EN

ROYAL Eijkelkamp
Meet the difference

1885

$\%O_2$ – mg/l – mbar - Temp

INSTRUCTIONS MANUAL

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1. Introduction

XS Instruments, globally recognized as a leading brand in the field of electrochemical measurements, has developed this new line of portable instruments completely produced in Italy, finding the perfect balance between performance, attractive design and ease of use.

The robustness and integrity of the case, the integrated brightness sensor and the practical carrying case make this instrument ideal for measurements directly in the field.

Thanks to the triple power supply and the ability to manually change the contrast and brightness of the display, this instrument is also suitable for use in the laboratory.

The innovative high definition colour LCD display shows all the necessary information, such as the measurement, the temperature, the buffers used for the last calibration (also custom), the condition of stability.

Everyone can use these tools thanks to the instructions that appear directly on the display. The calibration is guided step by step and the instrument configuration menu is easy to consult. In addition, a LED indicates the status of the system to the user.

Up to 2 calibration points can be carried out for the dissolved oxygen measurement with automatic recognition of values.

It is possible to consult the calibration data anytime and the representation makes the calibration process more efficient, through the icons of the buffers used.

Automatic or manual Data Logger function with values that can be stored in different GLP formats on the internal memory (1000 data) or on the PC.

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:***

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

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

WARNING for important information about the product

NOTE for useful information about the product

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 following the indications of the reference manual. Read the instructions carefully.

Advice

This symbol draws attention to possible damage to the instrument or instrumental parts.

Note

This symbol highlights further information and tips.

- ***Additional documents for safety***

The following documents can provide the operator with additional information to work with the measuring system safely:

- 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 both in the laboratory and directly in the field.

Pay attention to the technical specifications shown in the INSTRUMENT FEATURES / TECHNICAL DATA table; any other use is to be considered unauthorized.

This instrument has been manufactured and tested in compliance with EN 61010-1 safety standards relating to electronic instruments and has left the factory in perfect technical and safety conditions (see test report in each package).

The regular functionality of the device and the operator safety are guaranteed only if all the normal laboratory safety standards are respected and if all the specific safety measures described in this manual are observed.

- ***Basic requirements for a safe use***

The regular functionality of the device and the operator safety are guaranteed only if all the following indications are respected:

- the instrument can be used in accordance with the specifications mentioned above only;
- use the supplied power supply only. If you need to replace the power supply, contact your local distributor;
- the instrument must operate exclusively in the environmental conditions indicated in this manual;
  no part of the instrument can be opened by the user.
  Do this only if explicitly authorized by the manufacturer.

- ***Unauthorized use***

The instrument must not run, if:

- it is visibly damaged (for example due to transportation);
- it has been stored for a long period of time in 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 does not require maintenance procedures.

It is recommended to occasionally clean the instrument case with a damp cloth and a mild detergent. This operation must be performed with the instrument off.

The housing is in ABS / PC (acrylonitrile butadiene styrene / polycarbonate). This material is sensitive to some organic solvents, for example toluene, xylene and methyl ethyl ketone (MEK).

If liquids get into the housing, they could damage the instrument.

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 tool or authorizes its use by other people is the owner of the tool and is responsible for the safety of all users of the tool and third parties.

The owner of the instrument must inform users of the use of the same safely in their workplace and on the management of potential risks, also providing the required protective devices.

When using chemicals or solvents, follow the manufacturer's safety data sheets.

