



Neon® LF

DR. A. KUNTZE

MANUAL

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1. Your Neon®

is an instrument by Dr. A. Kuntze GmbH which offers high quality and long-term reliability, made in Germany.

With its modular design, the Neon® instrument can be tailored to your application.

The entry-level version contains inputs for measurement and temperature, a digital input, and an alarm relay. You can choose between key pad or touch screen operation.

A set of codes allows access to different operation levels. If you want to ensure that only authorized personnel can operate the instrument, define an auto-lock time after which the code is reset to default setting.

Save energy with the Eco mode, in which the display illumination is deactivated after an adjustable interval.

The Neon® instruments have an SD card slot. You can store and load instrument settings, to duplicate software settings to additional instruments or to reinstall yoursettings after updates or repair. You can also use the SD card for software updates.

We have equipped the Neon® instruments with some very convenient features:

The touch screen for example is the perfect complement to the graphical operation and gives you shortcut access to important menus from the main display.

The information displayed on the screen can be defined by the user, adding for example control values, data log status, – or maintenance information, such as the name and phone number of responsible facility personnel. In case of problems, the diagnosis function allows quick assessment of the situation.

Test functions make trouble-shooting and installation easier by providing manual operation of all digital and analog outputs.

The Neon® instruments are expandable through software add-ons and hardware modules.
You can add:

- A second digital input
- Up to two analog outputs
- A data log function that stores data on the SD card
- A PID controller with two control relays for concentration-based dosing
- Volume based dosing with two relays and flow measurement
- Modbus RTU interface

With the Neon® you have certainly made the right choice. On the following pages find out more about your instrument. If you have further questions or are looking for information not included in this manual or if you are interested in supplementing products such as sensors, or assemblies, just give us a call – we will be delighted to help you!

1.1. General and safety instructions

This operation manual applies to the following instruments

Instrument type	Neon®CM oder Neon®IL
SW version	v. 3.12

The manual contains technical information on installation, operation, and maintenance.

Keep this manual in a place where you can always look up the safety instructions and the information on handling and usage. According to DIN 61010 the manual is part of the product and has to be preserved as long as the instrument is used, and given to the new owner if the instrument is sold.

The instrument was designed, built, and tested according to the directives for electronic devices and has left our company in perfect working condition. To preserve this condition and to ensure safe operation, follow all instructions carefully and pay special attention to all warnings issued in this manual. If the instrument is visibly damaged or has been stored inappropriately or if there are any doubts concerning safe operation, shut it down and make sure it cannot be restarted.

You will notice that certain safety instructions are highlighted:

Warning	**highlights instructions for the protection of people. Disregarding warnings may cause accidents and injuries!**
Attention	**highlights instructions for the protection of the instrument and equipment. Disregarding these instructions may lead to damage or destruction of the instrument or equipment!**
Note	**is used to highlight interesting details.**

1.2. Warranty conditions

We have to point out that the warranties specified in our trading conditions are valid only if the following conditions are met:

> Installation and start-up by Dr. A. Kuntze personnel or trained and authorized technicians
> Maintenance of instrument and peripherical equipment according to the instructions of this manual
> Use according to the designation specified on the following pages
> Use of original accessories and spare parts only
> Observance of operation conditions and settings according to this manual

Warranty is void if any one of the conditions listed above is disregarded.

1.2.1. Transport damages

Please check for damages immediately after delivery and report any damages within 24h to the delivering company. Never work with a damaged instrument!

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1.2.2. Application

Neon® instruments can be used for the following measurements:Messgerät

Instrument	Measurement
Neon® pR	pH or ORP and temperature
Neon® Des	Free Chlorine, Chlorine dioxide, Ozone, or Hydrogen peroxide and temperature
Neon® LF IL	Inductive conductivity and temperature
Neon® LF CM	Conductive conductivity and temperature
Neon® Std	Measurements with sensors that supply a standard signal such as 4…20mA. Display in mg/l, ppm, or NTU
Neon® GAS	Gas monitoring for Chlorine, Chlorine dioxide and Ozone gasNeon® pR pH-Messung oder Redox und Temperatur

In many applications, the measured parameters are used for control purposes. Neon® instruments can be equipped with a controller with two set points. With this you can control actuators such as dosing pumps or valves to add chemicals until the desired set point is reached. Alternatively, the measured signal can be used as input for an external controller via the instruments´ interfaces.

