HORIBA

ONLINE WATER ANALYZER

TECHNICAL MANUAL

EL200

HORIBA ADVANCED TECHNOLOGY FRANCE
100B ALLÉE DE ST EXUPÉRY – 38330 MONTBONNOT ST MARTIN – FRANCE
TEL : +33 4 76 41 86 39 – FAX : +33 4 76 41 92 27
MAIL : SALES.HATFR@HORIBA.COM -WEB : WWW.HORIBA.COM

Safety warning and liability




Chemicals used as reagent or used as cleaning solution or used to prepare calibration solutions might be toxic, corrosive or irritant. Refer to the material safety data sheets (MSDS) for each chemical. Wear protection glass and gloves.

The documentation and/or Product are provided on an “as is” basis only and may contain deficiencies or inadequacies. The Documentation and/or Product are provided without warranty of any kind, express or implied.

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CE

This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.

The battery installed is also CE compliant.

To prevent electric shock:

- Unplug the power cord before any servicing, wiring or any operation inside the instrument.
- Connect this instrument only at a properly grounded power socket.
- Keep the screws well tight.

This instrument must be earthed!
In order to prevent any electric shock, verify that the power socket used for this instrument has an earth connection in accordance with regulations.

The security provided by this product is only assured for the intended use.
Maintenance can only be performed by qualified personnel.

Do not dispose of this product as household waste. Use an approved organization that collects and/or recycles waste electrical and electronic equipment.

CONTENTS

1. Maintenance

The maintenance of the EL200 controller is limited to the maintenance of the external probes such as:

- their cleaning if no automatic air cleaning is installed,
- the refilling of the cleaning or reagent solution, depending on the configuration,
- their replacement depending on the customer use.

The maintenance procedure and frequency are detailed for each external probe in **Table 1**.

Table 1. Maintenance procedures for each external probe.

Probe	Maintenance procedure	Frequency of maintenance
Chlorine probe	Maintenance includes: • the cleaning of the electrode, • membrane cap replacement, • refreshing the Internal Fill Gel (IFG). Conditioning is required at first time use after membrane cap change and IFG replacement. Note that a restarted probe needs about 4 hours to get an accurate reading.	Depending on the use: • Replacement of IFG every 3 to 6 months. • Replacement of the membrane cap every 12 months.
Conductivity	Maintenance includes: • the cleaning of the probe. Do not touch the probe cell surface with any hard object. If the probe cell surface is contaminated, soak the probe cell portion in light detergent and mild acid for about 15 min, respectively.	Depending on the use: • Weekly or monthly
Dissolved Oxygen	Maintenance includes: • the cleaning of the probe, • the replacement of the head. For the auto-cleaning probe option, it can be automatically cleaned by sending pressurised air.	Depending on the use: • Weekly or monthly cleaning. • Replacement of the head recommended every 12 months.
ORP	Maintenance includes: • the cleaning of the probe, • the replacement of the probe. Contamination of the sensing element often results in slow response and inaccurate readings. Clean the electrode by one of the following procedures: • Inorganic deposits. Immerse the electrode tip in 0.1 N HCl for 10 minutes. Wash the tip with DI water.	Depending on the use: • Weekly or monthly cleaning. • Replacement of the probe every 6 months.

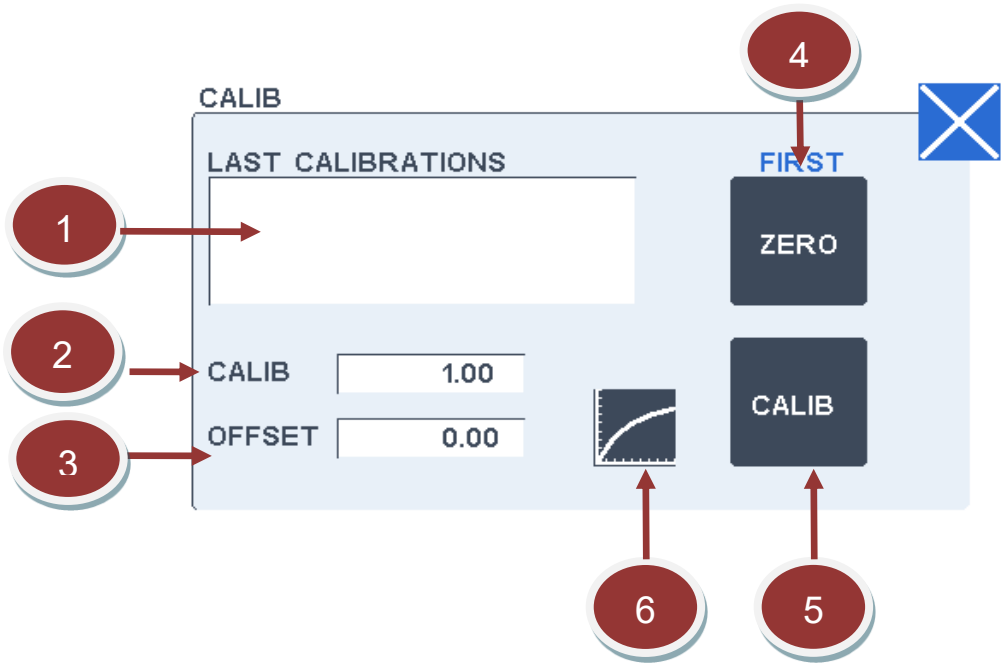
	• Organic oil and grease films: wash electrode tip and a liquid detergent and water. • After above treatment, soak the electrode tip in alcohol for 5 minutes, then in quinhydrone saturated pH4.01 for 15 minutes. Rinse with DI water afterwards.	
pH	Maintenance includes: • The cleaning of the electrode, • Calibration • Replacement of the electrode. For electrode cleaning, do not use strong solvents (e.g. acetone, carbon tetrachloride, etc) to clean the pH electrode. Clean the electrode under warm tap water using dish-washing detergent if the electrode has become dirty with oil or grease. If the electrode has been exposed to protein or similar materials, soak it in acidic pepsin. Be sure to recalibrate the electrode after cleaning. If previous cleaning procedures failed to restore response, soak the electrode on 0.1N HCl for 30 minutes. Rinse with DI water and recalibrate. If electrode response is not restored yet, replace the electrode.	Depending on the use: • Weekly to monthly cleaning. • Replacement every 6 months.
Temperature	No maintenance is required.	
TSS	No special maintenance, except from checking that the windows are clean.	
Turbidity	Maintenance includes: • The cleaning of the probes. • The cleaning of the laser and photodetector windows for TURB200. Do not touch the probe cell surface with any hard object. If the probe cell surface is contaminated, soak the probe cell portion in light detergent and mild acid for about 15 min, respectively. Regarding TURB200, be careful when cleaning the windows not to scratch them.	Depending on the use: • Weekly or monthly cleaning.
UV200	Maintenance includes: • The cleaning of the probe. Passage of compress air is recommended to clean the deposits that might stick to the windows. A 3 – 4 bar air jet for 10-20 seconds every 60-120 minutes is recommended. However, these are optional settings and can be adjusted as for the application.	Depending on the use: • Weekly or monthly cleaning.

