- Press *OK/SETUP* and immerse the sensor in the 1413 µS/cm buffer, keeping it slightly stirred and ensuring that no air bubbles are present in the cell. All conductivity values that the instrument is able to recognise flow through the beaker.
- When the beaker stabilises on the value 1413 and the icon ☺ appears, confirm by pressing *OK/SETUP*.
- The display flashes the actual measured value; then the calibration report showing the cell constant for each scale is shown, and finally the instrument automatically returns to measurement mode. The beaker icon for the calibrated point appears in the lower left-hand corner of the display.
- *One-point calibration is sufficient if measurements are made within the measuring range. For example, the standard solution 1413 µS/cm is suitable for measurements between approximately 200 - 2000 µS/cm.*
- To calibrate the instrument over several points, repeat all calibration steps once you have returned to measurement. The beaker for the newly calibrated point will be placed next to the previous one. It is advisable to start calibration with the least concentrated standard solution and then continue in order of increasing concentration.
- When re-calibrating a previously calibrated point, it is overwritten over the previous one and the cell constant is updated.
- For each cell constant, the instrument stores the calibration, so that the user using several sensors with different constants does not have to re-calibrate each time. The instrument recalls the last calibration with respect to the type of sensor (2 / 4 rings), the cell constant (0.1 / 1 / 10) and the type of buffer solution used (standard / user).

IMPORTANT: *Standard conductivity solutions are more vulnerable to contamination, dilution and the direct influence of CO_2 than pH buffers, which tend to be more resistant due to their buffering capacity. Furthermore, a slight change in temperature, if not adequately compensated for, can have a significant effect on accuracy. Special care must therefore be taken in the calibration process of the conductivity cell in order to obtain accurate measurements.*
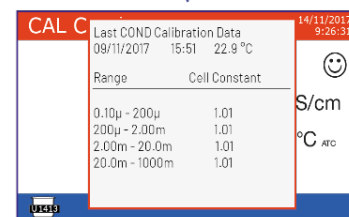
IMPORTANT: *Always rinse the cell with distilled water before calibration and when switching from one standard solution to another to avoid contamination. Replace standard solutions frequently, especially those with low conductivity. Contaminated or expired solutions can affect measurement accuracy and precision.*
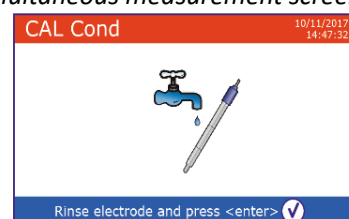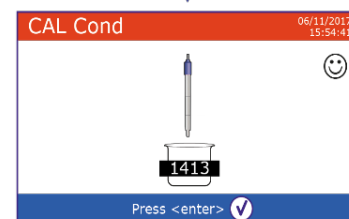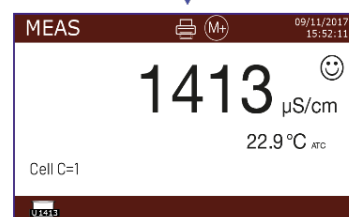
UM Series 880 PRO EN rev. 1 03.01.2023

CAUTION: Before proceeding with calibration operations, carefully consult the safety data sheets of the substances involved:

- *Calibration buffer solutions.*

Careful reading of the safety data sheets of the solutions used will help eliminate residual risks associated with skin contact, ingestion, inhalation or eye contact with them, which can generate possible but not probable minor damage. Contact your local distributor for more information.

• *Calibration with manual value*

Example calibration at 5.00 µS/cm using a 2-ring sensor with cell constant 0.1 or a 4-ring sensor (select sensor type in advance).

- Enter the Setup menu for **Cond/TDS** COND and select in the **Calibration Solutions** menu → **User** press *ESC/CAL* to return to measurement and position in Cond mode.
- Press and hold the *ESC/CAL* button for 3 seconds to enter calibration mode.
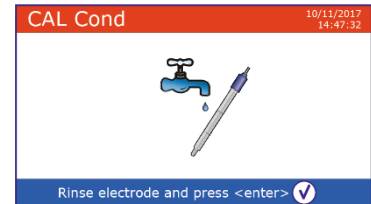
- Rinse the cell with distilled water and gently dab with absorbent towels. Start with a few mL of standard solution, press *OK/SETUP* and immerse the sensor in the 5.00 µS/cm conductivity standard.
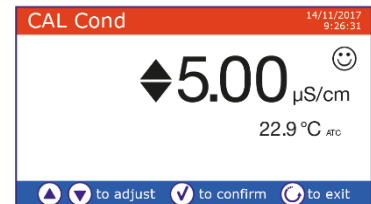
- Wait until the conductivity value on the display stabilises, when the icon ☺ appears, use the *UP ARROW/Print* and *DOWN ARROW/RM* buttons to adjust the value by entering that of the standard solution (e.g. 5.00 µS/cm).

- When the icon ☺ reappears, confirm the calibration point by pressing *OK/SETUP*.

- The calibration report appears automatically on the display; press the *OK/SETUP* button to return to measurement mode.
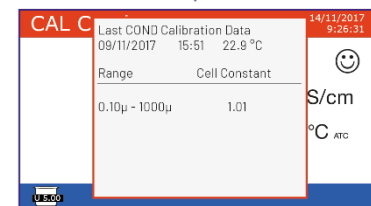
- In the bottom left-hand corner, the beaker icon is displayed for the calibration U5.00 . The value is preceded by the letter 'U' indicating that the value **was entered manually**.