3. Instrumental features

- ***Parameters***

OXY 70 Vio: % O_2, mg/l, mbar, Temp

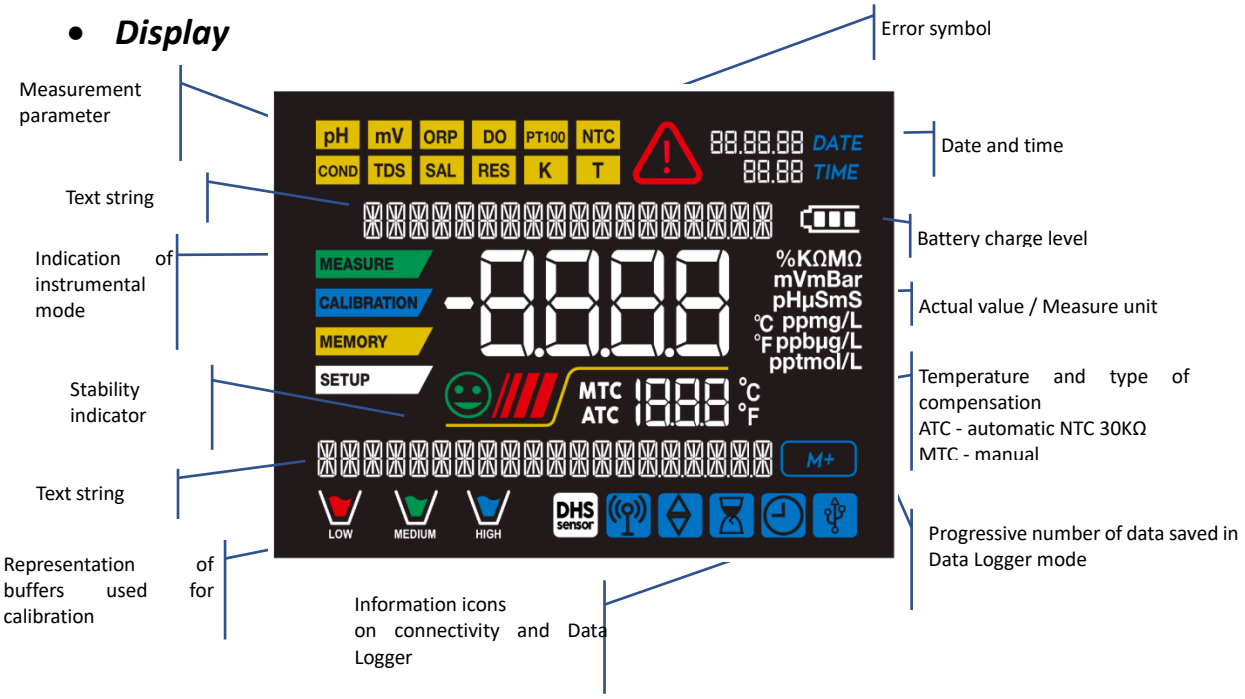
- ***Datasheet***

	OXY 70 Vio (optical sensor)
Dissolved O_2	
Measuring range	0,00…19,99 mg/l / 20,0…50,0 mg/l - ppm
Resolution	0,1 / 0,01
Accuracy	± 0,2 up to 10 mg/l-ppm ± 0,3 from 10 to 20 mg/l-ppm ± 5% in the range from 20 to 50 mg/l-ppm
Dissolved O_2 saturation measuring range	0,0…199,9 % / 200…400%
Resolution	0,1 / 1%
Accuracy	± 10%
Oxygen calibration points	1 or 2 automatic
Calibration points indication	Yes
Calibration report	Si
Barometric pressure measuring range	0…1100 mbar
Resolution	1 mbar

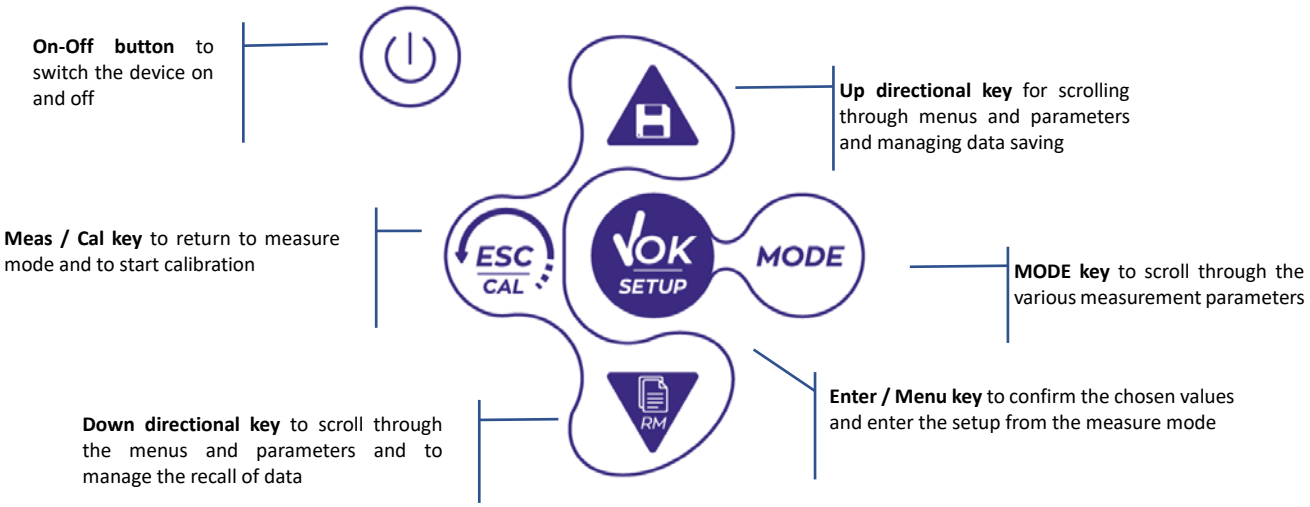
Accuracy	± 0,5%
Automatic temperature compensation ATC	Yes
Temperature	
Measuring range	-10,0…110,0 °C
Resolution	± 0,1°C
Accuracy	± 0,5°C
Temperature compensation ATC and MTC	Yes, automatic only
Salinity	
Measuring range	0…50 ppt
Salinity compensation	Si, manuale
System	
GLP with calibration Timer	Yes
Internal memory	1000 Data
Display	High definition colour LCD
Brightness and contrast management	Manual and automatic with integrated sensor
IP protection	IP 57
Power supply	AA 1,5 V – 3 batteries / 5 V power supply with USB cable
Sound level during standard operation	< 80 dB
Environmental operating conditions	0 … +60 °C
Maximum permissible humidity	< 95 % non-condensing
Maximum altitude of use	2000 m
System dimensions	185 x 85 x 45 mm
System weight	400 g
Reference regulations	EMC 2014/30/UE RoHS 2011/65/EU EN 61326-1 EN 61010-1

4. Instrument description

- ***Display***



- ***Keyboard***



- ***LED***

All the instruments are equipped with a two-colour LED (red and green) which provides the user with important information on the status of the system:

Funzione	LED	Descrizione
Power on	🟩	*Fixed*
Power off	🟥	*Fixed*
Standby	🟩	*Flashing every 20 s*
Stable measure	🟩	*Flashing every 3 s*
Errors during calibration	🟥	*Flashing every 1 s*
Errors during measurement	🟥	*Flashing every 3 s*
Time of saving the data	🟩	*On / Off in rapid succession*
Recall Memory mode	🟩🟥	*Alternate green and red, pause 5 s*
Selection confirmation	🟩	*Switched on for 1 s*
Timed screens	🟩	*Fixed*

5. Installation

- ***Supplied components***

The instrument is always supplied inside the specific carrying case with these accessories:

batteries, adaptor 5V with USB cable, standard 0 oxygen, paper tissues, screwdriver, beacker, multilingual user manual and test report.