2. Procedures

2.1. Calibration

2.1.1. Calibration Screen

The calibration screen below enables to recalibrate the measurement channel.
Recommendations for recalibration are given after the following screen description.



1 Last calibration window

This window displays the 5 last calibrations done with the date, time and the new calibration factor.

2 Scan last calibrations

These two buttons allow to scroll up and down the 10 last calibration records.

3 Calibration factor

This field allows changing manually the calibration factor of the channel.
This factor is normally changed automatically while doing a calibration procedure by pressing on the “CALIB” button.

4 Zero

This button enables to do the zero. Be sure that the probe is immersed on pure water before pressing on this button.
Note: When pressing this button, optical signals are accessible only for TURB200 and UV200 probes.

5 Calibration procedure

Refer to **section 2.1.2** for detailed information.

6 Linearization curve

Refer to **section 2.1.3** for detailed information.

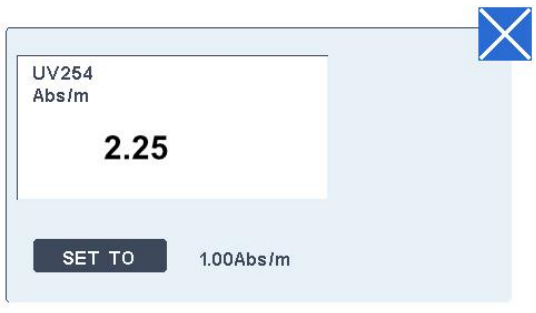
2.1.2. Calibration Procedure

The button 5 of the “Calibration” screen starts a calibration procedure:

- *Screen 1*: The standard value must be entered.
- *Screen 2*: the last measured value is displayed and must be validated (or re-entered). Be sure that the probe is immersed on the standard before pressing on the button SET TO.

When finished, a new calibration factor is determined and recorded on the calibration history.

Screen 1



Screen 2

2.1.3. Linearization Curve

As the Beer-Lambert law is not linear for high absorbance values, a linearization curve is entered to automatically compensate this non-linearity. This button displays the linearization curve and enables to enter or check the linearization values.

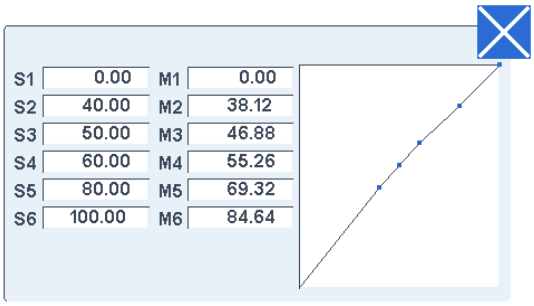
The Y-axis corresponds to the rough measurements entered on the M1 to M10 fields while the X-axis corresponds to the standard or final measurement, entered on the S1 to S10 fields (See *screen 1*).

The M1-M10 and S1-S10 values must be strictly increasing. It is recommended to put 0.0 and 0.0 as starting values for S1 and M1. The final value is linearly extrapolated between these points (see *Screen 2*). Unused points at the end of the table must strictly remain at 0.0 both for S and M.

In case a new linearization curve needs to be saved, proceed as follows:

a. In the “Calibration” screen shown before, make sure that the calibration factor is set to 1.
b. Select the button 6 of the “Calibration” screen. The screen 1 shown below is displayed.
c. Erase all previous values. Put 0 for all values except for S1 = 1 and M1 = 1.
d. Run a manual test on each standard solution.
e. Enter the values from S2 of the standards you used.
f. Enter the corresponding values measured by the analyser from M2.
g. Check that the linearisation curve is correct by manually running a standard.

Screen 1:



2.1.4. Calibration Standards

Calibration should be done before the first use. Periodical checking is also recommended, and a recalibration might be necessary after several months, depending on the conditions of use. To recalibrate the probes, first prepare the standard corresponding to the parameter as indicated in **Table 2**. Then do a manual measurement on this standard following the indications given in **section 2.1.2**. The calibration is finished. A new calibration factor has been calculated and has been recorded inside the calibration history displayed on the check screen. This new calibration factor will be taken into account for all further measurements.

Table 2. Standards and calibration guidance for each parameter.