- For each cell constant, the instrument stores the calibration, so that the user using several sensors with different constants does not have to re-calibrate each time. The instrument recalls the last calibration with respect to the type of sensor (2 / 4 rings), the cell constant (0.1 / 1 / 10) and the type of buffer solution used (standard / user)
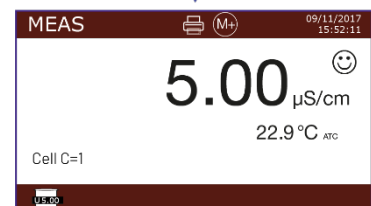
*Note: If you do not know the exact compensation coefficient, in order to obtain an accurate calibration and measurement, set the **Temp Compensation Factor → 0.00 %/°C** and then work by bringing the solutions to exactly the reference temperature. Another method of working without temperature compensation is to use the temperature tables on most conductivity solutions.*

IMPORTANT: Always rinse the cell with distilled water before calibration and when switching from one standard solution to another to avoid contamination. Replace standard solutions frequently, especially those with low conductivity. Contaminated or expired solutions can affect the accuracy and precision of the measurement.

• *Take a conductivity measurement*

- Access the Conductivity Setup menu COND to check the calibration and to verify and, if necessary, update the reading parameters (see section "**Cond/TDS Setup**'", press *ESC/CAL* to return to measurement mode.
- Press *MODE* to scroll through the different parameter screens until you reach *Cond* (see section "**Operation of the device**").

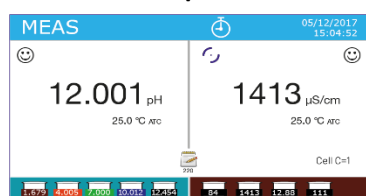Conductivity measurement can be had in two different screens:

COND 8 PRO / PC 8 PRO / COND 80 PRO / PC 80 PRO

Digital Traditional
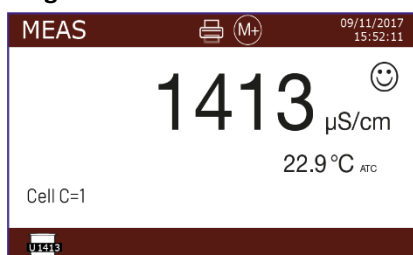
PC 8 PRO / PC 80 PRO
Simultaneous pH/Cond

COND 80 PRO / PC 80 PRO
Multiview

- **2-Ring Sensor**: Connect the conductivity cell to the BNC for Cond of the instrument and the temperature sensor to the RCA-Cinch.
- If the user does not use an electrode with a built-in temperature probe or an external NTC 30KΩ probe, it is advisable to update the temperature value (MTC) manually.
- **4-ring sensor**: Connect the conductivity cell to the Multipin connector.
- Remove the cell from its tube, rinse with distilled water, gently dab **taking care not to scratch the electrodes.**
- Immerse the sensor in the sample: the measuring cell and any vent holes must be completely submerged.
- Keep in slight agitation and remove any air bubbles, which would distort the measurement, by gently shaking the sensor.
- Only consider the measurement to be true when the stability icon appears ☺. To eliminate any errors due to user interpretation, you can use the **HOLD** function (*See* **Setup - > Readout with HOLD**) which allows you to stop the measurement as soon as it reaches stability.
- The instrument uses six different measurement scales and two measurement units (µS/cm and mS/cm), depending on the value. **Switching is performed automatically by the device in relation to the measurement**.
- After measurement, wash the cell with distilled water.
- The conductivity sensor does not require much maintenance. The main thing is to ensure that the cell is clean. The sensor should be rinsed with plenty of distilled water after each analysis; if it has been used with water-insoluble samples, clean it by soaking it in ethanol or acetone before doing so. Never clean it mechanically, this would damage the electrodes and impair their functionality. For short periods store the cell in distilled water, for longer periods store it dry.

Having immediate access to and management of all information regarding calibration and cell status allows the user to work while maintaining high quality standards.

IMPORTANT: The use of XS Sensor measuring cells is preferred and is the manufacturer's recommended solution for highly accurate analysis. The manufacturer has the possibility of supplying sensors with constant 0.1 / 1 / 10 so that they can be used in various fields of application (pharmaceutical, environmental, industrial, galvanic etc.).
For the 80 PRO Series, the manufacturer also offers the XS Sensor 4-ring cell, which allows a single sensor to cover the entire instrumental measuring range.

14. **Other measurements made with the conductivity cell**

Conductivity measurement can be converted into the parameters **TDS, Salinity and Resistivity**.

- In measurement mode, press the *MODE* button to scroll through the various parameters **TDS -> Salinity -> Resistivity**.
- These parameters use the conductivity calibration; pressing *ESC/CAL* will then take you directly to the conductivity calibration.

- *TDS*

COND 8 PRO, COND 80 PRO, PC 8 PRO, PC 80 PRO

Total Dissolved Solids (TDS) is the total weight of solids (cations, anions and non-dissociated substances) in one litre of water. Traditionally, TDS are determined by gravimetric method, but a simpler and faster method is to measure conductivity and convert it to TDS by multiplying it by the TDS conversion factor.

TDS factor

Access this setup menu to select the conductivity/ TDS conversion factor:

- **0.04 ... 1.00** - default 0.71 -

The table shows the TDS factors in relation to the conductivity value.

Conductivity of solution	TDS factor
1-100 µS/cm	0.60
100 - 1000 µS/cm	0.71
1 - 10 mS/cm	0.81
10 - 200 mS/cm	0.94

TDS unit of measurement

Access this setup menu to select the unit of measurement to be used in the display of the TDS parameter

- **mg/L - g/L** - default
- **ppm - ppt**

Note: As with conductivity, the scaling of the TDS parameter is automatic based on the measured value.

