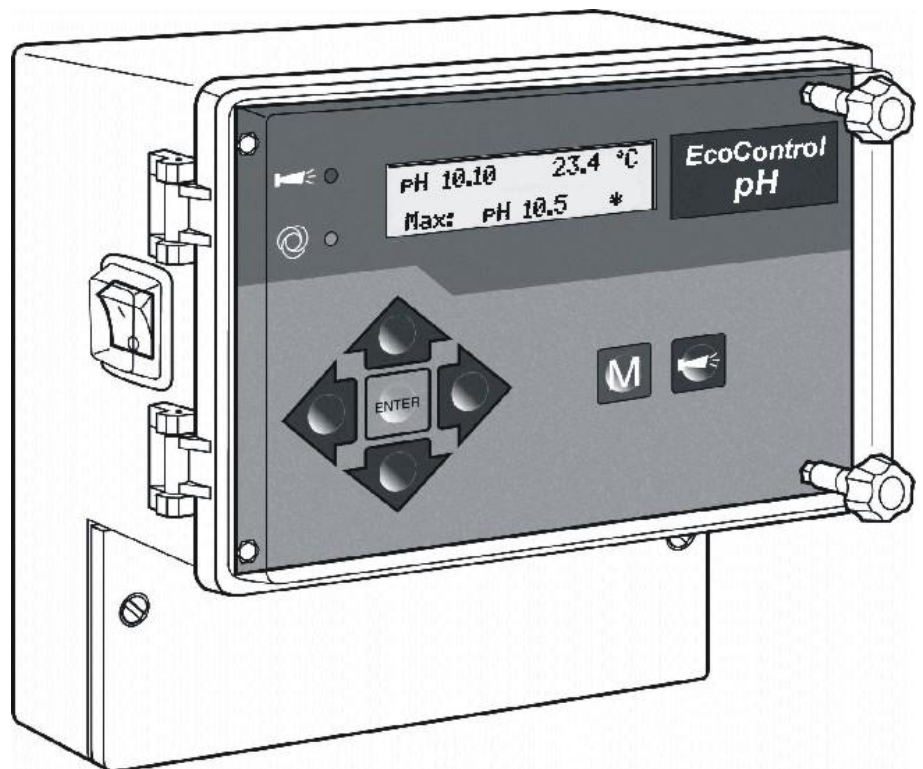


Operating Instructions EcoControl pH

pH – Measuring Instrument



Contents

Contents	2
Important safety information	4
Intended use	4
Qualification of the staff	4
Warning notices in these instructions	5
Further documents.....	5
Pay particular attention to	5
General instructions	5
Installation	6
Operation	6
Cleaning.....	6
De-installation	6
Disposal	6
Scope of delivery	7
Performance specifications	7
Position of the fuses and interfaces	9
Installation	10
Prior to installation	10
Installing EcoControl pH	10
Connecting the power supply and devices	10
After installation	12
Commissioning	13
Operating system.....	13
Menu tree “Service”	15
Menu tree “Basic program”	16
Calibrating the pH probe	18
Calibrating with preset buffers pH 7.00 and pH 9.00.....	18
Calibrating with freely selected buffers (two-point calibration)	19
Reset calibration to standard values.....	20
Calibration of the temperature sensor	20
Reset calibration temperature.....	21
Display or reset operating hours	21
Display and set the time and date	22
Operation	23
Key functions.....	23
Display	23
Operating display	23
Error messages.....	23
Enter/Alter values in the “Basic program” menu	25
Enter password.....	25
Define lower limit value and function if the limit value is not achieved.....	25
Define the upper limit value and function if the limit value is exceeded	27
Define a control area	29
Set the temperature compensation.....	30
Configure the alarm signal.....	31
Configure the 0/4-to-20 mA interface.....	32
Configure the integrated ring buffer	32

Configure the serial interface	33
Error messages.....	34
Alter the language on the display	34
Alter the password	34
Display the serial number	35
Define the maintenance interval	35
Release/Block the serial interface	36
Reset all settings to the factory settings (Reset)	36
Read the measuring data via the PC program "EcoControl"	37
Troubleshooting.....	38
Create diagnoses.....	38
Display or delete the error history	39
Display number and date of the software	39
Maintenance and Care.....	40
Replacing the battery	40
Display maintenance interval.....	40
Reset the maintenance interval	41
Disassembly	42
Accessories	43
pH combined electrodes	43
Technical Data.....	44
Conformity Declaration	45



Important safety information

- Please read the operating instructions carefully and completely prior to working with the instrument.
- Ensure that the operating instructions are always available for all user.
- Always pass the EcoControl pH on to a third party together with these operating instructions.

Intended use

The EcoControl pH in combination with a suitable combination electrode is only intended for measuring the hydrogen ion concentration in **aqueous media**. The instrument is intended for industrial usage.

- Always adhere to the performance limits stated in chapter “Technical data”.

To ensure correct and intended usage, the instructions and especially chapter “Important safety information” have to be read and understood.

The instrument is not used as intended if

- the instrument is used in applications areas which have not been stated in these instructions.
- the instrument is used under operational conditions which deviate from the ones described in these instructions.

Qualification of the staff

Assembly, calibrations and commissioning require fundamental electrical knowledge as well as knowledge of the respective technical terms. Assembly, calibration and commissioning should therefore only be carried out by a specialist or by an authorised individual supervised by a specialist.

A specialist is someone who due to his/her technical training, know-how and experience as well as knowledge of relevant regulations can assess assigned tasks, recognise potential hazards and ensure appropriate safety measures. A specialist should adhere to relevant technical regulations.

Warning notices in these instructions

The warning notices in these instructions warn the user about potential dangers to individuals and property resulting from incorrect handling of the instrument. Warning notices are structured as follows:

SIGNAL WORD!



Description of type or source of the danger

Description of the consequences resulting from non-observance

➤ Preventive measures. Always follow these preventive measures.

“**DANGER**” indicates an immediate hazardous situation which, if not avoided, will result in death or serious injury.

“**WARNING**” indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

“**CAUTION**” indicates a potentially hazardous situation which, if not avoided, would result in minor or moderate injuries or property damage.

“**Note**” indicates important information. If this information is not observed, it may result in an undesirable result or state.

Further documents

EcoControl pH is a plant component. Therefore, always observe the documentation of the plant manufacturer.

Pay particular attention to

General instructions

- Adhere to national health and safety regulations as well as environmental protection regulations in the country of use and at the installation site.
- Do not modify or tamper with the instrument.
- Quick, repeated switching on/off of the instrument should be avoided. After switching the main switch off, wait at least 5 seconds before switching it on again.
- Do not carry out any actions at the instrument which are not described in these instructions; failure to adhere to these instructions will negatively affect any warranty claims that you make thereafter.
- Adhere to national and local regulations during installation and start-up.

Installation

- Always completely disconnect the relevant plant part before installing the instrument or connecting/disconnecting it to/from the power supply. Secure the plant against reconnection.
- EcoControl pH requires an interference free and stable power supply and must be earthed. If necessary, use a mains filter to protect EcoControl pH against interference voltages caused, e.g., by solenoid valves or large motors. Never lay connecting cables parallel to power cables and keep cables to sensors as short as possible.
- Only connect the instrument to the mains voltage specified on the rating plate.
- Always observe technical data and ambient parameters.

Operation

- Ensure that the maximum electrical load capacity of the relay outputs and the total power rating are never exceeded.
- Immediately switch off EcoControl pH and contact service staff if malfunctioning occurs (e. g. display failure). The warranty will be void if you tamper with or attempt to repair EcoControl pH. Repairs must be carried out by authorised service staff.
- After a protective circuit (e.g. a fuse) has been tripped, always attempt to eliminate the cause of malfunctioning (e.g. replace a defective motor valve) before reactivating the protective circuit. Frequent triggering is always due to an error which, in certain circumstances, may also cause damage to EcoControl pH.

Cleaning

- Only use a dry, lint-free cloth for cleaning.

De-installation

- Prior to de-installing a defective instrument, always write down a description of the error (failure effect). It is only possible to repair a defective instrument (irrespective of the warranty period) if it is de-installed and returned to us with a description of the error.

Disposal

- Dispose of the device in accordance with national regulations.

Scope of delivery

- 1x pH measuring instrument EcoControl pH
- 1x Lithium battery, installed
- 1x Operating instructions

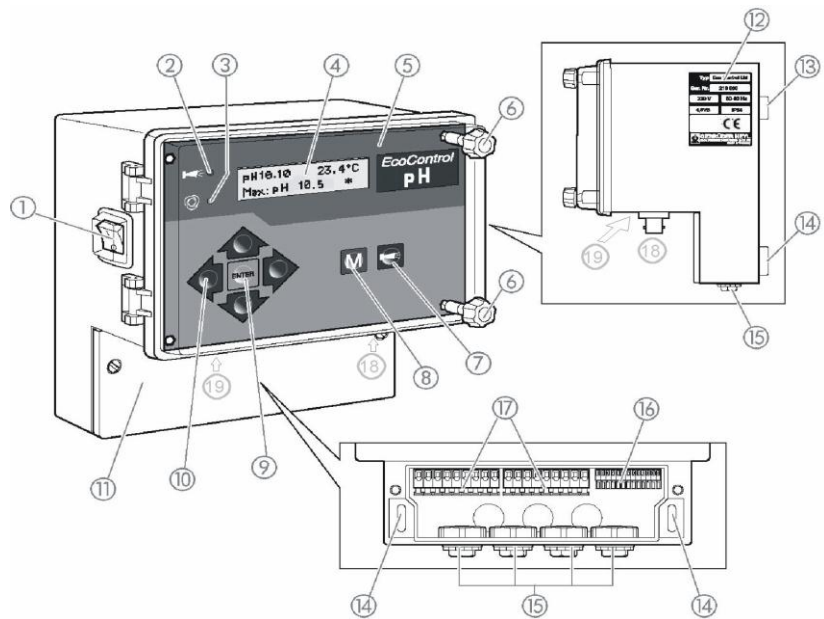
Performance specifications

Using EcoControl pH and a suitable combination electrode it is possible to determine the hydrogen ion concentration in **aqueous media** from pH 0.0 to pH 14.0.