Parameter	Standard and Calibration Guidance
Chlorine probe	Prepare a 20 mg/L free chlorine standard: Weight 1.850 g dichloroisocyanuric acid sodium salt $C_3HCl_2N_3NaO_3$ *(CAS number: 51580-86-0)* and dilute in 1 litre of demineralized water to obtain a mere solution of 1 g/L free Cl_2. Then take 20 mL of this mere solution and complete to 1 litre of demineralized water.
Conductivity	Put the electrode in demineralized water. - Do manual measurements using the check screen, wait for the stabilisation of the conductivity value (a few minutes if the electrode is new or dry), then press on the ZERO key. - Then put the electrode in a standard solution for conductivity (example 210 µS for 100 mg/L sodium chloride NaCl *(CAS number: 7647-14-5)* at 25°C). - Do a manual measurement on this solution using the check screen, wait for the stabilisation of the conductivity. - Go on the calibration screen, press on the CALIB key, enter the standard value on the keypad and press on SET TO. The calibration is finished. New offset and calibration factors have been calculated and recorded on the calibration history displayed on the calibration screen. These new offset and factors will be taken into account for all further measurements.

Dissolved Oxygen	The DO probe is factory calibrated and is normally stable for long period of time (one year). It may be recalibrated if necessary. Zero calibration: - Put the probe on zero-oxygen solution. A zero-oxygen solution can be prepared by dissolving 10 g sodium sulfite Na_2SO_3 *(CAS number: 7757-83-7)* into 300 mL of demineralized water and eventually adding a shake of cobalt chloride that accelerates the reaction. Allow a few minutes of reaction before using this solution. Do not keep this solution more than a few hours. - Do manual measurements using the check screen, wait for the value to stabilize (it may take a few minutes). Then go to the calibration screen and press on the ZERO key. Full scale calibration on air: - Put the electrode on ambient air. - Do manual measurements using the check screen, wait for both the value and the temperature to stabilize (it may take a few minutes). - Then go to the calibration screen and press on the 100% key. - Enter the atmospheric pressure read on a portable barometer. The probe is internally recalibrated. There is no change on the calibration factor.
Oxidation-Reduction Potential (ORP)	- Zeroing: Replace the ORP electrode on input terminal (J2 position if PH500 module or J12 if direct connection on EL200 board) by a strap to display 0 mV. - Wait for the stabilization of the ORP value, then press on the ZERO key. - Put the electrode in a standard buffer solution. - Do a manual measurement on this standard using the check screen and wait for the stabilisation of the ORP value. - Then go to the calibration screen and press on the CALIB button. Validate the last measured value and then enter the standard value on the keypad.
pH	- Put the electrode in a pH 7.0 buffer solution. - Press on the pH=7 key of the calibration screen. Wait for the stabilisation of the pH value, then press on the SET TO 7.0 key. - Put the electrode in a pH 4.0 buffer solution. - Press on the pH= … key of the calibration screen. Enter the standard value, wait for the stabilisation of the pH, then press on the SET TO key.

Temperature	- Put the temperature probe in a Dewar filled of ice and water. - Do manual measurement using the check screen, wait for the stabilisation of the temperature value, and then press on the ZERO key. - Put the temperature probe in a Dewar filled of water at a temperature between 50 °C and 80 °C with a reference thermometer inside. - Do manual measurement using the check screen, wait for the stabilisation of the temperature value. - Go to the calibration screen, then press on the CALIB key. Validate the last measurement then enter the value given by the reference thermometer on the keypad.
Turbidity by Absorbance (external probe)	- Do a TSS laboratory measurement on a sample representative of the measuring range. - Do a manual measurement on the same sample using the check screen.
Turbidity by nephelometry with laser diode	Take a turbidity standard (formazine for example) representative of the measuring range.
UV254 (UV200)	The analyser gives the result in absorbance by meter by default. No calibration is required in this measuring mode regarding the accuracy of flow cell optical path (± 0.1 mm). If the measuring mode is in COD and after than the UV254-COD relation has been tested, the analyser must be calibrated according to a COD laboratory measurement as each kind of effluent has a specific UV254 / COD ratio. The default calibration in COD mode corresponds to river water with a calibration factor of 0.5. The calibration factor for municipal wastewater is around 10. Note that many saturated organic compounds like glucose or alcohol do not have UV absorption. To recalibrate the analyser in COD mode, proceed as follows: - Take a representative sample and bring it to a laboratory for a COD measurement. - Do a manual measurement on this sample using the check screen (it is recommended to check first the zero). - When the laboratory measurement is known, go on the calibration screen and press on the CALIB button of the check screen. Enter the measurement given by the analyser and then enter the laboratory value on the keypad.

2.2. How to Connect a Probe

2.2.1. Connections on the EL200 Electronic Board

The drawing of the EL200 electronic board is explained below (**Figure 1**), with indications on where and which external probes can be connected:

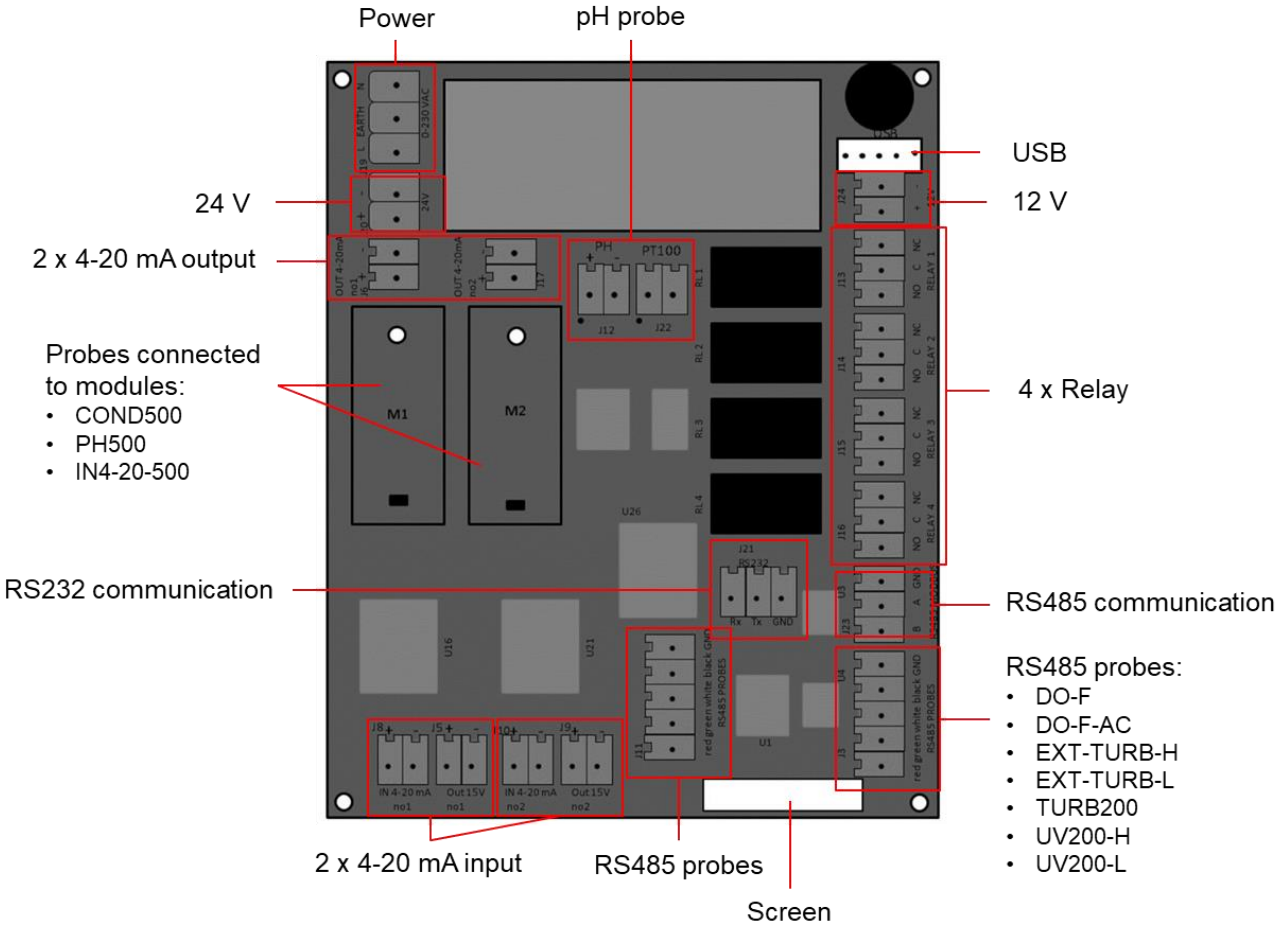


Figure 1. Drawing of the EL200 electronic board explaining the connections.

Note on RS485 probes: the two RS485 connectors are connected in parallel, meaning that up to two RS485 probes can be connected on each RS485 connector. **In total, four RS485 probes can be connected in one EL200** (practically, two wires per terminal are the maximum for a secured tightening).

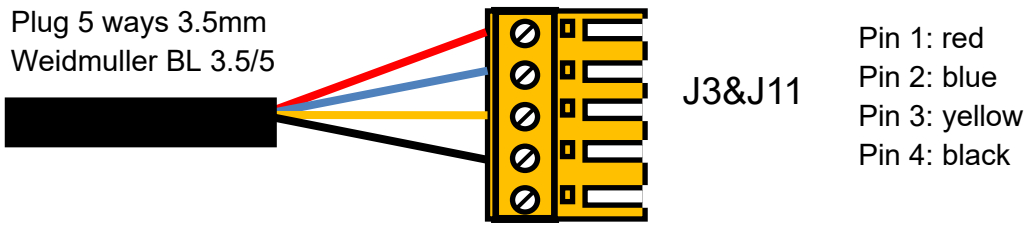
2.2.2. RS485 Probes

The following probes are connected to the RS485 port:

Probe	Probe Reference
Dissolved Oxygen probe by fluorescence	DO-F
Dissolved Oxygen probe by fluorescence with autocleaning	DO-F-AC
Total Suspended probe high range High range: 0 – 30000 mg/L TSS	EXT-TURB-H
Total Suspended probe low range Low range: 0 – 1500 mg/L TSS	EXT-TURB-L
Nephelometric turbidity sensor low range Range: 0 – 100 NTU	TURB200
UV200 high range Range: 0 – 600 Abs/m (0 – 5000 mg/L COD on rough municipal waste water)	UV200-H
UV200 low range Range: 0 – 200 Abs/m (0 – 100 mg/L COD on rough municipal waste water)	UV200-L

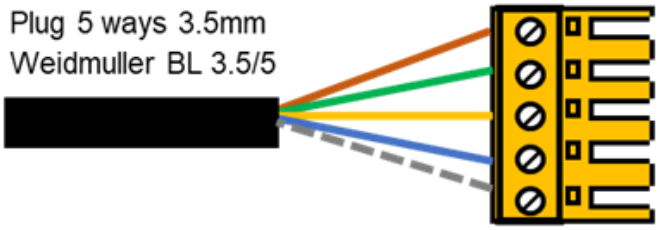
The Dissolved Oxygen probe by fluorescence has the following wiring:

Standard DO RS485 wiring



Note: several probes can be connected in parallel, except for the first time the probe is configured. It must be done one by one. Once configured, the probes can be connected in parallel.

The UV200 probe has the following wiring:

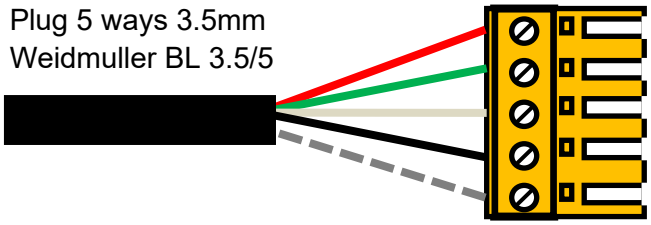


Pin 1: brown
Pin 2: green
Pin 3: orange
Pin 4: blue
Pin 5: shielding

Note: several probes can be connected in parallel, except for the first time the probe is configured. It must be done one by one. Once configured, the probes can be connected in parallel.