- *Salinity*

COND 8 PRO, COND 80 PRO, PC 8 PRO, PC 80 PRO

Usually the UNESCO 1978 definition is used for this parameter, which provides the use of psu (Practical Salinity Units) as unit of measurement corresponding to the ratio between the conductivity of a sample of sea water and that of a standard KCl solution maked by 32,4356 grams of salt dissolved in 1 kg of solution at 15 °C. Relationships are dimensionless and 35 psu are equivalent to 35 grams of salt per kilogram of solution. Approximately 1 psu is equivalent to 1g / L and considering the density of water is equivalent to 1 ppt. The UNESCO 1966b definition can also be used which provides that the salinity in ppt is expressed with the following formula:

S_{ppt}=**-0.08996+28.2929729R+12.80832R^2-10.67869R^3+5.98624R^4-1.32311R^5**

Where R= Cond value (at 15°) / 42.914 mS/cm (Conductivity of Copenhagen Seawater Standard).

*Note: If you want to perform a Salinity measurement in low conductivity solutions, it is advisable to deactivate the **Ultrapure Water**. See menu **Temp. compensation factor**→ **Ultrapure water.***

Unit of measurement Salinity

Access this setup menu to select the unit of measurement to be used in the display of the TDS parameter

- **ppm - ppt** - default
- **mg/L - g/L**

Note: As with conductivity, the scaling of the Salinity parameter is automatic according to the measured value.

- ***Resistivity***

COND 80 PRO, PC 80 PRO

For low conductivity measurements, such as ultrapure water or organic solvents, resistivity is preferred. Resistivity is the reciprocal of conductivity $\rho = 1/\kappa$ (MΩ*cm).

Note: *As with conductivity, the scaling of the Resistivity parameter is automatic according to the measured value.*

15.Multi-parameter visualisation

PH 80 PRO, COND 80 PRO, PC 80 PRO

Exclusively for Series 80 PRO instruments, up to 6 parameters can be shown simultaneously on the display at the user's discretion.

- In measurement mode, press ***OK/SETUP*** to enter the SETUP menu.

- Scroll using the arrow buttons to the **Multiview** menu and access by pressing ***OK/SETUP***.
- The display shows the list of all parameters managed by the instrument. Scroll with the arrow keys and with ***OK/SETUP*** activate the flag next to those you wish to display in the MULTIVIEW screen*.*
- Press ***ESC/CAL*** to confirm and return to measurement mode.

Use ***MODE to*** move to the MULTIVIEW screen.

		MultiView	🖨 🕒 ⌨	16/05/2022 14:18
🟩	pH	7,000	pH	25,0 °C
🟩	mV	0,0	mV	25,0 °C
🟦	ISE	0.00	mV	25,0 °C
🟫	Cond	12.880	µS/cm	25,0 °C
🟫	TDS	0.00	mg/l	25,0 °C
🟫	SAL	0.00	ppm	25,0 °C

For each selected parameter, its relative temperature is also displayed.

IMPORTANT*: To improve readability, there is no "smile" icon; to indicate to the user that the measurement has reached stability, the colour of the display value changes from black to grey.*

Note: *The user can select up to 6 parameters. If an additional parameter is selected, the error message "Too many parameters selected" appears.*

16.Data Logger Functions

These series of devices have the possibility of recording values on an internal memory or PC or printing them directly in various formats using the external printer. Recordings can be acquired manually or at preset frequencies. For Series 80 PRO devices, automatic data logger start-ups are also possible not only by pressing the ***UP/DOWN ARROW/Print*** button, but also when a threshold value or delta value is reached on the measurement. For the same devices, it is also possible to create and subsequently print on paper or export up to 4 customised print templates. From the **Analysis menu** (*see section* **Analysis Menu**) it is possible to edit the different identifiers.

To print: purchase the printer separately, connect it with RS232 cable to the identified "Printer" connector on the rear panel of the instrument, connect the power supply to the mains and switch it on by pressing the **I / O** switch. For further information, please refer to the printer's technical manual. Only use the printer specified by the manufacturer. Contact your local distributor for purchase or further information. The original printer already comes with a roll of normal paper, power supply and RS232 cable for connection to the instrument.

PC connection: connect the USB type B cable inside each package to the USB port marked 'PC' on the rear panel of the instrument and the other end to a COM port on your computer. Use only the USB cable supplied with each instrument.

- ## *Setup for the Data Logger parameter*

- In measurement mode, press *OK/SETUP* to enter the SETUP menu.

- Scroll using the directional keys to the **Data Logger** menu LOG and access by pressing *OK/SETUP*.

- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to select the programme you want to access.

The table below shows the structure of the setup menu for the Data Logger parameter; for each programme, the options the user can choose and the default value are shown:

Programme	Description	Options	Factory Settings
LOG	Send data to	Memory - Print - PC	Memory
	Data logging type	Manual - Auto with button - Auto Min/Max* - Auto Delta*	Manual
	Log Setting	*Settings for data loggers with automatic logging*	-
	Print Format	Simple - Complete - Template* No. 1 / 2 / 3 / 4	-
	Template*	Insert - View - Delete	-
	Delete data memory	Yes - No	No

* Function available only for Series 80 PRO

Send data to
Access this menu to select the destination for saving recorded values:

- **Memory** ⬚ - default setting **-** Recorded data are saved in the device's internal memory. Series 80 PRO instruments can store up to 8000 values; Series 8 PRO instruments up to 1000. The progressive registration number appears next to the icon 📝 .