Contact your local distributor to be updated on the correct composition of the sales kit and spare parts.

- ***Start-up***

- The device leaves the factory ready to be used by the user.
- Batteries are included.

- ***Connection of the power supply***

  - in addition to batteries, the instrument can be powered through electricity grid;
  - check that the electrical standards of the line on which the instrumentation is to be installed comply with the voltage and operating frequency of the instrument;
  - use the original power supply only;
  - connect the power supply to the USB cable and the other end of the cable (Micro USB) to the Micro USB port located on the front of the instrument;
- Connect the power supply to an electric socket easy to reach.

ATTENTION

Danger of death or serious injury from electric shock. 

Contact with live components can lead to injury or death.

- **Use the adapter supplied only.**
- **Do not put the power supply in contact with liquids nor in a condensing environment. Avoid thermal shock.**
- **All electrical cables and connections must be kept away from moisture or liquids.**
- **Check that the cables and plugs are not damaged, otherwise replace them.**
- **During use, do not cover the power supply and/or do not place it inside containers.**

The electricity supply can be originated from the power grid and from the USB port of a PC too.
If the instrument is powered by PC, the icon indicating the battery status disappears from the display  .

Opening the DataLink+ software, on the display it is shown this icon  .

- ***Power on, date and time update, power off***

Turn on the system by pressing the button  . The display initially activates all segments and then appears:

- model and firmware of the instrument;
- settings relating to the most important parameters and possible information about the DHS sensor;

On first use, and after each battery replacement, the instrument during the start-up phase will request the updating of the date and time.

- Using the directional keys, update the year and confirm with the key  . Carry out the same operation with the month and day, and subsequently with hours and minutes.
- The instrument will enter measure mode in the last parameter used.

  To switch off the instrument, press the key  in measure mode.

- ***Replacement of batteries*** 

The instrument works with 3 AA 1.5V batteries.
To proceed with the replacement:

1. Turn off the device.
2. Turn the instrument over with the display facing down and place it on a stable surface. It is advisable to put a cloth to avoid any scratching on display.
3. Using the screwdriver supplied, completely unscrew the screw close to the battery symbol.
4. Remove the battery stopper cap with the help of the lanyard.
5. Remove the 3 exhausted batteries (one in the left compartment and two in the right compartment) and insert the new ones. Pay attention to the correct polarity. Follow the diagram above the battery symbol in the rear compartment of the instrument.
6. Reinsert the battery holder and tighten the screw.

- ***Instrument transportation*** 

The instrument is always supplied with the appropriate carrying case. Use the original case only, to transport the instrument. If you need to buy it again, contact your local distributor.
The interior of the case is shaped to be able to house the instrument and the sensors still connected.

- ***Key functions***

Button	Pression	Function
	Short	Press to turn the device on or off.
	Short	In measure mode, press to scroll through the different parameters: • **OXY 70 Vio**: % O_2 → mg/l → mbar
	Short	• In calibration mode, press to return to measure mode. • In measure mode, press to start the calibration.
	Short	In measure mode, press to enter the setup. In the setup menus, press to select the desired program and / or value. During calibration, press to confirm the value.
 	Short	In the setup and subset menus press to scroll In the setup submenus, press to change the value In memory recall mode, press to scroll through the saved values. In MTC and customer calibration mode, press to change the value.  : In measure mode, press to save the data (manual Data Logger) or start and end the recording (Automatic Data Logger).  : In measure mode, press to recall the saved data.

	Long-press (3s)	In measure mode, keep one of the two keys pressed to change the temperature in MTC mode (manual compensation, without probe). When the value starts to flash, the user can change the temperature value by entering the correct one and confirming with .

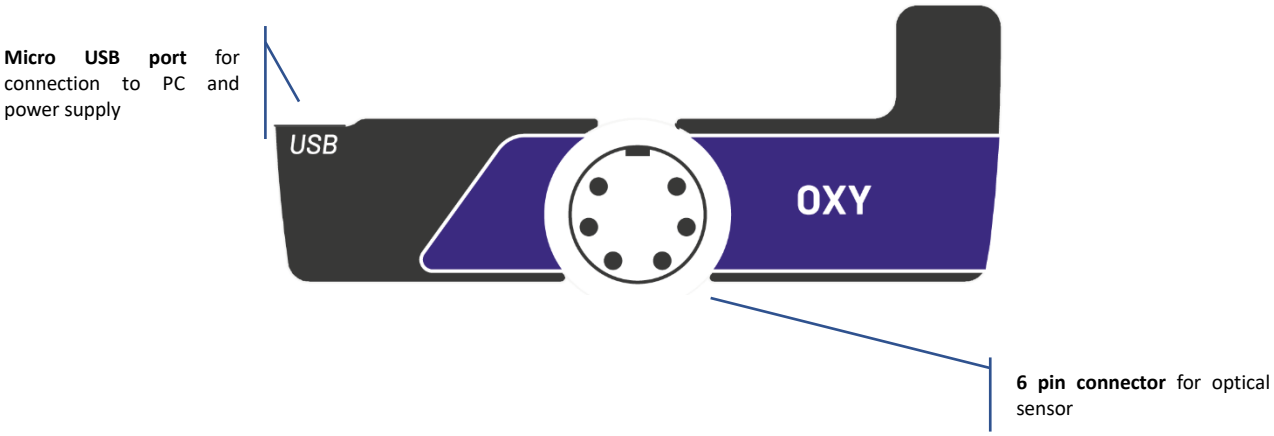
IMPORTANT:

- **When the Sleep mode is active (by default after two minutes of inactivity of the instrument) press any key to reactivate the brightness of the display.**
- **Only at this point do the keys regain their function.**

- ***Inputs / Outputs connections***

Use original accessories guaranteed by the manufacturer only.
If necessary, contact your local distributor.

OXY 70 Vio top panel



READ THE MANUAL BEFORE PROCEEDING TO CONNECT THE PROBES OR PERIPHERALS

- ***Symbols and icons on the display***

Symbol	Description	Symbol	Description
M+	Number of data stored in Data Logger mode on instrumental memory		Error in measurement or calibration
	Instrument connected to the DataLink+ software		FIXED: Automatic Data Logger set INTERMITTENT: Automatic Data Logger in operation

	FIXED: Calibration deadline set for that parameter INTERMITTENT: Calibration deadline active for that parameter		Press the directional keys to change the parameter or value on the display
	Measurement stability indicator		Battery charge indication
	The bars scroll if the measurement is not stable		

6. Operation of the device

- After the switching on, the instrument enters measure mode in the last screen before turning off.
- **To scroll through the different parameter screens, press the key**  .

Sequence of parameters in measure mode:

OXY 70 Vio

% O_2

mg/l

mbar

Note: *Pressing the button*  *after the last parameter, the instrument automatically restarts from the first one.*

In the measurement screen for %O_2 and mg/l, press the key  to start the calibration of the active parameter (next paragraphs).

On the left side of the display, through a string of different colours, it is always indicated how the instrument is located.

Note: *in order to confirm to the user the switching from one mode to another, the string flashes.*

String	Meaning
MEASURE	The instrument is in measure mode.
CALIBRATION	The instrument is in calibration (automatic or manual in relation to the user's choice).
SETUP	The user is in the setup mode. The configuration menus can concern the characteristics of the parameters or the general setting of the instrument.
MEMORY	The instrument is in the Recall Memory mode. The data stored are being displayed by running the manual or automatic Data Logger.

7. Setup menu

SETUP

- In measure mode, press the key  to enter SETUP mode, select the parameter to edit by using the directional keys and confirming with  .

OXY 70 Vio

DO SETTINGS

LOG SETTINGS

SETTINGS

- Within the selected menu, move between the different programs using the directional buttons and press the button  to access the submenu you want to edit.
- **Using the keys**  **and**  **choose the desired option or change the numerical value and confirm with**  **.**
- The value or parameter that is being edited is recognizable as it **flashes** on the display.
- The icon  indicates that the value or parameter to choose is editable using the directional keys.

- Press the key  to return to the previous menu.

SETUP

- ***Setup Menu Structure***

P5.0	DO SETTINGS		P5.1 Cal 0 P5.2 Salt Compensation P5.6 Cal Data P5.7 Set Due Cal P5.8 Reset Settings P5.9 Temp Cal
P8.0	LOG SETTINGS		P8.1 Data Logger Type P8.2 Clear Data
P9.0	SETTINGS		P9.1 Temperature U.M. P9.2 Time and data Set P9.3 Backlight mode P9.4 Brightness P9.5 Sleep Mode P9.8 Reset Settings P9.9 Auto Power-Off

8. Temperature measurement ATC – MTC

MEASURE

- **ATC**: The direct measurement of the sample temperature for all parameters is carried out through the NTC 30KΩ probe, integrated into the sensor.
- **MTC**: If no temperature probe is connected, the value must be changed manually: keep pressed  or  until the value starts to flash; then adjust it by continuing to use the directional keys; press  to confirm.

Note: with the optical sensor supplied together with the instrument, the manual temperature compensation (**MTC**) **IS NOT TO BE PERFORMED.**

9. %O_2 Parameter

DO

Connect the optical sensor to the 6-pole multipin connector.

It is not necessary connect an external temperature probe, because it is already integrated.

Connettere il sensore ottico al connettore di tipo Multipin 6 poli.

Once switched on, the device does not require any polarization time. There, it is ready for use (calibration and/or measurement).

SETUP

- ***O_2 parameter Setup***

- In measure mode press  to access the SETUP menu.
- Press the button  to access the **DO SETTINGS P5.0** menu.

Move with the keys  and  to select the program to access.
The table below shows the setup menu structure for the O_2 parameter, and for each program the options that the user can choose and the default value:

- ***Composition of the Setup menu for O_2 Parameter***

Program	Description	Options	Factory Default Settings
P5.1	CAL 0	-	-
P5.2	SALT COMPENSATION	0.0 – 50.0	0.0
P5.6	CALIBRATION DATA	-	-
P5.7	SET DUE CAL	NO – HOURS - DAYS	NO
P5.8	RESET SETTINGS	YES – NO	NO
P5.9	TEMPERATURE CAL	YES – NO	-

P5.1 Cal 0 (Calibration with Standard Zero 0_2)

- Access this setup menu to select the calibration with Standard (supplied together with the device in the carrying case) Zero Oxygen (next paragraphs “Calibration”).