The other RS485 probes have the following wiring:

RS485 probes wiring



Pin 1: red
Pin 2: green
Pin 3: white
Pin 4: black
Pin 5: Shielding

Note: several probes can be connected in parallel, except for the first time the probe is configured. It must be done one by one. Once configured, the probes can be connected in parallel.

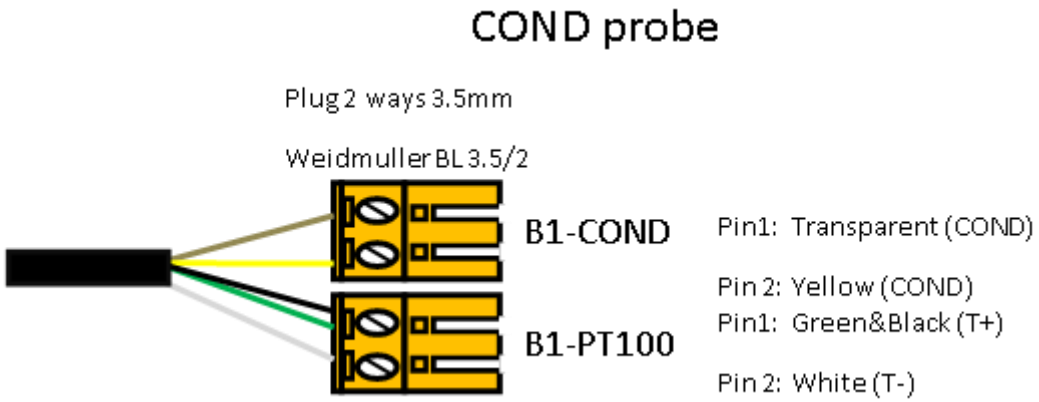
2.2.3. Probes Connected to Modules

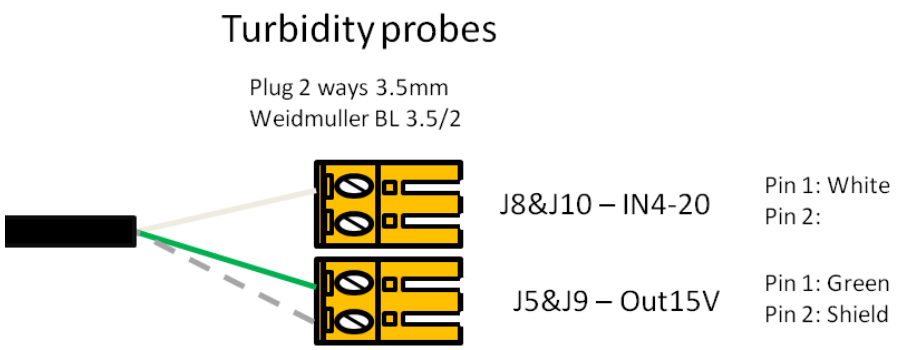
The following probes are connected to modules:

Probe	Probe Reference	Module Reference
Conductivity online electrode, K=1 Typical range: 0 - 10 mS	ELCOND	COND500
Conductivity online electrode, K=0.01 Typical range: 0 - 100 µS	ELCOND-0.01	COND500
Conductivity online electrode, K=0.1 Typical range: 0 - 1000 µS	ELCOND-0.1	COND500
Conductivity online electrode, K=10 Typical range: 0 - 100 mS	ELCOND-10	COND500
Inductive conductivity online probe Range: 0 – 200 mS	ICOND	Internal IN4-20-500 (or additional module)

Nephelometric turbidity probe high range High range: 0 – 400 NTU	EXT-TURBNEPH-H	Internal IN4-20-500 (or additional module)
Nephelometric turbidity probe low range Low range: 0 – 40 NTU	EXT-TURBNEPH-L	Internal IN4-20-500 (or additional module)
pH sensor, general purpose	ELPH	PH500
pH sensor, differential	ELPH-D	Internal IN4-20-500 (or additional module)
ORP sensor, general purpose	ELORP	Internal IN4-20-500 (or additional module)
Amperometric chlorine electrode	ELCHL	Internal IN4-20-500 (or additional module)

Put the relevant module on one of the twelve sockets of the EL200 board. Screw the module with a M3x6 screw.

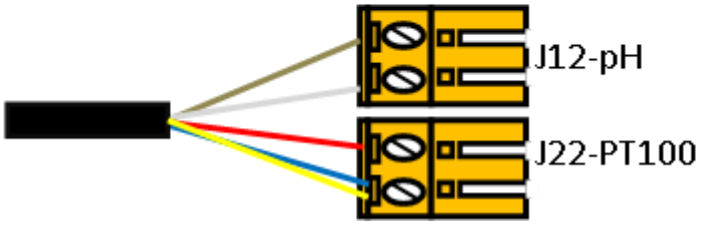




pH electrodes

Plug 2 ways 3.5mm

Weidmuller BL 3.5/2



Pin1: Transparent (G)

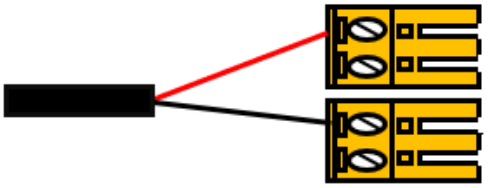
Pin 2: White reference (R)