- **Print** 🖨 - Data is printed directly to an external printer connected via the RS232 port (*see* **Connections Inputs / Outputs**). Access the **Print Format** menu to select which information is to be printed in the header.

- **PC** ⬦ - Recorded data are sent directly to the PC via USB connection and processed
via the DataLink+ software (*see* **DataLink+ Software** *section*).

Data logging type
Access this menu to select the start-up and data acquisition mode.

- **Manual** (M+) : The data is only acquired or printed when the user in measurement mode presses the *UP ARROW/Print* button.

- **Auto with button** ⏱ **:** Data acquisition or printing starts when the user in measurement mode presses the *UP/DOWN ARROW/Print* button and then continues automatically through the set interval. To set the acquisition frequency, access the **Log Setup** menu after selecting this mode.
*IMPORTANT: Unlike start modes with threshold value or delta value, using this mode the start of acquisition or printing is **immediate**.*

- **Auto Min/Max*** ⌄⌃ : In measurement mode, press the *UP ARROW/Print* button to start this type of storage start. The actual data acquisition or printout starts when the measured value reaches the threshold pre-set by the user and then continues automatically through the set interval. To set the acquisition frequency, threshold value and parameter of interest, access the **Log Setup** menu after selecting this mode.
*IMPORTANT: After starting this save mode, **until the measured value reaches the pre-set threshold** the icon flashes (data logger is active) but data will not be acquired or printed.*

- **Auto Delta*** ◁ : In measurement mode, press the *UP ARROW/Print* button to start this type of storage start. Actual data acquisition or printing starts when the measured value reaches a certain difference (delta) from when the recording was started (zero point) and then continues automatically through the set interval.

In addition to the automatic interval, the values corresponding to each delta are also acquired. To set the acquisition frequency, delta value and parameter of interest, access the **Log Setup** menu after selecting this mode.
IMPORTANT: After starting this save mode, until the **measured value reaches the pre-set difference between the delta and the initial value,** *the icon flashes (data logger is active) but data will not be acquired or printed.*
* Options available only for 80 PRO Series

Log Setting
If an **Automatic** type data logger was selected in the previous menu, access this menu to set the acquisition settings. If **Auto with button** was selected*:*
- **Time Between Samples** - HH:MM:SS - Using the arrow buttons and scrolling with *OK/SETUP* select the interval for automatic acquisition between values.

If **Auto Min/Max*** was selected*:*
- **Time Between Samples** - HH:MM:SS - Using the arrow buttons and scrolling with *OK/SETUP* select the interval for automatic acquisition between values.
- **Logged parameter**: Access this menu to select for which parameter data logging will take place with start when a minimum or maximum threshold is reached.
  Example: If the pH parameter is selected and the minimum and maximum thresholds are set for pH, this type of datalogger will only work in measurement mode if the user is in pH measurement.
- **Minimum value**: Access this menu to select the minimum threshold value at which data recording starts.
- **Maximum value**: Access this menu to select the maximum threshold value at which data recording starts.

IMPORTANT: *When starting the logger make sure that the parameter in measurement mode and the parameter selected in the* **logged parameter** *setup are the same. Otherwise, when starting registration, an error message will inform the user to update the parameters.*
If **Auto Delta*** was selected*:*
- **Time Between Samples** - HH:MM:SS - Using the arrow buttons and scrolling with *OK/SETUP* select the interval for automatic acquisition between values.
- **Logged parameter**: Access this menu to select for which parameter data logging will take place with start when a difference from zero is reached.
  Example: If the pH parameter is selected and the delta value for pH is set to start recording, in measurement mode this type of datalogger will only work if the user is in pH measurement.
- **Delta value**: Access this menu to select the delta value at which data recording starts. The delta is calculated with respect to an initial value -zero value-. This is the value of when the *UP ARROW/Print* button is pressed in measure to start this saving mode.

IMPORTANT: *When starting the logger make sure that the parameter in measurement mode and the parameter selected in the* **logged parameter** *setup are the same. Otherwise, when starting registration, an error message will inform the user to update the parameters.*
* Options available only for 80 PRO Series

Print format
Access this menu to select <u>which </u>information is to be printed in the header of a data logger executed on a printer.
- **Simple:** save sequence number / date and time / value, UM and temperature.
- **Complete:** instrument model / last cal report / progressive number saved / date and time
- **Template* 1 / 2 / 3 / 4:** Up to 4 customised print templates (*templates*) can be created in the 80 PRO Series devices.
* Options available only for 80 PRO Series

Template*
Access this menu to manage customised print templates.
- **Insert Template:** Access this menu to create a customised print template. Using the external keyboard, enter the name of the Template; then move with the directional keys and confirm with *OK/SETUP to* choose which information you want to appear in the print header. Press *ESC/CAL* to save the template.
IMPORTANT: *In menus where manual compilation is required (e.g.: Sample ID, Production Lot, etc.) IDs are automatically imported from the Setup Analysis Menu.*
- **See Template List:** Access this menu to manage the templates already created.

By selecting a template with the arrow buttons and *OK/SETUP* you can **VIEW**, **EDIT** or **DELETE** it.

- **Delete all templates:** Access this menu, then confirm with *OK/SETUP* to delete all templates created.

* Options available only for 80 PRO Series

Delete data in memory
Go to this menu and select **Yes** to delete all data saved in the internal memory.
Note: Stored data are retained even if there is an accidental power failure.

• *Example 1: Data Logger mode automatic on internal memory*

Example automatic pH recording to internal memory every 2 minutes.