- BNC connection for combination electrode and possible connection for external temperature sensor with PT100.
- Two independently programmable limit value contacts are available for various monitoring and control tasks.
- The measuring result can be transferred via the 0/4-20 mA interface or the serial RS232 interface.
- RS232 interface:

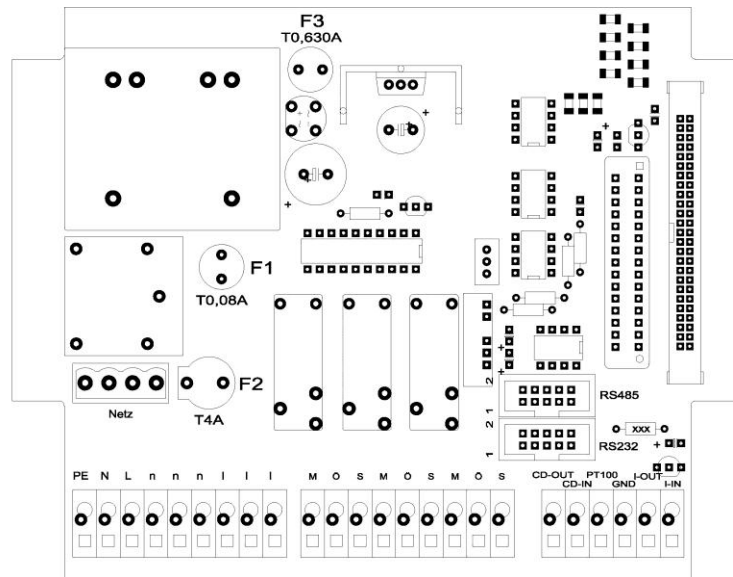
The measuring results can be output at a printer or PC. Between 20 (minimum) and 10,000 (maximum) measuring values with time and date can be saved by the instrument. Measuring values can be read via a PC with the aid of the "EcoControl" PC program

Operating features and connections



- | | |
|------------------------|---|
| ① I/O switch (backlit) | ⑪ Terminal box cover |
| ② LED "Alarm" | ⑫ Rating plate |
| ③ LED "Status" | ⑬ Eyelet for instrument fixing |
| ④ Display | ⑭ Slotted holes for instrument fixing |
| ⑤ Housing cover | ⑮ Cable bushings |
| ⑥ Housing cover screws | ⑯ Terminals for measuring data inputs and outputs |
| ⑦ "Alarm" key | ⑰ Terminals for power supply |
| ⑧ "M" key (Menu) | ⑱ Combination electrode connection |
| ⑨ "ENTER" key | |
| ⑩ Arrow keys | ⑲ Interface connection |

Position of the fuses and interfaces



- F1: Fuse 0.08 A
- F2: Fuse T4A (glass fuse 20 x 5)
- F3: Fuse 0.5 A

- Interfaces:
- RS485, sub D 10 pole
 - RS232, sub D 10 pole

Installation

Prior to installation

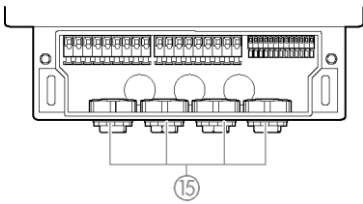
CAUTION!



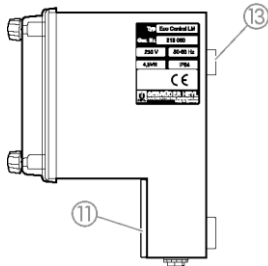
Risks resulting from incorrect installation!

EcoControl pH is protected against splash water and dust. High-pressure water and excessive dust will damage the instrument.

- Install the EcoControl pH at a location where it is protected against high-pressure water, dust and aggressive substances – e. g. in a switch cabinet or on suitable wall.

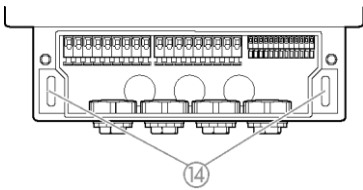


- Use a screwdriver to loosen the screws of the terminal box cover.
- Remove the terminal box cover ⑪



Installing EcoControl pH

- Use the screws to attach the instrument at a suitable position in the switch cabinet or on a wall.
- Hook the eyelet for instrument fixing ⑬ onto the screw.
- Use screws to fix EcoControl pH via the slotted holes for instrument fixing ⑭



Connecting the power supply and devices

CAUTION!



Risk of damages caused by electromagnetic fields!

- If EcoControl pH or the connecting cables are installed parallel to power cables or in close proximity to electromagnetic fields, the instrument may be damaged or measurements incorrect.
- Always install connecting cables and power cables separately.
- Always earth the instrument.
- Protect EcoControl pH against interference voltages – e. g. via a mains filter.
- Shield the instrument against strong electromagnetic fields.

CAUTION!**Risk of electric shocks during installation!**

If the power supply is not disconnected prior to installation, it may result in physical injuries, destruction of the product or damage to plant parts.

- Disconnect the relevant plant parts before installing EcoControl pH.
- Only use tested cables with sufficient cross-sections for the connections.

- Refer to the rating plate for the appropriate power supply.
- Connect the power supply to terminals 1–3.

The following devices can be connected to EcoControl pH:

- Various consumers, e.g. pumps, motors or solenoid valves (terminals 4–18)
- Sensors (terminals 19-22)
- Output devices (23, 24)

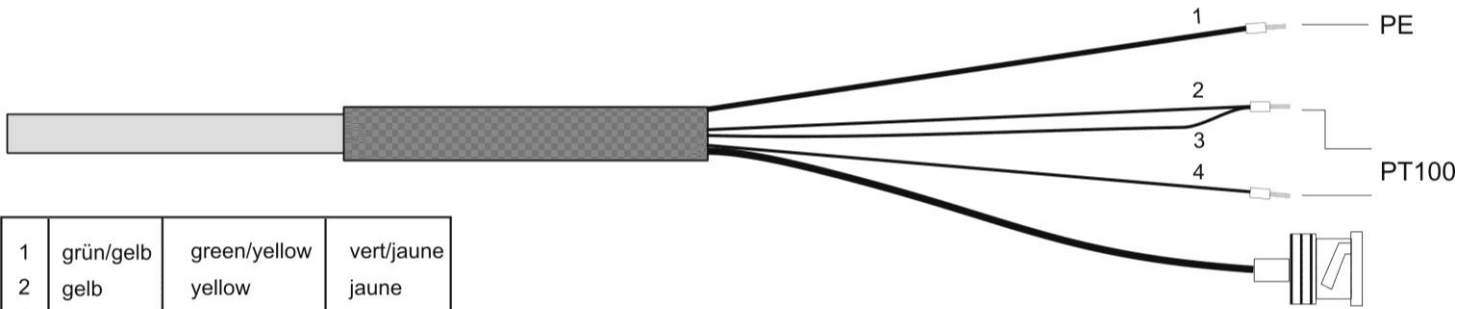
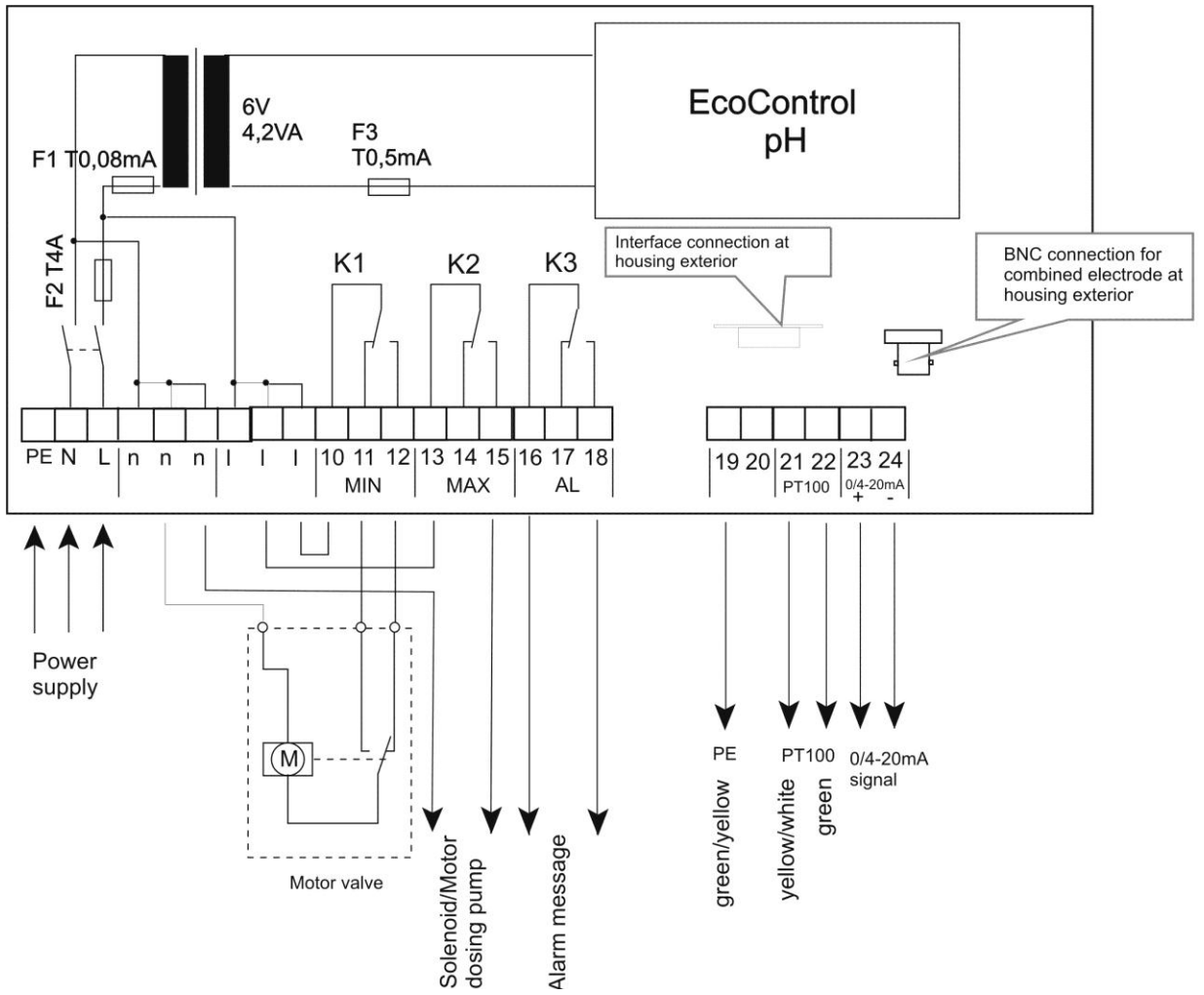
- Refer to the following table for the terminal block identification:

Terminals	Meaning
PE / N / L (1–3)	EcoControl pH power supply
n / l (4–9)	Consumer power supply
MIN (10–12)	Relay output: Switches when the value falls below the set minimum limit value.
MAX (13–15)	Relay output: Switches when the value exceeds the set maximum limit value.
AL (16–18)	Relay output: Switches when the set limit value for the alarm is achieved.
19 20	PE without use
21 and 22	Temperature sensor PT100 connection
23 and 24	0/4 - 20 mA signal output

CAUTION!**Power consumption**

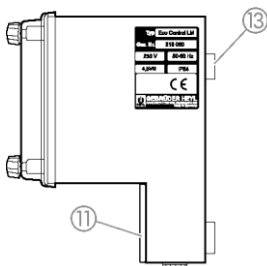
The maximum power consumption of all 3 relay outputs shall not exceed 920 W (at 230V) / 4 A.

The following diagram displays a connection example:



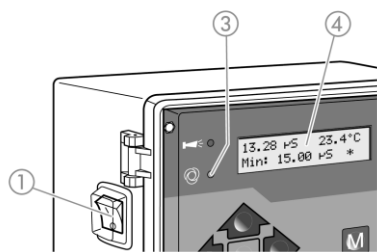
1	grün/gelb	green/yellow	vert/jaune
2	gelb	yellow	jaune
3	weiss	white	blanc
4	grün	green	vert

Coax cable with temperature compensation



After installation

- Replace the terminal box cover ⑪.
- Tighten the screws at the terminal box cover ⑪.



Commissioning

Switching EcoControl pH on/off

- To switch on the unit, flick the I/O switch ① to “I”.
The I/O switch ① is backlit. The LED “Status” ③ illuminates green. The operating display subsequently appears on the main display ④.
- To switch off the unit, flick the I/O switch ① to “O”.
The main display d is switched off. The LED “Status” ③ extinguishes.

Operating system

Opening the housing cover

To operate the unit, fold down the housing cover ⑤ as follows:

- Slightly turn the housing cover screws ⑥ anti-clockwise.
- Fold down the housing cover ⑤.

Call menu

- Press the “M” key (Menu) ⑧.
The basic menu appears.

Select menu

The following menus can be selected in the basic menu:

Menu	Functions
Service	Request and change current EcoControl pH settings and statuses. Access is not password protected.
Information	Display current settings from the “Basic Program” menu. Access is not password protected.
Basic program	Change settings or define values, enter plant data and parameters. The menu is password protected.

- Press the arrow buttons \uparrow or \downarrow to select the desired menu.
Continue to press the buttons to scroll up or down.
The selected menu is displayed in capital letters in the first line of the display.
- Press the “ENTER” key ⑨.
The selected menu opens. The menu item appears in the first line in capital letters.

Navigate to the desired menu item or input area

- Press the arrow buttons **↑** or **↓** to select a menu item. Continue to press the buttons to scroll up or down.
- Press the “ENTER” key **Ⓣ**.
The menu item displayed in the second line is selected and now appears in capital letters in the first line. The submenu or the input area is displayed.

Return to the higher order menu level

- Press the “M” key (Menu) **Ⓢ**.
The higher order menu level is displayed.

Enter/Change values

Only in the “Basic Program” and in some menu items in the “Service” menu is it possible to enter or change values. Active menu items are indicated via a tick, inactive menu items via a minus sign.

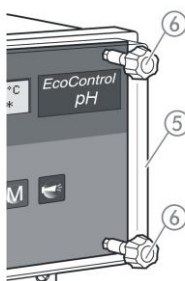
- Change to the desired input area as described in the previous section.
The first or active digit of the value you can change flashes.
- Press the **↓** button to reduce this value or the **↑** button to increase this value.
The changed value is displayed.
- Press the **←** or the **→** button to move to the previous or next digit respectively and to reduce or increase the value as desired.
- Press the “ENTER” key **Ⓣ** to confirm the displayed value.
The value is saved.

Exit menu

- Press the “M” key (Menu) **Ⓢ** several times to access the basic menu or to go to the operating display.

Note:

If a button is **not** pressed for 2 minutes, the unit automatically exits the menu and the operating display appears.