Pin 1: Red T+

Pin 2: Blue T- & Yellow (E)

pH Differential electrodes

Plug 2 ways 3.5mm
Weidmuller BL 3.5/2



Pin1: Red
Pin 2: Empty

Pin 1: Black
Pin 2: Empty

ORP electrodes

Plug 2 ways 3.5mm

Weidmuller BL 3.5/2

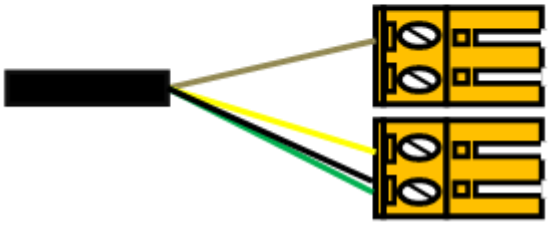
Pin1: Transparent (M)

Pin 2: White & Yellow (R+E)

Chlorine probe

Plug 2 ways 3.5mm

Weidmuller BL 3.5/2



Pin 1: Brown

Pin 2:

Pin 1: Yellow

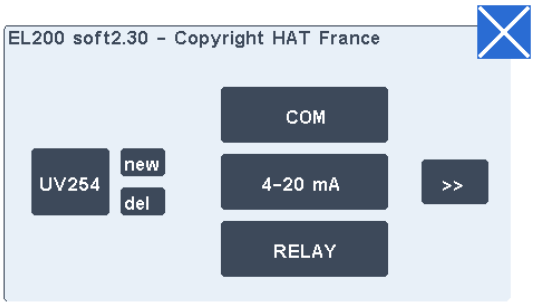
Pin 2: Green & Black

2.3. How to Add / Remove a Parameter

2.3.1. How to Add a Parameter

In case you need to declare a new parameter, proceed as follows:

a. In the Main menu screen, select “Settings” to open the Settings screen, and then select “New”.



b. Enter the password 3333.

c. Select the parameter you want in the list and click on OK.

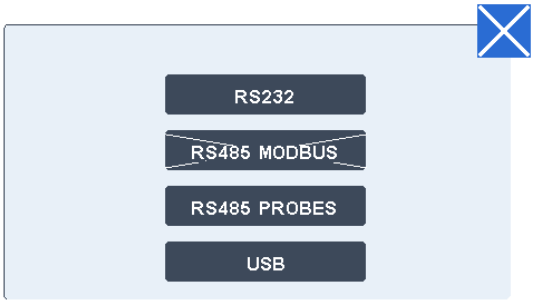
d. Choose the positions of the channel no. and multiplex, the position of the probe module, the position of the 4-20 mA module.

The parameter is now added and appears on the Settings screen.

2.3.2. Reinitialization of RS485 Probes

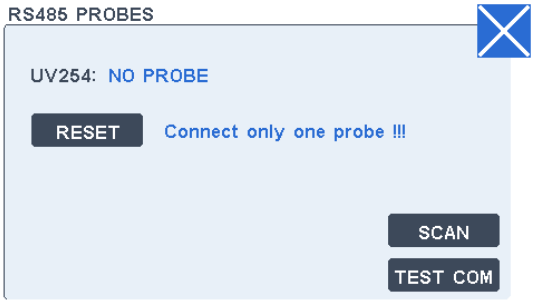
In case additional RS485 probes are added or replaced on one EL200 controller, an error message will appear on the second RS485 probe that was declared. A reinitialization has to be done to erase this error message. To do so, proceed as follows:

a. Declare the parameters as previously explained.
b. Go on the SETTINGS of the second RS485 probe that was declared.
c. Press on COMMUNICATION, then select RS485 PROBES as shown below:



d. Disconnect the first RS485 probe that was declared. Only the second probe should be connected.

e. Press on RESET:

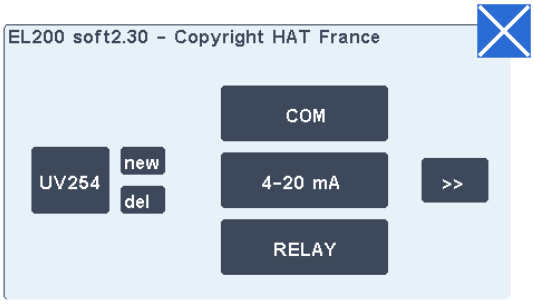


f. Reconnect the first RS485 probe. Both values measured by the probes will now be displayed.

2.3.3. How to Remove a Parameter

In case you need to remove a parameter, proceed as follows:

a. On the Settings screen, select the parameter you want to remove.



b. Select “DEL” and confirm.

c. Enter the password 3333.

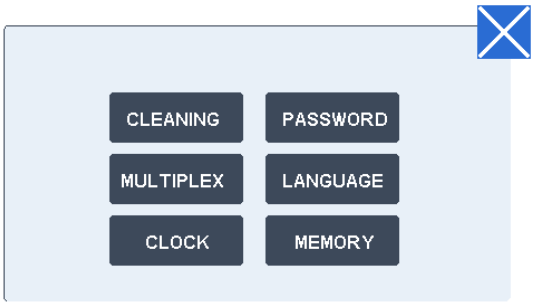
The parameter is now deleted.

2.4. Memory Re-initialization

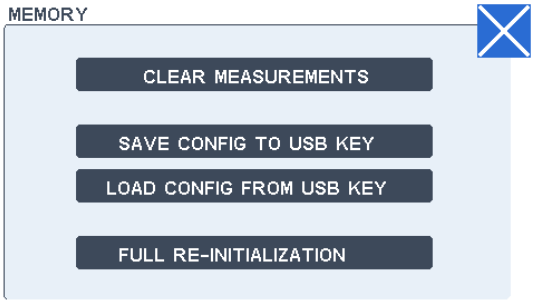
This procedure erases all the configuration (channel, parameters, general settings…). It may be used exceptionally in case of board replacement. The configuration must then be-reintroduced either manually or from a configuration file saved on a USB key.