- Access the **Data Logger** setup menu LOG .
- In the **Send Data in** menu, select **Memory.**
- In the **Recording Type** menu select **Auto with Key.**
- In the **Log Setup** menu, using the *OK/SETUP* button and the arrow keys to scroll through the values, enter **00:02:00.**
- Press *ESC/CAL* to return to measurement mode and go to the **pH** measurement screen. In the upper band of the display are the icons 🔲-saving to internal memory- and ⏱ - automatic saving at a preset frequency with start-up at the press of a button-.
- Press the *UP ARROW/Print* button to start recording. The icon ⏱ starts flashing, indicating that storage is in progress. The number next to the icon 📝 indicates how much data has been saved.
- Press *UP ARROW/Print* again to end the recording.

Note: Automatic recording is suspended when changing measurement parameters or entering the setup menu. Recording and printing in the Simultaneous pH/Cond and Multiview screens takes place for all parameters.

• *Example 2: Data Logger mode manual and Template creation*

Example of manual printing of a conductivity value by creating a customised header.

- Access the **Analysis** 🟰 setup menu and enter the desired identifiers.
- Access the **Data Logger** setup menu LOG .
- In the **Send Data in** menu, select **Print.**
- In the **Recording Type** menu, select **Manual.**
- In the menu **Template → Insert Template** create your customised print template.
- In the **Print Format** menu, select the Template just created in the previous setup.
- Press *ESC/CAL* to return to measurement mode and go to the **Cond** measurement screen. In the upper band of the display are the icons 🖨-print – and ⓜ₊ -manual save.
- Connect the printer to the RS232 port of the device.
- When you want to print the value, press the *UP ARROW/Print* button.

All the information of the customised Template will be given before the data.
Note: The customised template or standard header is reprinted in the following cases:
- *Device restart*
- *Change print format*
- *Change Logging Type / Log Setting*
- *New calibration*

• *Example 3: Automatic datalogger mode with start at threshold value*

Example Automatic recording of ORP value to internal memory every 30 seconds, but starting when a minimum or maximum threshold value is reached.

- Access the **Data Logger** setup menu LOG .
- In the **Send Data in** menu, select **Memory.**
- In the **Recording Type** menu, select **Auto Min/Max.**
- In the **Setup** menu **Log → Time Between Samples** enter **00:00:30.**

- In the **Setup** menu Log → **Logged parameter** enter **ORP.**
- In the **Log Setup** menu → **Minimum** and **maximum value** enter the mV values at which you want to start logging (***example:*** *minimum 300 mV maximum 700 mV*).
- Press ***ESC/CAL*** to return to measurement mode and go to the **ORP** measurement screen**.** In the upper band of the display are the icons ⬚ -saving to internal memory – and ⏱ - automatic saving at a preset frequency with start when a threshold value is reached.
- Press the ***UP ARROW/Print*** button to start recording. The icon ⏱ starts flashing, indicating that the datalogger is running.

Example: The initial value is 400 mV, the icon flashes but data is not acquired.
The value drops to 280 mV, the instrument starts taking measurements every 30 seconds.
Example 2: The initial value is 725 mV. The instrument immediately starts taking measurements every 30 seconds.
- Press ***UP ARROW/Print*** again to end the recording.

• *Recall of data saved on the instrumental memory*
- In measurement mode in the parameter of interest, press the ***DOWN ARROW/RM*** button to show the stored data for that specific parameter on the display.
- Using the directional keys, scroll through the various pages of data.
- Press ***ESC/CAL*** to return to reading mode.

Note: The first value in a series always has the sequence number "1" and is identified by an orange icon.
In the data recall in the 80 PRO Series, the sample identifier can be displayed. ⓘ

17.Analysis menu

PH 80 PRO, COND 80 PRO, PC 80 PRO
To ensure total customisation of the analysis and guarantee complete traceability of the analytical data, the 80 PRO Series instruments are equipped with this innovative setup menu that allows different identifiers to be entered via an external keyboard. In order to obtain the correct flow of information within the analysis laboratory, identifiers in the form of customised templates can be printed (*see section* **Print Format**) or exported to a PC.

• *Setup for the Analysis parameter*
- Connect the original external keyboard to the USB Type A connector on the back of the instrument (*see* **Inputs/Outputs Connections** *section*).
- In measurement mode, press ***OK/SETUP*** to enter the **SETUP** menu.
- Scroll using the arrow buttons to the **Analysis** menu ▤ and access by pressing ***OK/SETUP***.
- Move with the ***UP ARROW/PRINT*** and ***DOWN ARROW/RM*** buttons and select the identifier you want to change.
- Edit the selected identifier and confirm with **OK/SETUP.**

The table below shows the structure of the setup menu for the Analysis parameter:

Programme	Description	Options		Programme	Description	Options
	Sample ID	-			Cond Sensor ID	-
	Lot Production	-			Lot sensor COND	-
	Method	-			Buffer 1 - Lot	-
	Company name	-			Buffer 1 - Expiry	-
	User ID	-			Buffer 2 - Lot	-
	PM Name	-			Buffer 2 - Expiry	-
	Laboratory	-			Buffer 3 - Lot	-
	Environmental Conditions	-			Buffer 3 - Expiry	-
	Sample Condition	-			Buffer 4 - Lot	-
	pH Sensor ID	-			Buffer 4 - Expiry	-
	Lot pH Sensor	-			Buffer 5 - Lot	-
	ION Sensor ID	-			Buffer 5 - Expiry	-
	Lot ISE sensor	-			Notes	-
	ORP Sensor ID	-			Restore Factory default	Yes - No
	Lot ORP Sensor	-				

Note: Entering identifiers allows you to create customised print templates.
Sensor IDs are linked to the instrument type (example: in pH 80 PRO there is NO ID and Lot for Cond sensor).