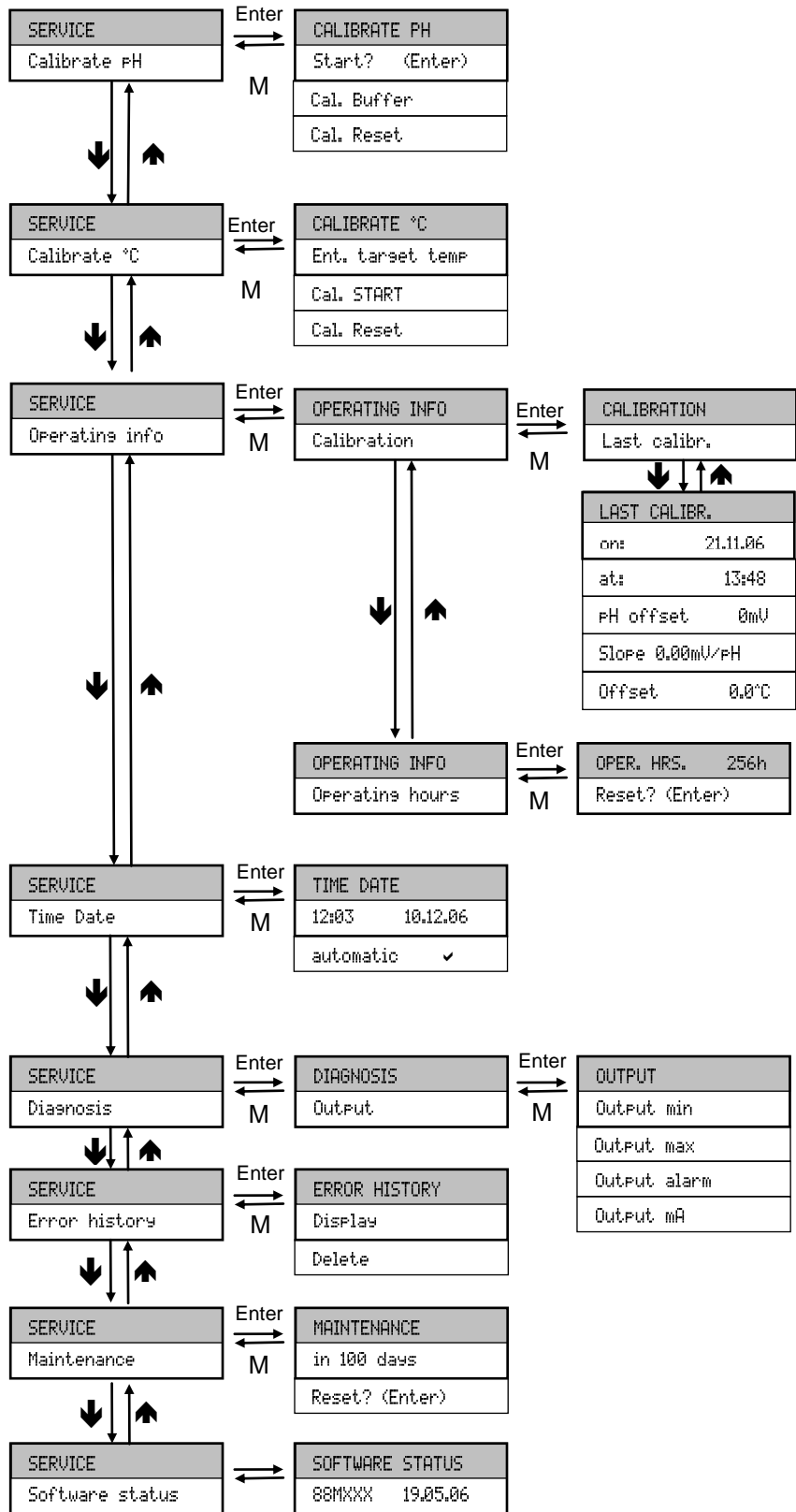


Closing the housing cover

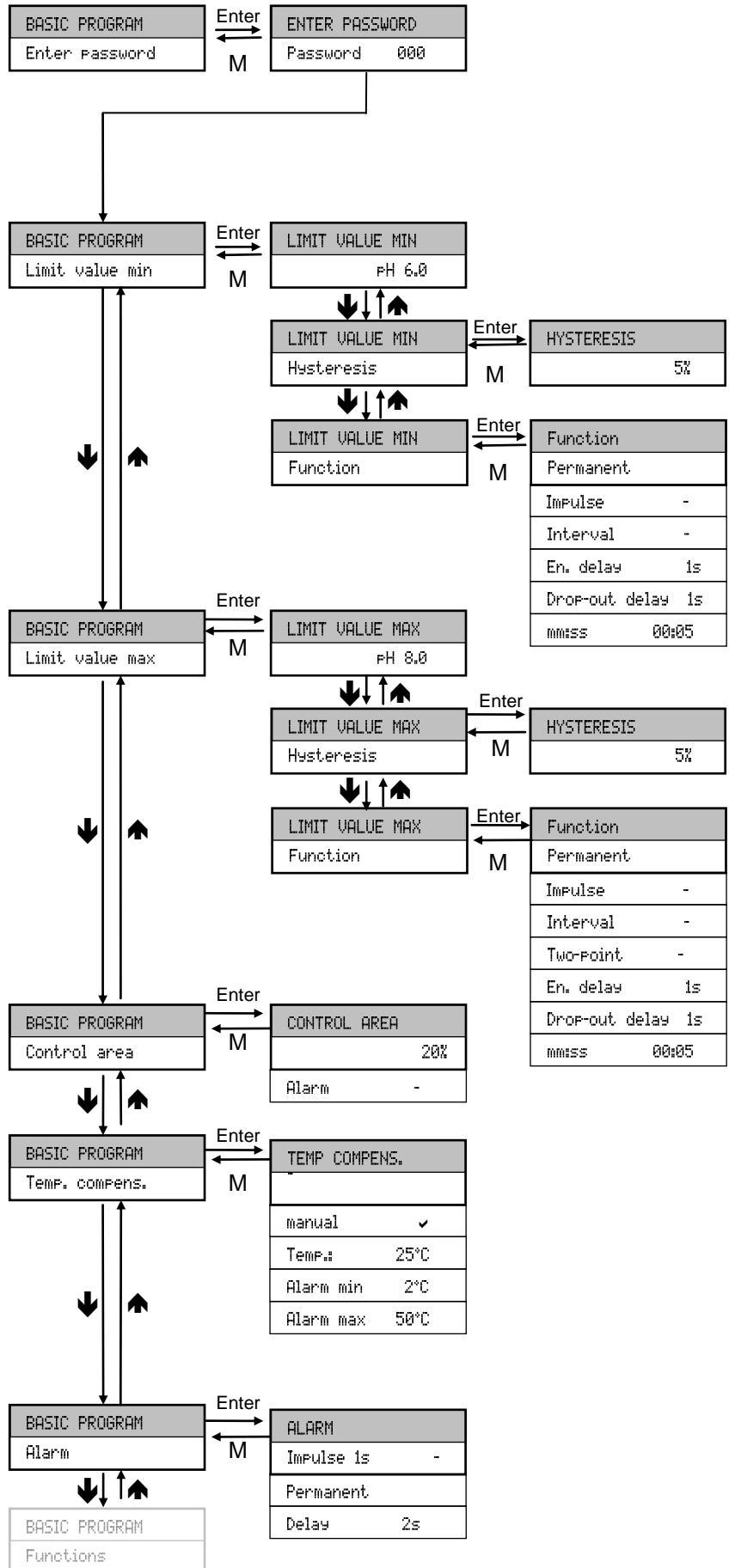
To protect the instrument, always close the housing cover **⑤** as follows:

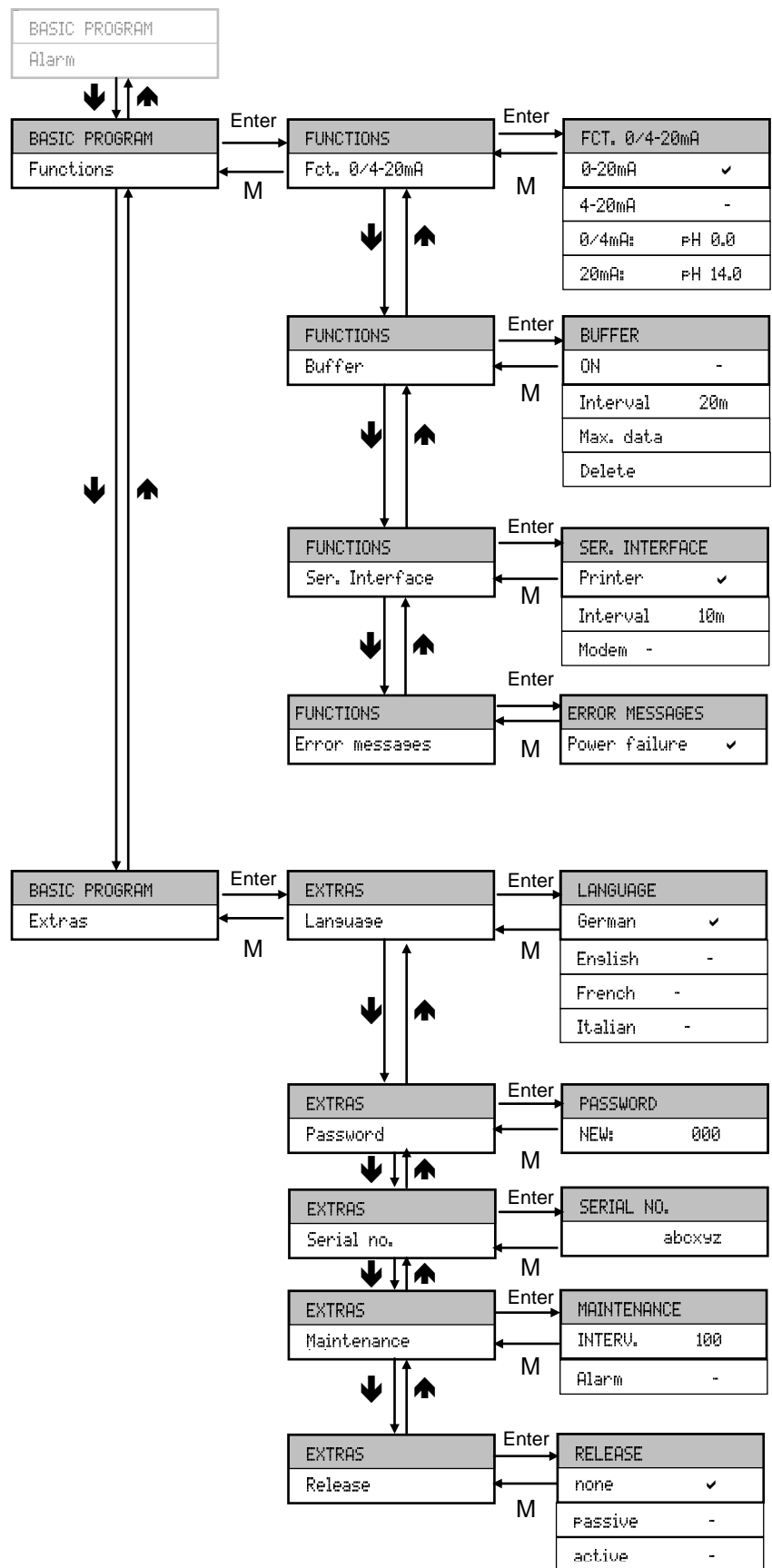
- Shut the housing cover **⑤**.
- Hold the housing cover **⑤**.
- Slightly turn the housing cover screws **⑥**.

Menu tree "Service"



Menu tree “Basic program”





Calibrating the pH probe

The pH probe must be calibrated before using the instrument. Two buffer solutions (two-point calibration) are required for this task. Since the values of the buffer solutions are temperature dependent, the type of temperature compensation must be selected first.

```
TEMP. COMPENS
  automat.      ✓
```

If a PT 100 temperature sensor has been connected:

- Select the menu items "Basic program" > "Temp. compens." > "autom. ✓".

```
TEMP. COMPENS
  manual       ✓
```

If a temperature sensor has not been connected:

- Select the menu items "Basic program" > "Temp. compens." > "manual. ✓".

and subsequently

```
TEMP. COMPENS
Temp.:        25°C
```

- Select the menu items "Basic program" > "Temp. compens." > "Temp.: 25".

Use the cursor keys to enter the temperature of the buffer solution. The preset factory value is 25°C.

The probe can now be calibrated. The buffers pH 7.00 and pH 9.00 are entered as standard. However, any buffers can be used if you enter the correct values (see next section).

If you are operating with automatic temperature compensation, please leave the probe in the buffer solution for at least two minutes before calibrating.

Calibrating with preset buffers pH 7.00 and pH 9.00

```
CALIBRATE PH
Cal1  pH 7.00  /
```

- Select the menu items "Service" > "Calibrate pH" > "Start? (Enter)".

The factory set first calibration value "Cal1 pH 7.00" appears on the display

- If the displayed buffer corresponds to the your selected buffer solution: Press the "ENTER" key to confirm it

The instrument executes calibration. (Rotating dash at the end of the second line)

```

CALIBRATE PH
Cal2    pH  9.00  /

```

The second calibration value “Cal2 pH 9.00” subsequently appears

- If the displayed buffer corresponds to the your selected buffer solution: Press the “ENTER” key to confirm it

The instrument executes calibration. (Rotating dash at the end of the second line)

“OK” appears after correct calibration.

```

CALIBRATE PH
          OK !

```

Two-point calibration has been carried out successfully.

- Press the “M” key to exit the menu item

Please refer to chapter Operation / Display / Error messages / Calibration errors if error messages appear, e.g. “Error 1”.

Calibrating with freely selected buffers (two-point calibration)

```

CALIBRATE PH
Cal. Buffer

```

Set your selected buffers as follows:

- Select the menu items “Service” > “Calibrate pH” > “Cal. Buffer”.

```

CAL. BUFFER 1
          pH  5.20

```

“CAL. BUFFER” “pH 7.00” appears on the display.

- Press the “ENTER” key to confirm it and use the cursor keys to enter the desired buffer (e.g. pH 5.20)

- Press the “ENTER” key to confirm it

- Use the cursor key ↓ to call the menu item “CAL. BUFFER 2” “pH 9.00”

```

CAL. BUFFER 2
          pH  7.50

```

- Press the “ENTER” key to confirm it and use the cursor keys to enter the desired buffer (e.g. pH 7.50)

- Press the “ENTER” key to confirm it

- Press the “M” key to exit the menu item

Calibration can now be carried out with your buffer solutions:

```

CALIBRATE PH
Start?  (Enter)

```

- Select the menu items “Service” > “Calibrate pH” > “Start? (Enter)”.