- Once confirmed the operation, in measure mode on the lower left in the display, the beaker 

indicates the point % 0_2 = 0 on which the calibration was performed.

  - **P5.2 Salt Compensation (manual)**
  -
  - The salinity of the sample to be measured influences the partial pressure of the dissolved oxygen. For a correct measurement, it is necessary to set the salinity value of the sample. If oxygen measurements are carried out on salt or sea water samples, it is important to modify the measurement by setting the indicative salinity value of the sample.
  - The default value is 0 ppt, access the parameter **SALT COMPENSATION P5.2** of the setup menu to change it and select the desired value between 0.0 … 50ppt.
  - **The average salinity of the sea water is 35ppt.**

P5.6 Calibration data O_2

Access this menu to get information on the last performed calibration. The following screens will automatically scroll on the display:

- First screen: Beakers indicating the points (0% - 100% O_2) on which the calibration was performed.
- Second screen: OFFSET value of the sensor expressed in %.
- Third screen: EFFICIENCY of the sensor, expressed in Slope %.
- Fourth screen: Value of COMPENSATION of Salinity, expressed in ppt.
- Fifth screen: Value of BAROMETRIC PRESSURE, expressed in mbar, at which the calibration was performed.
- Sixth screen: TEMPERATURE at which the calibration was performed.
- ***Note**: The instrument accepts calibrations with Oxygen sensors with Slope % between 80 – 120%.*
- *Outside this range of acceptability, the instrument does not allow to end the calibration and displays the error message* SLOPE OUT OF RANGE

P5.7 DO Calibration deadline (Set Due Cal)

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

- By default, no calibration deadline is set. Use the directional keys to select HOURS or DAYS and access with button . Use the directional keys to change the number that appears in the center of the display, entering the hours or days that must elapse between two settings, and confirm with .
- If a calibration deadline is set, the icon is present on the display in measure mode.
- When the calibration deadline is activated, the instrument prevents further measurements.
  The error icon and the icon representing the calibration deadline flash on the display.
  The string "MAKE A NEW CAL" invites the user to perform a new calibration of the pH sensor to be able to work again.
  Press the key to start the calibration.

P5.8 Reset of the DO parameter (Reset Settings)

If the instrument does not work properly or incorrect calibrations have been carried out, confirm YES with button , in order to take all the parameters of the DO menu back to the default settings.

***IMPORTANT:** The factory reset of the parameters **DOES NOT** erase the stored data.*

P5.9 Temperature calibration

All the instruments of this series are pre-calibrated for a correct temperature reading. However, if there is a difference between the measured and the real temperature (usually due to a probe malfunction), it is possible to perform an offset adjustment of ± 5°C.

After the connection of the temperature probe, use the keys and to correct the temperature offset value and confirm with .

- ***Information about LDO70 probe***

The LDO70 probe uses a luminescence optical technology for dissolved oxygen measurements in water.
This type of probe has many advantages compared to classical polarographic type sensor, some of these are:

- Zero polarization time, the instrument is always ready
- No shaking of the sample because there is no oxygen consumption
- No electrolyte in the membrane
- No interferences with other gases (e.g. CO_2)
- Reduced maintenance time
- Very fast response time
- Accurate even with small sample volumes
- Stable and accurate measurements even at low dissolved oxygen value.

- ***Measuring principle***

On a permeable membrane to oxygen has been fixed a chemical substance called luminophore. Inside the sensor, a light source pulses a light of blue colour that is reflected from the luminophore on an inner photocell. When the oxygen, permeating through the membrane, comes in contact to the luminophore, it modifies the blue light in proportion to the partial pressure of the oxygen. This variation is read by the photocell which generates a proportional electrical signal.

- ***Probe storage***

When the probe is not in use, store it in the storage cap containing distilled water. In this way, the membrane is protected and hydrated, ready for use.

- ***Oxygen sensor calibration***

CALIBRATION

The luminophore of the optical sensor is subject to aging and wear, therefore, you need to calibrate it regularly in the air.

- ***Calibration in air at 100%***

The ordinary calibration is performed at 100% in air.
Turn the instrument on, dip the probe in water and wait for the polarization time of 10 minutes.
Later, dry the probe thoroughly with paper towel and proceed as follows:

- Place the probe in air with the membrane facing downwards and wait for 2 minutes. Then, connect the sensor to the device.
- In measure mode, press the key  to enter in calibration mode.
  On the display, it appears the string *"POINT OXY 100.0"*; the device will look for the value %O_2 = 100 %.
  Keep the sensor in air in a vertical position with the membrane facing downwards.
- When the signal is stable, the red bands will be replaced by the stability icon  .

  Press the button  , as indicated by the string *"PRESS OK"*.

  On the display, the measured value flashes, then the sensor and finally the beacker  appears below on the left and indicates that the instrument is calibrated on value 100%O_2.
- After the calibration, the instrument enters in measure mode automatically.