Return to factory settings
Access this setup menu to delete all edited fields.

18. Configuration Menu

- In measurement mode, press *OK/SETUP* to enter the **SETUP** menu.
- Scroll using the arrow buttons to the **Setup** menu [⚙] and access it by pressing *OK/SETUP*.
- Use the *UP ARROW/PRINT* and *DOWN ARROW/RM* buttons to select the programme you wish to access.

The table below shows the structure of the setup menu; for each programme, the options the user can choose and the default value are shown.

Programme	Description	Options	Factory Settings
	Select parameters	All parameters	View
	Display information*	Simple - Complete	Simple
	Password *(8 PRO series)*	8 numeric characters	-
	Reading with HOLD	No - Yes	No
	Date format	dd/mm/yyyy - mm/dd/yyyy - yyyy/mm/dd	dd/mm/yyyyy
	Date setting	-	-
	Time Format	0 ... 24 - 0 ... 12 AM/PM	0 ... 24
	Time setting	-	-
	Temperature unit option	°C - °F	°C
	Select language	Eng - Ita - Deu - Esp - Fra - Por	English
	Buzzer Mode	ON – only Alarm - OFF	ON
	Due calibration Mode	Lock measure - Only Advice	Block size
	Restore Factory default	No - Yes	No

*Functions available only for 80 PRO Series

Select parameters
Access this setup menu to select which parameters to enable and disable in read mode. By default, all are enabled.
Use the directional keys to move between the different parameters and press *OK/SETUP to* insert or remove the flag respectively if you want to keep the parameter read or disable it.

Display information *
Access this setup to select how much information is shown on the display in measurement mode.
- **Simple** -default- The display only shows the measured value, unit of measurement, temperature, stability icon and cell constant.
- **Complete** In addition to the default information, the display in reading mode also shows icons with **user ID** 👤 ,

  sample ID 🧪 (*identifiers entered from* **Analysis Menu**) and for pH the sensor status.

*Functions available only for 80 PRO Series

Password *(setup menu only active in Series 8 PRO instruments)*
Access this menu to activate or deactivate the password function If enabled, in the 8 PRO Series the password is requested:
- To start calibration.
- To delete data stored in data logger mode.
- To change the date and time of the instrument.
- To change the calibration deadline.
- To change the "*Calibration Deadline Mode"* setup menu.
- To perform a factory reset.

The password consists of 8 digits to be entered with the arrow keys and confirmed with **OK/SETUP**
To disable the password enter '0 0 0 0 0'.

Reading with HOLD
Access this setup menu to activate or deactivate the HOLD stability criterion.
- **No** -default- The measure is not fixed.
- **Yes:** With this option active, the measurement is stopped as soon as it reaches stability.

The locked value is indicated with the icon **HOLD**. To unlock and restart the measurement until the next stability press **ESC/CAL**.
***Note**: Once the HOLD function is activated, it is active for all parameters being measured.*
ⓘ

Date format
Access this setup menu to change the date format.
- **dd/mm/yyyyy** -default-
- **mm/dd/yyyyy**
- **yyyyy/mm/dd**

Date Setting
Access these setup menus to update device date.

Time Format
Access this setup menu to change the time format of the device.
- **0 ... 24 -** default -
- **0 ... 12 AM/PM**

Time Setting
Access these setup menus to update device time.

Temperature unit option
Access this setup menu to select which temperature unit to use.
- **°C** -default-
- **°F**

Select language

Access this setup menu to select the device language.

- English -default-   - Espanol
- Italiano   - Francais
- Deutsch   - Portoguese

Buzzer Mode

Access this setup menu to manage the instrument beeper.

- **OFF**
- **Only Alarm**
- **ON** - default-

Due calibration mode

Access this setup menu to manage what happens in the measurement when the calibration expires (*see section* **Calibration Expiry** *of Various Parameters*).

- **Lock measure**: with this option activated, when the calibration expires the measurement is replaced by a series of dashes so that analysis cannot continue until a new calibration is performed.
- **Only Advice**: With this option activated when calibration expires, the user can continue working. An icon next to the measurement indicates that the calibration has expired.

Restore Factory default

Enter this setup menu and confirm with **Yes** to reset all settings to default values.

19. Advanced User Management

PH 80 PRO, COND 80 PRO, PC 80 PRO

On the 80 PRO Series instruments, it is possible to optionally manage access. In this mode, you need to enter your personal password linked to your user via the external keyboard to access the instrument's functions.

The tool can manage 3 different access levels divided among 15 users (at least always an initial **Admin**).
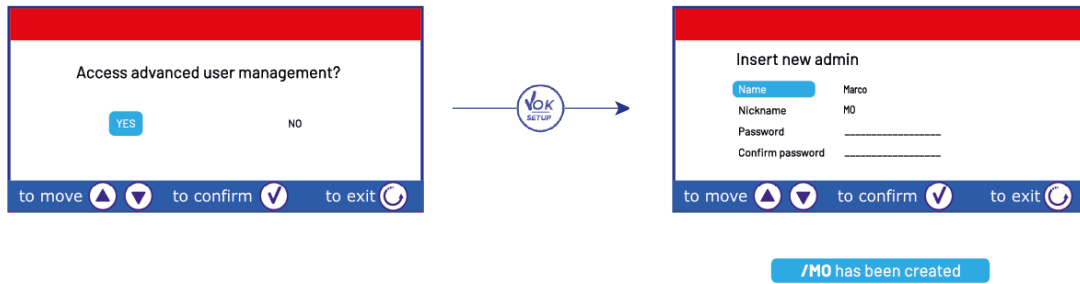
- **Admin**

- **Responsible**

- **User**

There is also a fourth level called **Guest, which can** only display measurements that can be accessed freely without a password.