Your selected first calibration value “Cal1 pH 5.20” appears on the display

```

CALIBRATE PH
Cal1    pH  5.20  /

```

- If the displayed buffer corresponds to the your selected buffer solution: Press the “ENTER” key to confirm it

The instrument executes calibration. (Rotating dash at the end of the second line)

```

CALIBRATE PH
Ca12  pH  7.50
    
```

The second calibration value “Cal2 pH 7.50” subsequently appears

- If the displayed buffer corresponds to the your selected buffer solution: Press the “ENTER” key to confirm it

```

CALIBRATE PH
      OK !
    
```

The instrument executes calibration. (Rotating dash at the end of the second line)

“OK” appears after correct calibration.

- Press the “M” key to exit the menu item
- Calibration has been carried out correctly.

Please refer to chapter Operation / Display / Error messages / Calibration errors if error messages appear, e.g. “Error 1”.

CAUTION!



Risk of incorrect measured values

If calibration is not carried out or an unsuitable buffer solution is used, it will result in incorrect measured values.

Reset calibration to standard values

To cancel incorrect calibration, either repeat the calibration process, as described in the previous section, or reset calibration as follows: Select and confirm “Service” > “Calibrate pH” > “Cal. Reset”.

Calibration is reset to the standard value. Your measuring system is not calibrated! The calibration reset is registered with the time and date.

Calibration of the temperature sensor

With automatic temperature compensation it may also be wise to carry out calibration of the temperature measurement (e.g. for longer lengths of the sensor lead).

```

CALIBRATE  °C
Ent. target temp
    
```

Carry out compensation as follows:

- Select the menu items “Service” > “Calibrate °C” > “Ent. target temp.”.

```
CALIBRATE    °C
Start
```

- Press the “ENTER” key to confirm it and use the cursor keys to enter the temperature of the measuring medium
- Select the menu items “Service” > “Calibrate °C” > “Start”.

The instrument executes calibration. (Rotating dash at the end of the second line)

```
CALIBRATE    °C
                OK!
```

The message “Calibrate °C OK!” appears if calibration was successful

Press the “M” key to exit the menu item

Please ensure that the entered input-target-temperature does not deviate by more than $\pm 5^{\circ}\text{C}$ from the sensor temperature. The error message “ERROR 4” appears for larger deviations. This error message also appears for an unavailable sensor or an open circuit/short circuit.

Reset calibration temperature

To cancel incorrect calibration, either repeat the calibration process, as described in the previous section, or reset calibration as follows:

```
CALIBRATE    °C
Cal. Reset
```

- Select and confirm “Service” > “Calibrate °C” > “Cal. Reset”.

```
OFFSET        0.0 °C
Reset? (Enter)
```

- Press the “ENTER” key to confirm it

The display on the left appears with the previous offset.

- Press the “ENTER” key to confirm it

Calibration is reset to the standard value. Your measuring system now operates with the temperature value provided by the sensor. The calibration reset is registered with the time and date.

Display or reset operating hours

EcoControl pH records the operating hours. To display the operating hours:

```
OPER. HRS.    1256 h
Reset? (Enter)
```

- Select and confirm “Service” > “Oper. info” > “Operating hours”.

The current reading of the operating hours meter is displayed.

- Press the “M” key to exit the menu.

To reset the operating hours meter to zero:

- Select and confirm “Service” > “Oper. Info” > “Operating hours” > “Reset? (Enter)”.

The operating hours are reset to zero.

Display and set the time and date

EcoControl pH has an integrated clock, which continues to run even when the unit is switched off – as long as the battery is not flat. To set the time, proceed as follows:

TIME	DATE
11:55	31.12.07

- Select and confirm "Service" > "Time Date" > "hh:mm dd.mm.yy".
The current time and date are displayed.
- To alter the time and date, press the "ENTER" key $\text{\textcircled{9}}$.
Use the arrow keys to select and change every digit of the time and date.
- To save the time and date, press the "ENTER" key $\text{\textcircled{9}}$.

To set the clock automatically for summer and wintertime:

TIME	DATE
automatic	✓

- Select and confirm "Service" > "Time Date" > "automatic".
If a tick appears, the clock is automatically set for summer and wintertime; if a dash appears, the clock is not automatically set for summer and wintertime.
- Use the cursor keys and "ENTER" $\downarrow\uparrow$ to change the setting

Operation

Key functions

Key	Function
ENTER	<ul style="list-style-type: none"> • Acknowledge input • Trigger functions • Activate menu item for inputs
Arrow keys	<ul style="list-style-type: none"> • Menu navigation • Input of numerical values and programming data
M	<ul style="list-style-type: none"> • Call menu • Call higher order menu (back)
Alarm	<ul style="list-style-type: none"> • Switch off alarm signal (the fault display can only be deleted once the fault has been eliminated)

Display

The operating display appears after switching on the instrument. If an error occurs, the display switches to the respective error message. Furthermore, the display shows the menu and enables programming of EcoControl pH.

The display has two lines each with max. 16 characters.

Operating display

PH 6.72	23.2°C
12:03	08.01.07

Line 1 displays the current pH measuring values and the liquid temperature in °C.

Line 2 displays the date and time as standard; if necessary, it is possible to change to the status messages: Limit values/Limit value contacts and further measuring values. The display is updated every 5 seconds.

Error messages

If errors occur at EcoControl pH, a respective error message appears on the display ④.

Note:

In addition to the displayed error messages, the red LED “Alarm” ② illuminates or flashes.

Alternate display of error messages and operating display. Each occurred error is stored in the error history (see Display or delete the error history).

```
Power failure
8:36      17.06.06
```

Power failure

When switching on EcoControl pH after a power failure, the following message appears: "Power failure". After switching on or after voltage recovery, EcoControl pH starts in the basic state.

- Check the plant for possible negative results due to the power failure.

All the saved values, e.g. calibration values, are not lost, even during a power failure. The integrated clock is battery backed and continues to run.

To acknowledge the error display:

- Press the "Alarm" key ⑦

```
Control area
exceeded
```

Control area

The following displays only appear if the alarm for the control area has been activated.

The pH value is outside the programmed tolerance range. Depending on the actual programming, the relay K3 "AL" is switched in addition to the display.

To acknowledge the error display:

- Press the "Alarm" key ⑦.

```
Min. temperature
12:45      24.12.06
```

Minimum temperature

The programmed minimum permissible temperature has not been achieved. Depending on the actual programming, the relay K3 "AL" is switched in addition to the display.

To acknowledge the error display:

- Press the "Alarm" key ⑦.

```
Max. temperature
12:45      24.12.06
```

Maximum temperature

The programmed maximum permissible temperature has been exceeded. Depending on the actual programming, the relay K3 "AL" is switched in addition to the display.

To acknowledge the error display:

- Press the "Alarm" key ⑦.

```
Calibrate PH
Error 1 (M)
```

Calibration error

Calibration has not been carried out correctly! Check the buffer or probe. Repeat calibration.

```
Calibrate PH
Error 2 (M)
```

The slope of the combination electrode is outside the permissible range! Clean/Replace the probe.

```
Calibrate PH
Error 3 (M)
```

The same buffer has been entered twice!

To acknowledge the error display:

- Press the "M" key (Menu)

Enter/Alter values in the “Basic program” menu

EcoControl pH can be configured in the “Basic program” menu. Enter the password to switch to the “Basic program” menu.

Enter password

It is a 3-figure password; the combination can be between “000” and “999”. The password is factory set to “000”.

```
ENTER PASSWORD
```

```
Password 000
```

- Select and confirm “BASIC PROGRAM” > “Enter password”. “Password 000” appears on the display.
- Enter the password and confirm it via the “ENTER” key (Ⓢ). Once the correct password has been entered, the Basic Program menu opens. “BASIC PROGRAM” appears on the display. If an incorrect password is entered, the “INFORMATION” menu opens. It is possible to read but not alter all the parameters in the “INFORMATION” menu.

Define lower limit value and function if the limit value is not achieved

Define the lower (minimum) limit value and its switching hysteresis in the “MIN LIMIT VALUE” menu and program the function which is to occur if the value falls below the lower limit value. If the value falls below the lower limit value, it appears after “MIN:” in the bottom line of the display and the relay K1 “MIN” reacts according to the programmed switching function.

First define the lower limit value as follows:

```
LIMIT VALUE MIN
```

```
PH 6.0
```

- Select and confirm “Basic program” > “Min limit value”. The current lower limit value appears on the display.

To alter this value:

- Press the “ENTER” key (Ⓢ).
- Enter the desired lower limit value and confirm it.

Note:

The lower limit value must be less than the upper limit value.

Now define the hysteresis:

```
HYSTERESIS
```

```
5%
```

- Select and confirm “BASIC PROGRAM” > “Min limit value” > “Hysteresis”. The current hysteresis appears on the display.

To alter this hysteresis:

- Press the “ENTER” key ⑨.
- Enter the desired hysteresis in per cent and confirm it.

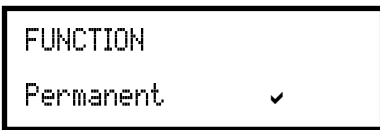
Now program the switching function which is to occur if the value falls below the lower limit value:

Note:

The neutral position of the relay is the same for the de-energised EcoControl pH and when the lower limit value is achieved: Contact between terminals: 10 and 11.

- Select and confirm “BASIC PROGRAM” > “Min limit value” > “Function”.

The “FUNCTION” menu appears on the display. It includes the following menu items:



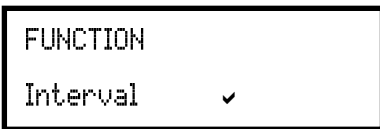
- “Permanent”:
If the value falls below the lower limit value, the relay K1 “MIN” is permanently switched (contact between terminals: 10 and 12). The relay drops out again if the lower limit value plus the set hysteresis is exceeded.