To do a memory re-initialization, proceed as follows:

a. In the Settings screen, select >> to open the second Settings screen:



b. Select MEMORY:



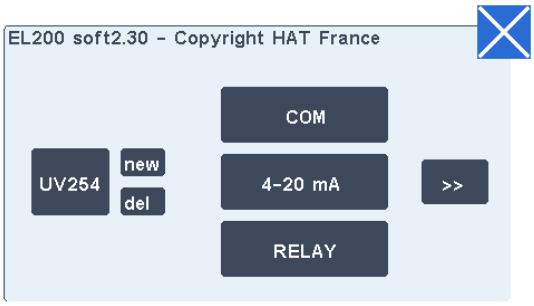
c. Select FULL RE-INITIALIZATION. Note that you can select SAVE CONFIG TO USB KEY before doing the re-initialization.

2.5. USB

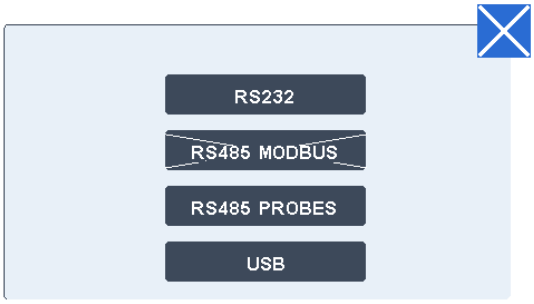
2.5.1. How to Take Screenshots

To take screenshots, proceed as follows:

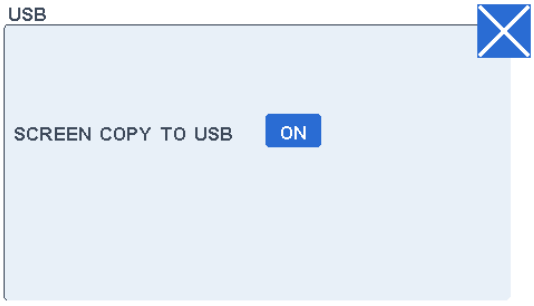
a. Select a parameter on the “Values process screen”. The following screen is displayed:



b. Select “COM”, then “USB”:



c. Select 



From now on, a screenshot will be saved on your USB key when you insert it in the USB plug on the EL200 controller. This configuration will last until you press 

again, or if you turn off the controller. Then, do this procedure again to reactivate the USB screen copy.

Disconnect the USB key as soon as the operation is finished as USB connection is not watertight and as it may block the analyser normal operation.

2.5.2. How to Update the Software

In case you need to update the software, proceed as follows:

a. Save the software file on a USB key.
b. Turn off the controller.
c. Plug in the USB key on the controller.
d. Press anywhere on the screen with your finger.
e. Turn on the controller.
f. Choose the version of software you want to download and press on START.
g. Once the downloading is finished, remove the USB stick. You can start using the controller.

2.6. Modbus Addresses

Address in Decimal	Internal Name	Type	Description
99	jb_clean	16-bit integer	Start a cleaning cycle when set to 1 (back to 0 when finished)
100	invalid	Table of 16 16-bit integer	Channels measuring error code (0=no error)
132	process	Table of 16 IEEE float	Channels process value (not updated by measurements in check screen)
196	calib_factor	Table of 16 IEEE float	Channels calibration factor
260	offset	Table of 16 IEEE float	Channels offset factor
324	active	Table of 16 16-bit integer	Channels in operation (1=in operation, otherwise 0)
356	label	Table of 16 strings of 7 characters	Channels label name (null character terminated)
468	unit	Table of 16 strings of 7 characters	Channels unit name (null character terminated)

3. Troubleshooting

3.1. General troubleshooting

Disconnect the power cord before servicing!

Symptoms	Checking / Origin
The screen remains totally black after connecting the power cord. **AND** The red LED D8 on the EL200 board is OFF.	- Check the power socket. - Check J19 connector (mains input, high voltage!). - Check J2 connector (24V DC output from the power supply). - Failure on the power supply of the EL200 board.
The screen remains totally black after connecting the power cord. **AND** The red LED D8 on the EL200 board is ON.	- Failure off the EL200 board.
If Bip when powered on but unstable display.	- Check the screen connector J1 on the bottom of the EL200 board. - Failure off the EL200 board.

3.2. Measuring errors for external probes

Probes	Error no	Signification	Origin / Remediation
Conductivity	1	Over range	- Check on pure water. - Failure on the conductivity board (replace).
pH	1	Over range	- Probe disconnected. - Failure on the pH board (replace).
Temperature	1	Over range (high)	- Check the connection of the temperature probe.
	2	Over range (low)	- Check the probe with an ohmmeter, the value must be in a 100 to 120 Ohm range, if not replace the probe. - Failure on the temperature module (replace).
TURB200	1	No connection	- The probe is not connected or badly connected. - The probe is not properly configured. - **A special initialisation must be done when the probe is used for the first time.**
	2	Detector default	- Check wiring. - Failure on photodetector board (repair or replace).
	3	The light level is too high	- Too much parasite light. Check that the cover is properly closed. - Test on demineralized water. - Check that no air bubble is present in the flow cell. If yes, check the fittings.
	4	The light level is too low	- Check red light from the laser by removing the three black knobs of the probe. - The sample is highly turbid. Check the probe on tap water and/or standard solution (100 NTU maximum) - Failure on the photodetector board (repair or replace).
UV200	1	No connection	- The probe is not connected or badly connected. - The probe is not properly configured. - **A special initialisation must be done when the probe is used for the first time.**
	2	Detector default	- Check wiring. - Failure on photodetector board (repair or replace).