- ***Calibration with zero oxygen standard***

Normally, it is enough to calibrate the instrument in the air at 100% as explained previously. However, sometimes it is also necessary to calibrate at 0%, for example when:

- A probe or luminophore is replaced by a new one
- The probe is not used for a long period of time (3-6 months)
- The instrument does not calibrate at 100%, in this case calibrate it before at 0%.
- The instrument does not measure correctly

For calibration at 0%, proceed as follows:

Turn the instrument on, rinse the probe in distilled water; dry the probe thoroughly with paper towel and proceed as follows:

- Put the probe in the Zero Standard Oxygen and wait for 5 minutes.
- In measure mode, press the button  , remain in Menu **DO SETTINGS P5.0** and confirm pressing the button  again.
- Press the button  again, confirm the entry into submenu **CAL 0 P5.1**.
  - On the display, the string *"POINT OXY 0.0"* appears; the device will search for the value %O_2 = 0%.
  - Gently stir the probe in the Standard and eliminate any air bubbles under the membrane, moving the sensor.
  - The scrolling on the display of four red bands  means that the measurement is not stable yet.
  - Consider the measurement truthful only when the stability icon appears  .
- Confirm the value by pressing the button  .
  - The instrument automatically returns to measure mode.
- The beaker icon  appears at the bottom left, indicating that the instrument is calibrated on value 0% O_2.

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

- *Zero oxygen Standard calibration solution*

Note: The Zero Oxygen Standard Solution is SINGLE DOSE! After its use, contact your local distributor for the purchase.

Perform the calibration in air at 100% too. This procedure remains saved, even after the turning off of the device.

- ***Calibration range***

The time range between two calibrations (100% in air) depends on the type of the sample, the efficiency of the electrode and the researched accuracy; usually, it is necessary to calibrate the instrument at least once a week, but for a better accuracy, it is recommended to calibrate it more often.
The instrument must be recalibrated, if occurs one of the following conditions:

- New probe, or probe not used for a long time
- After the luminophore replacement.

- ***Errors during calibration*** 

- NOT STABLE: The button  was pressed with still unstable signal. Wait for the icon  to appear to confirm the point.
- WRONG BUFFER: The buffer is polluted or not part of the recognized families.
- SLOPE OUT OF RANGE: The slope of the sensor calibration line is out of the acceptable range 80 - 120%.
- CALIBRATION TOO LONG: The calibration exceeded the time limit: only the points calibrated up to that moment will be kept.

10. Dissolved oxygen measurement

- ***Before starting***

In order to reduce measurement errors and get the greatest possible accuracy, observe the following rules before starting:

- The sensor must be calibrated;
- The sensor must be placed in a vertical position with the membrane downwards;
- Remove the protective cap;
- The sensor must be at the same temperature of the sample to analyse; if necessary, leave the probe immersed in the sample until the reaching of thermal equilibrium.

- ***Measure Mode***

The instrument can work in two different measure modes:

- **Dissolved O_2 Saturation** expressed in %
- **Dissolved O_2 Concentration** expressed in mg/l, corresponding to ppm **mg/l = ppm**
- **Barometric pressure**

- During the measurement press the button 

, in order to change the unit of measurement.

• *Performing the measurement*

Remove the protective cap of electrode, rinse it with distilled water; dab it with paper towel and dip in the solution to analyse. Gently stir and wait until the value stability, when the icon  appears on the display, take the reading.

• *Barometric pressure compensation*

Since the measurement of the partial pressure of the dissolved oxygen is related to the barometric pressure, this instrument is able to compensate each variation, thanks to the integrated barometric sensor.

In order to view the barometric pressure measured by the instrument, press the key 

during measurement and scroll through the measurement parameters: $\%O_2 \leftrightarrow$ mg/l $\leftrightarrow$ mbar.

11. Probe LDO70 maintenance

If the instrument does not calibrate or the reading does not stabilize, it is necessary to perform a maintenance of the probe in the following way:

1) Check that the luminophore is clean, in case wash it with water.
2) The luminophore must be intact, undamaged, and without holes.
3) Unscrew the luminophore and check that the inside is dry, free from condensation and infiltration. If there is condensation or infiltration, check the integrity of the O-ring seal of the luminophore and, if necessary, replace it. Dry thoroughly with a paper towel and screw the luminophore ensuring an airtight seal.

After the maintenance, make a new **Calibration in air at 100%.**

***Note**: if even after maintenance the probe does not calibrate, then replace the luminophore with a new one.*

• *Replacement of luminophore*

The efficiency of the luminophore decreases with wear to the point that the instrument is no longer able to calibrate itself, in this case it is necessary to replace it. To replace the luminophore proceed as follows:

1) Unscrew the luminophore;
2) Check the integrity of the inside of the probe;
3) Replace the o-ring with a new one supplied with a new luminophore;
4) Screw the new luminophore ensuring an airtight seal.

After the maintenance make a new **Calibration of the oxygen sensor.**

12. Data Logger Function

This series of devices has the possibility of recording values in GLP format on the instrument's internal memory.

- The instrument can save up to 1000 data in total. Once the memory is finished, the values are NOT overwritten. In measure mode, the number of data stored for that parameter appears next to the ***M+*** icon.
- It is possible to recall and consult the values on the display or download them to a PC using the appropriate software.
- If you have the possibility to work directly connected to the PC, the data are automatically saved on the software without having memory limitations.
- Recordings can be acquired **manually** (MANUAL) or **automatically at preset frequencies** (HOURS - MINUTES).

PC Connection: *connect the USB cable inside each package to the USB port on the top panel of the instrument and the other end to a COM port on the computer.*

Use the USB cable supplied with the instrument only.