Example:

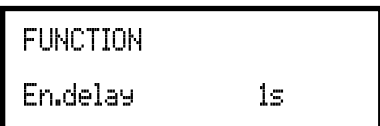
Lower limit value = pH 6.0
Relay drop out at 5 % hysteresis = pH 6.3



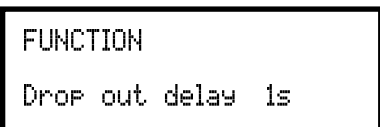
- “Impulse”:
If the value falls below the lower limit value, the relay K1 “MIN” switches for a time period set under “mm:ss” (see below). The relay K1 “MIN” remains switched for this set time period – even if the lower limit value is then achieved.



- “Interval”:
If the value falls below the lower limit value, the relay K1 “MIN” switches at the time interval set under “mm:ss” (see below). The pulse duty factor is 1:1, i.e. the switch-on time and switch-off time are identical.



- “En.delay” (Energy delay):
If the value falls below the lower limit value, the relay K1 “MIN” switches after the delay period set here (0 to 99 s). If the limit value is exceeded during this delay period, the relay K1 “MIN” remains idle.



- “Drop-out delay” (Drop-out delay):
If the lower limit value is exceeded, the relay K1 “MIN” drops out after the delay period set here (0 to 99 s). If the value falls below the limit value during this delay period, the relay K1 “MIN” remains switched.

FUNCTION	
mmiss	00:05

- "mm:ss" (Time):
Time for which the functions "Impulse" and "Interval" are switched (00:00 to 99:99).
- Select and confirm the desired function ("Permanent", "Impulse" or "Interval") in the "FUNCTION" menu.
The activated function is indicated by a tick, inactive functions via a minus sign.
- Enter the desired times in the functions "En.delay.", "Drop-out delay" and "mmiss" and confirm them.

Define the upper limit value and function if the limit value is exceeded

Define the upper (maximum) limit value and its switching hysteresis in the "MAX LIMIT VALUE" menu and program the function which is to occur if the upper limit value is exceeded. If the upper limit value is exceeded, it appears after "Max:" in the top line of the display and the relay K2 "MAX" reacts according to the programmed switching function.

First define the upper limit value as follows:

LIMIT VALUE MAX	
	pH 8.0

- Select and confirm "Basic program" > "Max limit value".
The current upper limit value appears on the display.

To alter this value:

- Press the "ENTER" key $\text{\textcircled{9}}$.
- Enter the desired upper limit value and confirm it.

Note:

The upper limit value must be greater than the lower limit value, but smaller than the measuring range.

Now define the hysteresis as follows:

HYSTERESIS	
	5%

- Select and confirm "Basic program" > "Max limit value" > "Hysteresis".
The current hysteresis appears on the display.

To alter this hysteresis:

- Press the "ENTER" key $\text{\textcircled{9}}$.
- Enter the desired hysteresis in per cent and confirm it.

Now program the switching function which is to occur if the upper limit value is exceeded:

Note:

The neutral position of the relay is the same for a de-energised EcoControl pH and when the upper limit value is exceeded:
Contact at terminals: 13 and 14.

- Select and confirm “Basic program” > “Max limit value” > “Function”.

The “FUNCTION” menu appears on the display. It includes the following menu items:

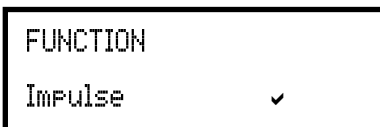


- “Permanent”:
If the upper limit value is exceeded, the relay K2 “MAX” switches permanently (contact at terminals: 13 and 15). The relay drops out again if the value falls below the upper limit value less the set hysteresis.

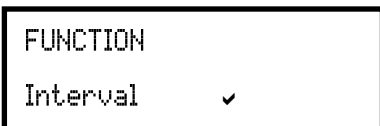
Example:

Upper limit value = pH 8.0

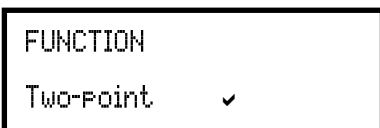
Relay drop out at 5 % hysteresis = pH 7.6



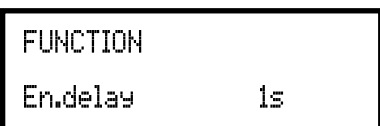
- “Impulse”:
If the upper limit value is exceeded, the relay K2 “MAX” switches for a time period set under “mm:ss” (see below). The relay K2 “MAX” remains switched for this set time period – even if the upper limit value is no longer exceeded.



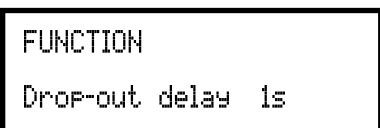
- “Interval”:
If the upper limit value is exceeded, the relay K2 “MAX” switches at the time interval set under “mm:ss” (see below). The pulse duty factor is 1:1, i.e. the switch-on time and switch-off time are identical.



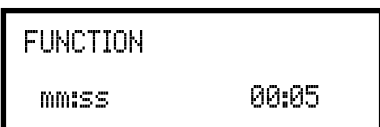
- “Two-Point”: (Two-point controller function)
If the upper limit value is exceeded, the relay K2 “MAX” switches. This drops out again when the value falls below the lower limit value.
Any programmed energy and drop-out delays are also operative, i.e. the energy delay of the upper limit value and the drop-out delay of the lower limit value.



- “En.delay.” (Energy delay):
If the upper limit value is exceeded, the relay K2 “MAX” switches after the delay period set here (0 to 99 s). If the value falls below the limit value during this delay period, the relay K2 “MAX” remains idle.



- “Drop-out delay” (Drop-out delay):
If the value falls below the upper limit value, the relay K2 “MAX” drops out after the delay period set here (0 to 99 s). If the limit value is exceeded during this delay period, the relay K2 “MAX” is switched.



- “mm:ss” (Time):
Time for which the functions “Impulse” and “Interval” are switched (00:00 to 99:99).


- Select and confirm the desired function (“Permanent”, “Impulse” or “Two-Point”) in the “FUNCTION” menu.
The activated function is indicated by a tick, inactive functions via a minus sign.

- Enter the desired times in the functions “En.delay.”, “Drop-out delay” and “mm:ss” and confirm them.

Define a control area

It is possible to define a control area. This is a tolerance range by which the value can fall below the lower limit value or exceed the upper limit value before an error message appears on the display.

It is also possible to define whether the alarm should sound if the value falls below or exceeds the control area.



Control area
exceeded

If the value falls below or exceeds the control area, the error message "Control area not achieved" or "Control area exceeded" alternates with the operating display.

Example:

Upper limit value = pH 8.0

Lower limit value = pH 6.0

Control area = 20%

The error message appears at pH 9.6 (upper limit value + 20%) and at pH 4.8 (lower limit value – 20%).

Define the control area first:

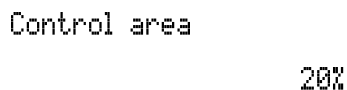
WARNING!



Danger to people and property!

If the control area is set to "0%", EcoControl pH will not trigger an alarm – not even if "Alarm" has been checked!

➤ Set the control area to at least "1%"!



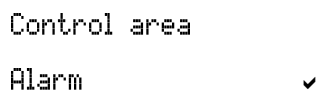
Control area
20%

➤ Select and confirm "Basic program" > "Control area".
The current control area appears on the display.

To alter this value:

➤ Press the "ENTER" key .

➤ Enter the desired control area in per cent and confirm it.



Control area
Alarm ✓

Subsequently activate/deactivate the alarm:

➤ Select and confirm "Basic program" > "Control area" > "Alarm".

If a tick appears after "Alarm" on the display, the alarm is activated; if a minus sign appears after "Alarm" on the display, the alarm is not activated.

➤ Press the "ENTER" key .

➤ Select and confirm the alarm status.

Set the temperature compensation

The temperature compensation ensures that the correct pH value is measured even if the temperature of the medium changes.

In the "TEMP. COMPENS." menu define:

- whether temperature compensation is to occur automatically or manually,
- at which temperatures the alarm is to be triggered,
- which alarm signal is to be output.

Set automatic / manual temperature compensation

```
Temp. compens.
  automat.      ✓
```

```
Temp. compens.
  manual       ✓
```

If the temperature sensor PT100 has been connected to connection "PT100" (terminals 23 and 24) of EcoControl pH (see the connection example in chapter "Installation / Connecting the power supply and devices", select and confirm

- > "Basic program" > "Temp. compens." > "automat." (automatic temperature compensation).

If the temperature sensor PT100 has not been connected to connection "PT100", select and confirm

- > "Basic program" > "Temp. compens." > "manual" (manual temperature compensation).

Entering the temperature for manual temperature compensation

```
Temp. compens.
Temp.          21°C
```

If "manual" has been selected, enter the temperature of the medium to be measured (25°C is the default setting of the instrument):

- > Select and confirm "Basic program" > "Temp. compens." > "Temp".
- > Enter the temperature of the medium, e.g. 21°C.

Enter the temperature for the insufficient temperature alarm

```
Temp. compens.
Alarm min      10°C
```

- > Under "Basic program" > "Temp. compens." > "Alarm min" enter and confirm the temperature at which the alarm is triggered if this temperature is not achieved.

If this temperature is not achieved, the error message "Temperature Min." appears on the display and a fault message is output at output AL.

Enter the temperature for the excess temperature alarm

```
Temp. compens.
Alarm max      40°C
```

Note:

If "0°C" has been entered here, the temperature is not monitored. An alarm will not sound even if the temperature of the medium decreases rapidly.

- > Under "Basic program" > "Temp. compens." > "Alarm max" enter and confirm the temperature at which the alarm is triggered if this temperature is exceeded.

If this temperature is exceeded, the error message "Temperature Max." appears on the display and a fault message is output at output AL.

Note:

If "0°C" has been entered here, the temperature is not monitored. An alarm will not sound even if the temperature of the medium increases rapidly.