	3	Signal too high on Led 1	- Too much parasite light. - Protect from direct UV irradiation.
	4	Signal too high on Led 2	- Too much parasite light. - Protect from direct UV irradiation.
	5	Signal too low on Led 1	- Too much turbidity or organic matter in the water sample. - Check on demineralized water.
	6	Signal too low on Led 2	- Too much turbidity in the water sample. - Check on demineralized water.
TSS	1	No connection	- The probe is not connected or badly connected. - The probe is not properly configured. - **A special initialisation must be done when the probe is used for the first time.**
	2	General default	- Send for repair.
	3	Out of range	- Check the measuring range. - Test on a formazin standard or demineralized water.
	4	Negatives values	- Do the zero on demineralized water.
DO Insight	1	No connection	- The probe is not connected or badly connected. - The probe is not properly configured. - **A special initialisation must be done when the probe is used for the first time.**
	2	Light too high on peak	- Too much signal on the peak photodiode. - Check on demineralized water.
	3	Bad signal on the peak photodiode	- Check on demineralized water.
	4	Light too high on reference	- Too much signal on the reference photodiode. - Check on demineralized water.

	5	Bad signal on the reference photodiode	- Check on demineralized water.
	6	Temperature default	- Check on demineralized water. - Send for repair.
	7	Temperature default	- Check on demineralized water. - Send for repair.
DO aurora	1	No connection	- The probe is not connected or badly connected. - The probe is not properly configured. - **A special initialisation must be done when the probe is used for the first time.**
	2	Default	- Check on demineralized water. - Send for repair.
	3	Temperature default	- Check on demineralized water. - Send for repair.
	4	Default	- Check on demineralized water. - Send for repair.
	5	Default	- Check on demineralized water. - Send for repair.
	6	Default	- Check on demineralized water. - Send for repair.
	7	Default	- Check on demineralized water. - Send for repair.

3.3. Screen Ribbon Troubleshooting

In very rare cases, the screen display might be malfunctioning. If it happens, check the connection of the screen ribbon. To do so, proceed as follows:

a. Check the two grey connectors shown on the left picture (**Figure 2**).
b. Pull them off as on the right picture (**Figure 2**).
c. Put back the ribbon.
d. Push the two grey connectors to their initial position.

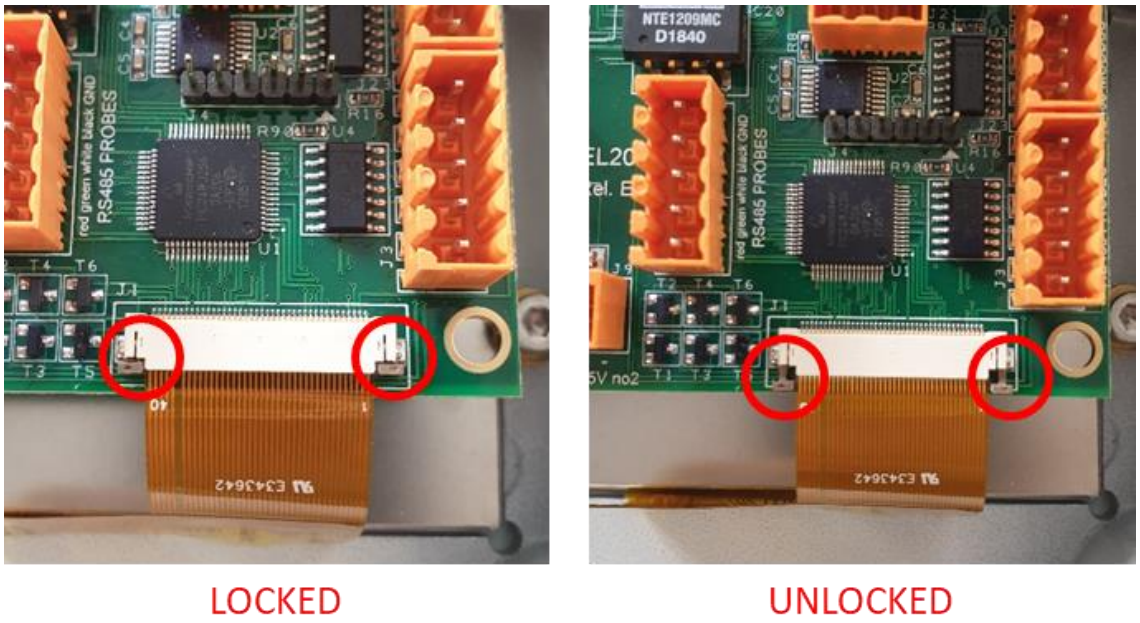


Figure 2. Positions of the grey connectors of the screen ribbon.

4. General Specifications

Dimensions (HxWxD):	140 x 140 x 91 mm
Weight:	2 kg
Mounting:	Wall
Rating:	Nema 4X
Display:	Colour LCD, 480 x 272 pixels, 4.3", LED backlight
For outdoor:	An enclosure is required
Altitude:	Less than 2000 m
Humidity:	85% or lower
Pollution degree:	2
Storage temperature:	- 25 °C to + 65 °C
Power supply:	100 - 240 VAC ± 10% / maxi 20 VA / 50 / 60 Hz
Overvoltage category:	II
Connected on power systems:	TT
Analog 4-20 mA outputs:	2 (expendable to 4 if no other module), galvanic isolation
Analog 4-20 mA inputs:	2 (expendable to 4 if no other module), galvanic isolation plus isolated 15 V DC output
RS485 connector for probes:	2 (up to 4x RS485 probes) for DO, TSS
pH/ORP input:	1 (expendable to 3 if no other module), galvanic isolation
Conductivity input:	0 (expendable to 2 if no other module), galvanic isolation
Security:	Two level passwords
Relay:	4 x electromechanical SPDT (form C) contact, 5 A
Relay function:	High & low alarm, default (power safe mode selectable)
Communication:	MODBUS RS232 and RS485
USB:	For configuration backup/restore, download and software update, screencopy
Safety standard:	EN 61010-1:2010
EMC standard:	EN 61326-1:2013, IEC61000-3-2, IEC61000-3-3, IEC61000-4-

2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-11