• *Setup for Data Logger parameter*

SETUP

- In measure mode press button to access the SETUP menu.
- Use the directional keys to move to **LOG SETTINGS P8.0** and access the menu by pressing the key .
- Move with the keys and to select the program to access.

The table below shows the setup menu structure for the Data Logger mode; for each program, there are the options that the user can choose and the default value:

• *Composition of setup menu for the Data Logger menu*

Program	Description	Options	Factory Default Settings
P8.1	TYPE OF SAVING	MANUAL – HOURS - MINUTES	MANUAL
P8.2	EMPTY INTERNAL MEMORY	YES – NO	-

P8.1 Registration type
Access this menu to select the data acquisition mode:

- **MANUAL**: **The data is acquired only when the user presses the button** .
- **HOURS - MINUTES: Set an automatic data acquisition frequency range.**

Use the directional keys to move from MANUAL to HOURS or MINUTES. Access with and, as

indicated by the icon , change the value of the acquisition time. Confirm the setting with the key .

- **Use of automatic Data Logger**
- In measure mode press to start and end automatic recording.
- When the automatic data saving is running, the icon flashes on the display.
- When it is set, but not in operation, the icon on the screen remains fixed. When the 1000 total values are reached, the recording stops automatically.
  Note: *Scrolling through the parameters, the recording stops.*

P8.2 Memory emptying

Access this menu and select YES to clear the saved data and empty the memory.
Next to the ***M+*** icon. It shown the total number of data stored.

- ***Example of automatic Data Logger mode***

Example: automatic pH recording on internal memory every 2 minutes

- Access the **LOG SETTING P8.0** setup menu.
- Enter the **LOG TYPE P8.1** menu, press and move with directional keys to **MINUTES**.
- Use the directional keys to change the number that flashes on the display. Enter "**2**" and confirm with .
  Go back to measure mode**.**
  - The icon is lit in the lower string of the display, which indicates that an automatic frequency Data Logger has been set. Press to start recording; the icon starts flashing, indicating that the storage is in progress. The number next to the ***M+*** icon indicates how much data has been saved for that parameter.
  - Press again to end the recording.

Note*: automatic recording is suspended when the measurement parameter is changed.*

- ***Example of manual Data Logger mode***

Example: recording a Conductivity value in manual mode

- Access the **LOG SETTING P8.**0 setup menu.
- Enter the **LOG TYPE P8.**1 menu, press key and move with the directional keys to **MANUAL**.
- Confirm with and return to measure mode, go to the **COND** screen COND**.**
  Press to save the value. The number next to the ***M+*** icon indicates how much data has been saved for that parameter.

Note*: Manual or automatic saving of a value is confirmed by a sequence of flashes of the green LED*

- ***Recall Memory***

MEMORY

- In measure mode in the parameter of interest, press key to enter the RECALL MEMORY mode. The last saved data is shown on the display.
- As indicated by the string , use the directional keys to scroll through the different stored values. The number next to the ***M+*** icon indicates the save slot.
- Press to return to measure mode.

Note*: if during the data saving, the instrument is in error, this error will be displayed on the data recall phase on the instrument*

- ***Clear the saved data***

- To clear the data stored in the instrumental memory, access the **CLEAR DATA P8.2** setup menu and select **YES**.

IMPORTANT*: Factory reset of the pH, ORP and Cond parameters does not delete the stored data*

13. Instrument Setup menu

SETUP

- In measure mode, press key to access the SETUP menu.
- Use the directional keys to move to **SETTINGS P9.0** and access the menu by pressing the key .
- Move with the keys and to select the program to access.

The table below shows the setup menu structure for the general settings of the instrument; for each program, there are the options that the user can choose and the default value:

- ***Composition of the setup menu for Setting menu***

Program	Description	Options	Factory Default Settings
P9.1	TEMPERATURE U.M.	°C / °F	°C
P9.2	DATE AND TIME SET	-	-
P9.3	BACKLIGHT MODE	INDOOR – OUTDOOR-AUTOMATIC	AUTOMATIC
P9.4	BRIGHTNESS	LOW – MEDIUM - HIGH	MEDIUM
P9.5	SLEEP MODE	OFF – 2 MIN – 5 MIN	2 MIN
P9.8	RESET	YES - NO	NO
P9.9	AUTO POWER-OFF	YES – NO	NO

P9.1 Unit of measurement for temperature
Access this setup menu to select the temperature unit to use:

- **°C** -default-
- **°F**

P9.2 Date and time setting
Access this setup menu to update the device date and time.

Use the directional keys to change the year, confirm with ENTER and repeat the same operation for month, day, hours and minutes.

P9.3 Backlight Mode
Access this setup menu to select the contrast mode to use for the display backlight:

- **INDOOR (In)** – Recommended if you use the device indoors.
- **OUTDOOR (Out)** – Recommended if you use the device outdoors.
- **AUTOMATIC (Auto)** – Default option. Thanks to the brightness sensor, the display automatically adapts to the environment conditions. This mode also ensures longer battery life.

P9.4 Luminosità
Accedere a questo menu di setup per scegliere tra tre differenti livelli di luminosità del display:

- **LOW** – bassa
- **NORMAL** – media
- **HIGH** – alta

***Note**: Keeping the display bright always adversely affects battery life*

P9.5 Sleep mode
Access this setup menu to select whether and after how long activating the device Sleep mode:

- **OFF**: Sleep mode off.
- **2 MIN**: The instrument enters Sleep mode if no key is pressed for 2 minutes.