Configure the alarm signal

It is possible to choose between two signals as the alarm message:

- Continuous contact or
- One second impulse.

Furthermore, it is possible to enter a time by which the alarm signal is to be delayed.

Note:

The neutral position of the relay K3 "AL" is the same for the de-energised EcoControl pH and when the alarm has been triggered: Contact between terminals: 16 and 17.

- Select and confirm "Basic program" > "Temp. compens" > "Alarm".

The "ALARM" menu appears on the display. It includes the following menu items:

- "Permanent":
If the alarm is triggered, the relay K3 "AL" switches permanently once the delay period (see below) has expired (contact between terminals: 16 and 17). The relay drops out again as soon as the cause of the alarm has been eliminated or the "Alarm" key ⑦ is pressed.
 - "Impulse 1s":
If the alarm is triggered, the relay K3 "AL" switches once for 1 second once the delay period (see below) has expired (contact between terminals: 16 and 17). The relay drops out again after one second.
 - "Delay":
If the alarm is triggered, the relay K3 "AL" switches once the entered delay period has expired. If the cause of the alarm is eliminated during this delay period, the alarm is not triggered.
- Select and confirm the desired function ("Permanent" or "Impulse 1s") in the "ALARM" menu.
The activated function is indicated by a tick, the inactive function via a minus sign.
 - Enter and confirm the desired delay period under "Delay".

```
ALARM
Permanent  ✓
```

```
ALARM
Impulse 1s  ✓
```

```
ALARM
Delay      10s
```

Configure the 0/4-to-20 mA interface

The 0/4-to-20 mA interface is suitable, e. g., for connecting a printer. To adapt the output signal to your printer, configure the transmission-ratio spread as well as the lower and upper limit.

- Select and confirm "Basic program" > "Functions" > "0/4-20mA".

The "FCT.0/4-20mA" menu appears. It includes the following menu items:

- "0-20 mA":
If the menu item is activated, the interface supplies 0 to 20 mA.
- "4-20 mA":
If the menu item is activated, the interface supplies 4 to 20 mA.
- "0/4 mA":
Value of the smallest output pH value (normally pH 0).
- "20 mA":
Value of the maximum output pH value.

```
FCT.0/4-20mA
0-20 mA    ✓
```

```
FCT.0/4-20mA
4-20 mA    ✓
```

```
FCT.0/4-20mA
0/4 mA     0.0pH
```

```
FCT.0/4-20mA
20 mA     14.0pH
```

- Select and confirm the desired transmission-ratio spread ("0-20 mA" or "4-20 mA") in the "FCT.0/4-20mA" menu. The activated transmission-ratio spread is indicated by a tick, the inactive transmission-ratio spread via a minus sign.
- Enter and confirm the desired pH values under "0/4 mA" and under "20 mA".

Notes:

Observe the actual measuring conditions when setting the limits. A large transmission-ratio spread is not more exact than the measuring system allows.

The maximum load of 500 Ω should not be exceeded!

Configure the integrated ring buffer

EcoControl pH has a ring buffer in which up to 10,000 measured values can be saved with the time and date. The oldest values are overwritten by the new ones if the ring buffer is full.

- Select and confirm "Basic program" > "Functions" > "Buffer". The "Buffer" menu appears. It includes the following menu items:

- "On":
Ringer buffer status: If a minus sign appears, EcoControl pH will not save any measured values; if a tick appears, EcoControl pH will save the currently measured pH value and temperature [°C] with the time and date – at the interval defined as follows.

```
BUFFER
On    ✓
```



```

BUFFER
Interval    20m

```

```

BUFFER
Max. data  500

```


```

BUFFER
Delete

```

- “Interval”:
Interval in minutes during which a measured value is saved. The interval can be set between 1 and 99 minutes.
 - “Max. data.”:
Number of measured values which are saved. The minimum number is 20 and the maximum 10,000.
 - “Delete”:
Menu item for deleting the integrated ring buffer.
- Select and confirm the desired status in the “Buffer” > “On” menu. The activated buffer is indicated by a tick, the inactive buffer via a minus sign.
- Enter and confirm the desired interval in which a data record is to be saved under “Buffer” > “Interval”.
- Enter the number of measured values to be saved under “Buffer” > “Max. data”.

To delete the ring buffer:

- Select and confirm “Buffer” > “Delete”.
“RESET? (Enter)” appears on the display.
- Press the “ENTER” key .
The ring buffer is deleted.

Configure the serial interface

The measured values saved in the ring buffer can be read with a PC program via the serial interface. The serial interface is designed for a Baud rate of 19200 and 1 stop bit and has no parity.

Note:

To ensure data can be transferred via the serial interface, the serial interface must be released as described under “Release/Block the serial interface”.

- Select and confirm “Basic program” > “Functions” > “Ser.Interface”.
The “SER.INTERFACE” menu appears. It includes the following menu items:

```

SER.INTERFACE
Printer    ✓

```

- “Printer”:
Status of the printer function. If the printer function is activated, the measured results are output at a serial protocol printer – at the interval defined as follows.

```
SER.INTERFACE
Interval    10m
```

```
SER.INTERFACE
PC in/out   ✓
```

```
SER.INTERFACE
Modem      ✓
```

```
ERROR MESSAGES
Power failure ✓
```

```
LANGUAGE
German     ✓
```

```
PASSWORD
NEW:       000
```

- “Interval”:
Interval in minutes during which printing occurs. The interval can be set between 1 and 99 minutes.
- “PC in/out”:
Configuration of the serial interface for communication with a connection program (e. g. hyper terminal). If this option is activated, the serial interface transfers the current measured conductivity once per second.
This option is used for diagnosis and for recording the special behaviour for test purposes.
- “Modem”:
Configuration of the serial interface for communication with a PC via modem or null modem cable. If this option is activated, the measuring results are output at the PC as soon as the PC program “EcoControl” requests them at the PC.

Error messages

(available from software version 88M012)

You can switch of the error message „Power failure“.

Alter the language on the display

The EcoControl pH can display menu texts, error messages, etc. in four languages. Further languages are possible on request.

- Select and confirm “Basic program” > “Extras” > “Language”.
The “LANGUAGE” menu appears. It currently includes the following languages:
 - German
 - English
 - French
 - Italian
 - Further languages on request
- Select and confirm the desired language.
The activated language is indicated by a tick, the inactive language by a minus sign. The menu texts, error messages, etc. then appear in the selected language.

Alter the password

It is possible to alter the three digit password which has to be entered to change to the “Basic program”.

- Select and confirm “Basic program” > “Extras” > “Password”.
The current password appears. The password is factory set to “000”.

To alter this password:

- Press the “ENTER” key (Ⓜ).
- Enter and confirm the three digits for the new password.
The password is altered.

Display the serial number

EcoControl pH has a serial number. This serial number is required to read data via the serial interface with the aid of a communication program at a PC.

Note:

The serial number is located on the rating plate ⑫ after the “Instr. no.”.

SERIAL NO. 205505

- Select and confirm “Basic program” > “Extras” > “Serial no.”. The serial number appears.

Define the maintenance interval

It is possible to set a maintenance interval for the combination electrode.

MAINTENANCE INTERV. Days: 120

- Select and confirm “Basic program” > “Extras” > “Maintenance interval”. The current maintenance interval appears.

To alter this maintenance interval:

- Press the “ENTER” key ⑨.
- Enter and confirm the desired maintenance interval in days (0 to 999). The maintenance interval is altered. Once the maintenance interval has elapsed, the message “Maintenance required!” appears on the display.

Note:

If the maintenance interval is set to “000”, monitoring does not occur.

- Select “Basic program” > “Extras” > “Maintenance interval” > “Alarm”. If there is a tick after “Alarm”, an alarm signal is output as soon as the maintenance interval has elapsed; if there is a minus sign after “Alarm”, an alarm signal is not output.
- Press the “ENTER” key ⑨ to alter the alarm status.

Once maintenance has been completed, reset the interval to the selected value via the menu item Reset (Enter). Also see chapter “Maintenance and Care / Reset maintenance interval”.

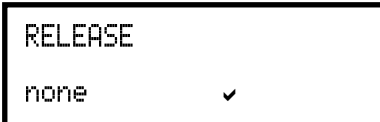
Release/Block the serial interface

The integrated serial interface can be blocked or released.

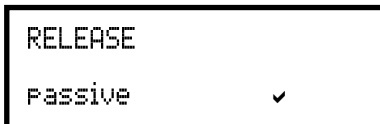
Note:

To ensure data can be transferred via the serial interface, the serial interface must be configured accordingly, as described under “Configure the serial interface”.

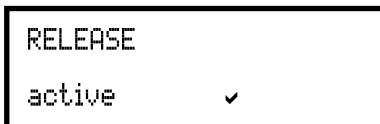
- Select and confirm “Basic program” > “Extras” > “Release”. The “RELEASE” menu appears. It includes the following menu items:



- “none”:
The serial interface is blocked. It is neither possible to read data nor program data via a PC.



- “Passive”:
The serial interface is only released for reading data with the PC program “EcoControl”.



- “active”:
The serial interface is released for reading measured values of EcoControl pH.
If the measured values of EcoControl pH are to be read via a PC, the serial interface for communication with a modem or a PC must be configured via a null modem cable (see chapter “Operation /Configure the serial interface”). The PC program “EcoControl” is required for this task.

Reset all settings to the factory settings (Reset)

CAUTION!



Risk of data loss!

If all the settings are reset to the factory settings, all the entered values are deleted – e. g. also calibration. The instrument is subsequently not ready for operation.

- Only reset the factory settings if absolutely necessary.

To reset the basic factory settings:

- Switch EcoControl pH on while pressing the arrow key ↓.
All the settings are deleted and reset to the factory settings.

Read the measuring data via the PC program “EcoControl”

The following settings in section “Configure the serial interface” or “Release/Block the serial interface” must be carried out as follows:

“Modem”:

Configuration of the serial interface for communication with a modem or a PC via a null modem cable.