• *First Start-up Advanced User Management*

From measurement mode, press the button and enter the admin profile.

The administrator has all functionalities of the tool active and can create, edit or delete other profiles.

- **Name**: Enter the name of the administrator.
- **Nickname**: Enter initials or an identifier of up to 4 characters. The nickname of the active user will be shown on the display during measurement together with the level symbol.
- **Password** and Confirm Password: Enter and confirm the password associated with the profile.
  The password must be between 6 and 10 characters long and contain a symbol, a capital letter and a number.

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Access advanced user management?

YES   NO

to move ▲ ▼   to confirm ✓   to exit ⟳

Insert new admin
Name   Marco
Nickname   MO
Password   _____
Confirm password   _____

to move ▲ ▼   to confirm ✓   to exit ⟳

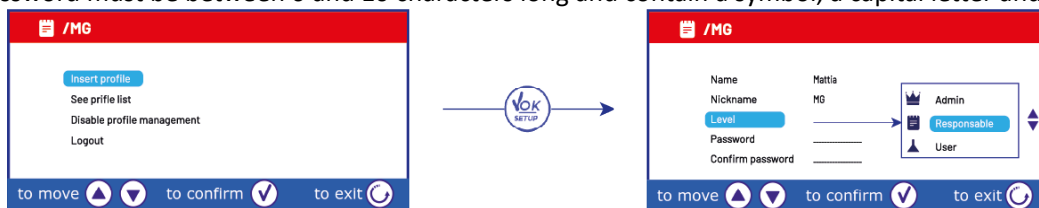/MO has been created

• *Admin Profile*

The following operations can be performed from the administrator profile:

Creating new profiles

Use this option to enter the remaining user profiles:

- **Name**: Enter the name of the user of the profile being created.
- **Nickname**: Enter initials or an identifier of up to 4 characters. The nickname of the active user will be shown on the display during measurement together with the level symbol.
- **Level**: Select the access level to be matched to the profile. Different levels have different privileges.
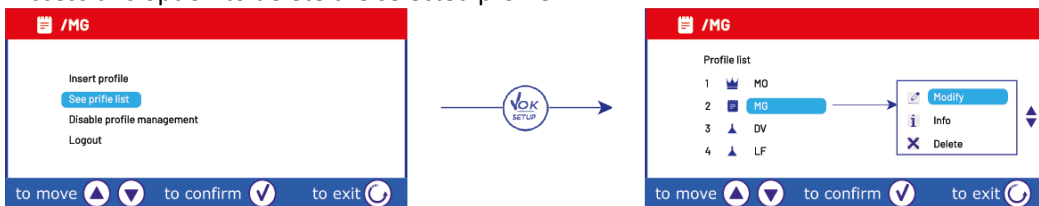- **Password** and Confirm Password: Enter and confirm the password associated with the user.
  The password must be between 6 and 10 characters long and contain a symbol, a capital letter and a number.

📋 /MG

Insert profile
See prifle list
Disable profile management
Logout

to move ▲ ▼   to confirm ✓   to exit ⟳

📋 /MG

Name   Mattia
Nickname   MG
Level
Password   _____
Confirm password   _____

👑 Admin
📋 Responsable
⛰ User

to move ▲ ▼   to confirm ✓   to exit ⟳
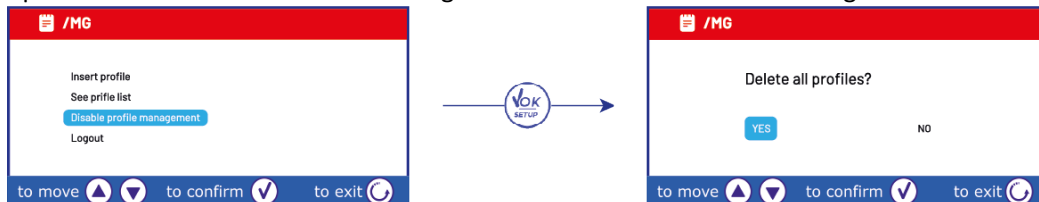
Profile list management

Use this option to manage profiles already created. For each profile it is possible:

- **Modify**: Log in to modify one or more of the following profile characteristics: Name, Nickname, Level, Password.
- **Info**: Log in to obtain information on when and by whom the profile was created/edited.
- **Delete**: Access this option to delete the selected profile.

📋 /MG

Insert profile
See prifle list
Disable profile management
Logout

to move ▲ ▼   to confirm ✓   to exit ⟳

📋 /MG

Profile list
1 👑 MO
2 📋 MG
3 ⛰ DV
4 ⛰ LF

✎ Modify
ⓘ Info
✕ Delete

to move ▲ ▼   to confirm ✓   to exit ⟳

Disable advanced user management

Select this option to disable advanced user management and return to normal management without users.

📋 /MG

Insert profile
See prifle list
Disable profile management
Logout

to move ▲ ▼   to confirm ✓   to exit ⟳

📋 /MG

Delete all profiles?

YES   NO

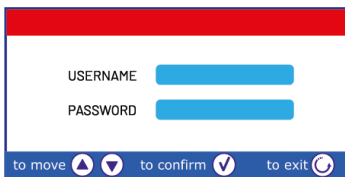to move ▲ ▼   to confirm ✓   to exit ⟳

Exiting the administrator profile

Select this option to exit the administrator profile and log in with another user.