5 MIN: The instrument enters Sleep mode if no key is pressed for 5 minutes.

When the device is in Sleep mode, the brightness of the display is reduced to a minimum, significantly saving battery consumption.

***Note**: Sleep mode only affects the brightness of the display. All other instrumental functions continue to operate normally (e.g. Data Logger).*

To exit from the Sleep mode and return the display to normal brightness, press ANY button.
Once the display brightness is activated, the buttons reacquire their function (paragraph "Key function").

P9.8 Reset Settings
Access this setup menu to restore the instrument to factory conditions.

***IMPORTANT:** Restoring the factory parameters does not delete the stored data.*

P9.9 Auto off
Access this setup menu to activate or deactivate the auto-shutdown of the instrument:

- **YES:** The instrument automatically turns off after **20 minutes** of inactivity.
- **NO:** The instrument remains always on, even if you are not using it.

NOTE: *Auto-switch-off of the instrument is disabled, if data is being recorded with the automatic Data Logger mode*

IMPORTANT*: The correct and systematic use of parameters P9.3 / P9.4 / P9.5 / P9.9 allows to significantly lengthen battery life.*

14. DataLink+ Software (per Windows 7/8/XP/10)

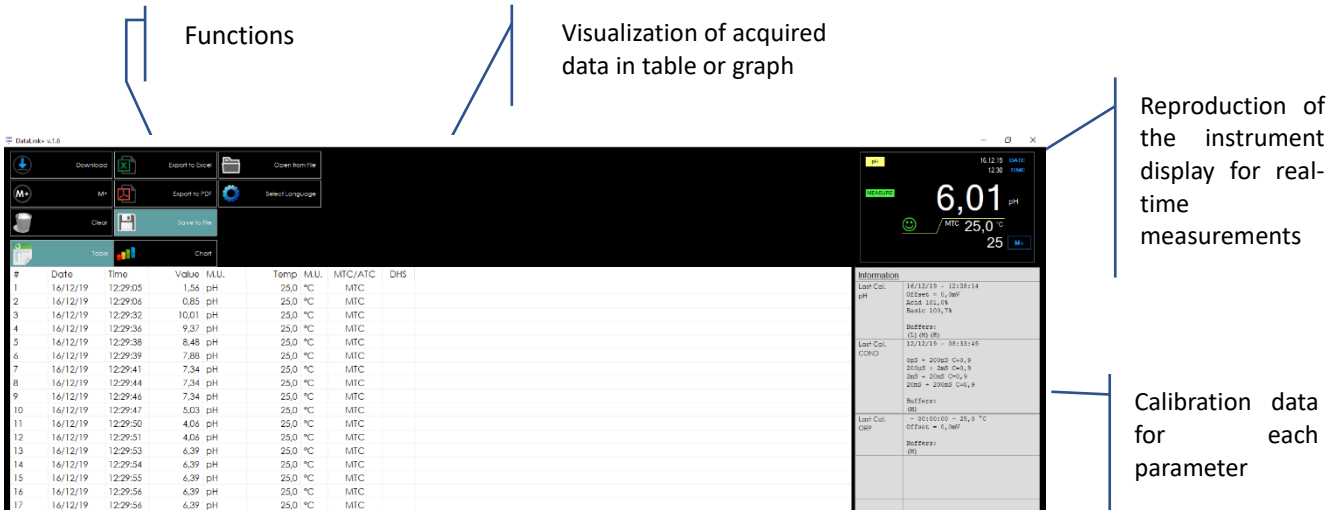
It is possible to connect the instruments of the 70 Vio series to the PC and then use the DataLink + 1.6 software (and later versions) to perform data download, Data Logger directly on PC and exports in .xls (Excel) and .pdf.

The software can be downloaded for free from the web site (pay attention to the correct installation of the drivers).

- https://www.giorgiobormac.com/it/download-software_Download.htm.
- Connect the USB cable inside each package to the USB port on the top panel of the instrument and the other end to a COM port on the computer.
- Use the USB cable supplied with the instrument only.
- Start the program and then switch on the instrument.
- Wait for connection to be established (the connection data are shown at the bottom left of the display).

- ***Functions***

- **Download**: the data saved in the instrumental memory are downloaded to a PC and displayed in the table for processing.
- **M+**: instantaneous acquisition of a value (equivalent to the manual Data Logger option).
- **Logger**: automatic acquisition with set frequency.
- **Empty**: emptying 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 the data in the table, of graphs, calibration reports and instrumental information.
- **Save to file / Open from file**: saving the data in the table and possibility to reload them in order to process them or continue recording.
- **Select the language**: set the interface language (Eng – Ita – Deu – Esp – Fra – Cze).
- **Table** / **Graph**: how to display the acquired data. The graphs are divided by parameter and can be printed separately.



15. Warranty

- ***Warranty period and limitations***

- The manufacturer of this device and its accessories offers the final consumer of the new device the five-year warranty from the date of purchase, in the event of state-of-the-art maintenance and use.
- During the warranty period, the manufacturer will repair or replace defective components.
- This warranty does not apply, if the product has been damaged, used incorrectly, exposed to radiation or corrosive substances, if foreign materials have penetrated inside the product or if changes have been made, which have not been authorized by the manufacturer.

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16. Disposal of electrical devices

This equipment is subject to the regulations for electronic devices.

Dispose of in accordance with local regulations.