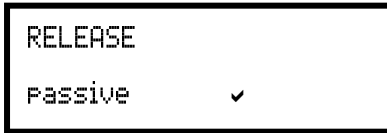
“Passive”:

The serial interface is only released for reading data with the PC program “EcoControl”.

or

“active”:

The serial interface is released for reading measured values of EcoControl pH and for deleting.



- Connect the PC via the RS232 interface directly to the EcoControl controller or via a modem (remote transfer)
- Start the “EcoControl” software at the PC
- Enter the EcoControl pH instrument number in the “Serial number” field.
- Click on “read”.
The “Save as” window opens.
- Select the folder and the file name under which the read data is to be saved and click on “OK”.
The software reads the data from EcoControl pH and saves it as a csv worksheet. The csv worksheet can be opened and edited with a spreadsheet program.

Troubleshooting

Should problems or questions arise while operating EcoControl pH which are not described in these operating instructions and/or cannot be solved, please contact our technical hotline.

Tel.: +49 (0)5121 7609-51

Fax: +49 (0)5121 7609-44

Email: info@heyl.de

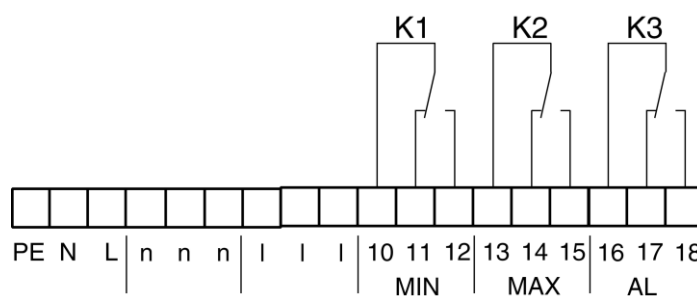
Try to identify the problem as accurately as possible and record the actions and conditions under which it occurred. This will enable us to offer you swift effective assistance.

Create diagnoses

It is possible to display the switching statuses of the three relays which switch the connections of consumer. Furthermore, the relays can be manipulated for test purposes – e. g. for commissioning.

To display the switching statuses:

- Select and confirm “Service” > “Diagnosis” > “Output”.
- Select and confirm the relay whose switching status is to be displayed.
 - “Output min”:
Corresponds to relay K1 “MIN” (terminals 10, 11, 12),
 - “Output max”:
Corresponds to relay K2 “MAX” (terminals 13, 14, 15),
 - “Output alarm”:
Corresponds to relay K3 “AL” (terminals 16, 17, 18),
 - “Output mA”:
Corresponds to terminals 23 and 24.



Neutral position (de-energised)

The switching status of the selected relay is displayed:

- “off”: the selected relay is not active,
- “on”: the selected relay is active,
- “10.0 mA”: the current applied at the output (terminals 23 and 24)

DANGER!



Risk of personal injuries and damage to plant parts!

If the relays which switch the connections for consumer are manipulated, it will trigger the corresponding reactions of the connected plant. This may result in personal injuries or damage to plant parts.

- Always make sure that people are not at risk and downstream plant parts cannot be damaged before manipulating the relays.

- Press one of the arrow keys ↓ or ↑.

The switching status of the selected switch changes and is shown on the display.

To alter the current at the output (terminals 23 and 24):

- Press one of the arrow keys ↓ or ↑ several times.
The current is reduced or increased by 5 mA.

Display or delete the error history

The error history is a list of the error messages or statuses which have occurred during current operation. The error history is not lost after a power failure. Errors are registered with the time and date – if the clock battery provides sufficient power. The number of error messages can be exported or read, but not the actual error history.

To display the error history:

- Select and confirm “Service” > “Error history” > “Display”.
The last error message is displayed.
- Press the arrow key ↓ to display older error messages.

To delete the error history:

The error messages stored in the error history can be deleted and the recording restarted as follows:

- Select and confirm “Service” > “Error history” > “Delete”.
All the stored error messages are deleted.

Display number and date of the software

The number and date of the Eco-Control pH software can be retrieved as follows:

- Select and confirm “Service” > “Software status”.
The number and date of the software are displayed.

```
Power failure
06:56 16.12.06
```

```
SOFTWARE STATUS
87M002 15.08.06
```

Maintenance and Care

Replacing the battery

The EcoControl pH battery powers the integrated clock to ensure that the clock does not have to be reset after a power failure. The battery has a service life of approx. 5 years.

If the error messages are saved without the time and date in the “Service” > “Error history” > “Display” menu after power failure, the battery is flat.

Note:

A “CR 2032” lithium battery is required.

Replace the battery approx. every 5 years as follows:

DANGER!



Risk of electric shock!

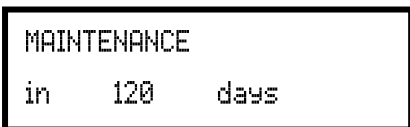
Working at the open instrument can result in electric shocks and there is a danger of death.

- Always completely disconnect the instrument from the mains before replacing the battery.
-
- Open the housing cover.
 - Use a 7 mm or 5 mm hexagon socket screw key to loosen the four screws that hold the display board in place.
 - Carefully remove the display board without pulling the connected cables and turn the display board over.
 - Remove the battery from the holder, always observe correct battery polarity.
 - Insert a new battery which is the same as the old one.
 - Re-insert the display board into the housing and carefully tighten the four screws.
 - Close the housing cover.
 - Dispose of the old battery in accordance with national regulations.
 - Set the time and date (see chapter “Commissioning / Display and set the time and date”).

Display maintenance interval

A maintenance interval can be programmed, as described in chapter “Operation / Define the maintenance interval”, e.g., to receive a reminder about imminent maintenance tasks or probe calibration. If a maintenance interval has been programmed, the remaining days of the current interval can be displayed as follows:

- Select and confirm “Service” > “Maintenance”.
The remaining days of the maintenance interval are displayed.



Reset the maintenance interval

If a maintenance interval has been programmed, the fault message "Maintenance required!" is output at output AL once the maintenance interval has elapsed.

- Carry out the required maintenance work.
- Acknowledge the fault message "Maintenance required!" by selecting and confirming "Service" > "Maintenance" > "Reset". "OK!" appears on the display. The fault message is cancelled. The interval restarts.



MAINTENANCE

Reset

Note:

If a maintenance interval has not been set, "Maintenance not active!" appears.

Disassembly

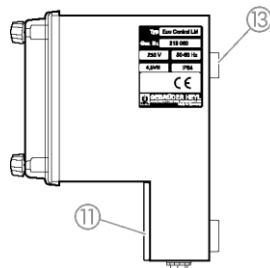
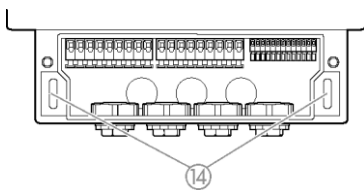
CAUTION!



Risk of injuries when disassembling live parts!

If the power supply is not disconnected prior to disassembly, it may result in physical injuries, destruction of the product or damage to plant parts.

- Disconnect the relevant plant parts before disassembling EcoControl pH.



- Loosen the screws at the terminal box cover ⑪.
- Remove the terminal box cover ⑪.
- Disconnect all the connected cables.
- Remove the two screws from the slotted holes for instrument fixing ⑭.
- Remove EcoControl pH from the eyelet for instrument fixing ⑬.
- Screw the terminal box cover ⑪ back on.

Accessories

pH combined electrodes

Type	Pressure (bar) (in 10^5Pa)	Temp. [°C]	Measuring range [pH]	Order no.
EMK 20	0-8	0-80	1 – 13	320301
EMK 50	0-6	10-130	1 – 14	320302 *)

*) with PT 100

Please refer to our delivery programme for an up-to-date overview of available accessories.

Technical Data

We reserve the right to make technical changes without notice in the interest of constantly improving our products!

Power supply:	24 V AC, 115 V AC or 230 V AC $\pm 10\%$ 50 - 60 Hz Fuse T4A
Power consumption without exterior load:	max. 6 VA
Degree of protection:	IP54
Protection class:	I
Conformity:	EN 61000-6-2, EN 61000-6-4, EN 61010-1
Ambient temperature:	5 - 45°C
Dimensions EcoControl	W x H x D = 166 x 155 x 115 mm
Weight:	Approx. 0.8 kg

Measuring range	pH 0.0 to pH 14.0
Display accuracy:	± 2 digits or $\pm 2\%$ from measuring range end, depending on the applied probe
Resolution:	0.01 pH
Automatic or manual temperature compensation	
Temperature display:	0.0 to 99.9 °C ± 0.5
Current interface:	0/4 - 20 mA, max. load 500 Ω , galvanically decoupled
RS232 interface	19200 Baud, 1 stop bit, no parity

Conformity Declaration

EC Conformity Declaration



for the following product

**EcoControl pH
pH-measuring instrument**

We hereby confirm that the above product conforms to the principal health and safety regulations laid down in the EC Directives 2004/108/EG and 2006/95/EG. This declaration applies to all units produced in accordance with the attached manufacturing documents which are a constituent part of this declaration.

The product was assessed with reference to the following standards:

- EN 61000-6-4:** Electromagnetic compatibility, Generic emission standard
- EN 61000-6-2:** Electromagnetic compatibility, Generic immunity standard
- EN 61010-1:** Safety requirements for electrical equipment for measurement, control and laboratory use

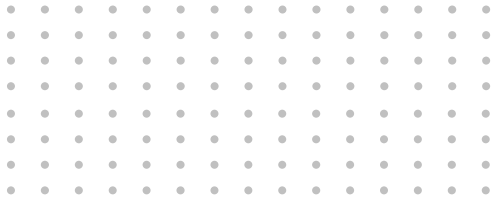
This declaration is made on behalf of

**GEBRÜDER HEYL
Analysentechnik GmbH & Co. KG
Orleansstraße 75b
31135 Hildesheim**

by


Jörg-Tilman Heyl
General Manager

Hildesheim, 05/12/2012



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