• *User Change*

To change users while you are working with Advanced User Management active, from measurement mode press

 and with the external keyboard enter the credentials of the new profile.

• *Access levels*

With the advanced user management mode active, three different password-protected access levels plus an open-access guest level are available.

Admin : The ADMINISTRATOR level has access to all menus of the tool and all its functionalities.
This level is the only one that can manage (create, edit, delete) the other profiles (*see* **Admin profile**).
It is the only level that can disable the entire Advanced User Management to return to normal instrumental default functionality.

Responsible : The RESPONSIBLE level compared to the ADMINISTRATOR level has the following menus <u>disabled</u> (<u>not editable</u>):
- Resetting various parameters to factory conditions.
- **Data logger** menu LOG .
- Menu Analysis .
- **Setup** menu for changing date/time, temperature unit, language, calibration deadline mode.
- **User Management** Menu for inserting, viewing, editing and deleting other users/disabling Advanced User Management.

All instrumental functions (start calibration, start data logger, RM, change user, etc.) are accessible.

User : the USER level only has the following functions <u>enabled</u>:
- Viewing / Printing of calibration reports.
- Change units TDS / Salinity.
- Enabling/disabling HOLD reading and buzzer.

All instrumental functions (start calibration, start data logger, RM, change user, etc.) are accessible.

Guest: the GUEST level can be accessed freely without a password by pressing from the login screen.
This user level can only view measurements, all setup menus and instrument functions are disabled.

To disable the GUEST level and log in with another profile, press the button (*see section* **User Change**).
IMPORTANT: *Keep the access passwords for the various users carefully. In case of lost passwords, contact your local dealer to reset the instrument.*

20.Independently controlled magnetic stirrer

All Series 8 PRO and 80 PRO instruments can be connected to the independently controlled magnetic stirrer; included if the instrument is purchased in the STIRRER version or ordered separately. The magnetic stirrer is equipped with a functional probe stand, with 3 compartments to hold the measuring sensors and a hole for a temperature probe. Use only the original stirrer. Contact your local distributor for more information.

• *Operation*

- Connect the instrument connector, identified as 'Stirrer' (*see* **Inputs/Outputs Connections**), to the connector on the rear panel of the stirrer. Use only the original cable supplied.

- Press ⏻ to switch on the stirrer: the first green LED lights up.
- To activate the motor press **+** once, then use the **+** and **-** buttons to adjust the speed.
  The stirring speed is adjustable in 15 levels; every 5 steps a green LED lights up.

Note: The stirrer can be attached either to the right or left side of the instrument by means of metal brackets on the base of the stirrer (example in the photo below). Unscrew the brackets and then screw them back on with one hole under the instrument and the other under the stirrer. Placement in this way eliminates the residual risk of possible minor damage caused by manual handling of loads or contact with moving parts. Example of an instrument in "Stirrer" version:

Compliance with the above, and reading this manual before each use, eliminates the residual risk of minor electrocution damage, however unlikely they may be.

21.DataLink+ software (for Windows 7/8/10)

You can connect the Series 8 PRO and Series 80 PRO instruments to your PC and then use the software DataLink+ for downloading data, dataloggers directly to a PC and exporting to excel and pdf complete with headers and IDs. The software can be downloaded free of charge from these websites (please pay attention to correct driver installation):

- https://www.giorgiobormac.com/it/download-software_Download.htm
- https://www.xsinstruments.com/download
- Connect the USB type B cable inside each package to the USB port marked "PC" on the rear panel of the instrument and the other end to a COM port on your computer.
- Only use the USB cable supplied with each instrument.
- Start the programme and then switch on the instrument.
- Wait for the connection to be established (connection data are shown at the bottom left of the display).

• *Functions*

- **Downloading**: data saved in the instrument memory are downloaded to the PC and displayed in a table for processing.
- **M+**: instantaneous acquisition of a value (equivalent to manual datalogger option).
- **Logger**: automatic acquisition with set frequency.

- **Empty**: Empty the data in the table. If the password is active, it will be requested.
- **Export to Excel** / Export to **PDF**: export to PDF and Excel of all data in the table, graphs, calibration reports and instrumental information.
- Save to file / **Open from file**: saving data in a table and the possibility of reloading them in order to process or continue recording.
- **Select language**: Set the interface language (Eng - Ita - Deu - Esp - Fra - Por).
- **Analysis***: it is possible to view and export the identifiers entered in the Analysis menu and view which of them will appear in customised print templates.
- **Audit Trail***: you can view and export the list of accesses and events.
- **User*** : Display active user and access level (profile).
- **Table** / **Graph**: display mode for acquired data. Graphs are divided by parameter and can be printed separately.
* Function available only for 80 PRO Series

Functions

Visualisation of acquired data buffers in a table or graph

Instrument display for real-time measurements

Calibration data for each parameter

Data-logger automatic

Connection data and instrumental information

22. Warranty

- The manufacturer of this device offers the end user of the new device a three-year warranty from the date of purchase in the event of proper maintenance and use.
- During the guarantee period, the manufacturer will repair or replace defective components.
- This guarantee applies only to the electronic part and does not apply if the product has been damaged, misused, exposed to radiation or corrosive substances, if foreign materials have penetrated into the product, or if modifications have been made that have not been authorised by the manufacturer .

23. Disposal of electronic devices

This equipment is subject to regulations for electronic devices.
Dispose of in accordance with existing local regulations.