Applications are for example neutralisation, detoxication, drinking water treatment, industrial waste water, process water, disinfection, and process control.

As a safety precaution, measurement and calibration are checked for failure by the instrument. Failures are indicated on the display via text messages that are stored in an eventlog and via the alarm relay and, if activated, as 22mA current via the analog output.

If the failure makes control unreliable, the controller is automatically switched off until the failure has been taken care of.

Warning **The instrument checks the input signals, calibration results, and the water flow, if a flow sensor is connected. It cannot detect erroneous settings or failures in the treatment system, nor can it check for plausibility! The safety of the system of which the instrument is part of lies within the reach of responsibility of whoever built the system!**

1.2.3. Intended use

Use these instruments only for the monitoring and control of water – or, in case of gas monitoring instruments, of ambient air.

Use only sensors, assemblies, and accessories made by Dr. A. Kuntze, and make sure that they fit your application. Make sure that the required measuring conditions such as flow, pressure, temperature etc. are constantly maintained.

Install and operate the instrument according to this manual. Carry out all steps described, and check all measurements and settings before you activate the controller.

Use all available safety measures such as the alarm relay, the 22mA alarm current, the dosage control, and the low-water indication.

Regularly check that all safety measures are in good working condition!

Warning **The protection built into the instrument is impaired if it is not used as intended!**

1.3. Features

Basic instrument LF	
Measuring ranges Conductivity (conductive)	0.. 2.000 µS/cm (c=0.05/cm), 0.. 20.00 µS/cm (c=0.05/cm), 0.. 200.0 µS/cm (c=0.05/cm), 0.. 2.000 mS/cm (c=0.20/cm), 0.. 20.00 mS/cm (c=1.00/cm), 0.. 200.0 mS/cm (c=10/cm)
Conductivity (inductive)	0.. 2.000 mS/cm, 0.. 20.00 mS/cm, 0.. 200.0 mS/cm, 0.. 2000 mS/cm
Temperature	-30.. +140°C
Display	Measured value and temperature with units Additional information selectable: contact data, SD card status, mA output, control variable, or relay status
Operation	Key pad or touch screen
Calibration	1-point calibration against reference, zeropoint calibration possible
Measurement	Conductive conductivity (CM) Inductive conductivity (IL) TDS
Averaging	Off / low / medium / high, selectable via menu
Temperature measurement	Conductive: Pt100 or Pt1000, 2-wire or 3-wire connection Inductive: NTC 214k
Temperature compensation	Automatic or manual (linear and for CM ulta pure water compensation)
Relay 3 – alarm relay	Potential-free contact 6A, 250 V, max. 550VA Alarm events selectable via menu Min. and max. limits and adjustable delay

Basic instrument LF	
Digital input 1	For external controller stop, low-water indication, or level monitoring Display text can be selected according to intended function Input can be set to N/O or N/C contact via menu
Test menu	Operation of relays and outputs
SD card	To load and save settings To save the diagnosis file To load software updates
Auto lock	Resets the code to 0000 after a defined period of time
Eco mode	Saves energy by deactivating the display illumination after an adjustable interval
Eventlog	Stores up to 100 events
Event help	Provides help for current events
Add-on	Functions can be added via code

Add-ons	
Digital input 2	For external controller stop, low-water indication, or level monitoring Display text can be selected according to intended function Input can be set to N/O or N/C contact via menu Flow measurement for volume based dosing
Analog output 1	0/4.. 20 mA galvanically isolated, max. load 500 Ohm 22 mA alarm current selectable via menu To read out measured value, or temperature, or controller output Scaleable within the measuring range
Analog output 2	0/4.. 20 mA galvanically isolated, max. load 500 Ohm 22 mA alarm current selectable via menu To read out measured value, or temperature, or controller output Scaleable within the measuring range

Add-ons	
Data log	Measured value, temperature, input signal and control variable selectable Interval adustable between 1 second and 24 hours Ring or Stop mode
Digital interface	Modbus RTU, 19200 bps, 8 Bit, 1 Stop-Bit, even parity

Add-on PID controller	
Controller options	On/Off controller with adjustable hysteresis P/PI/PID controller as Pulse-Pause, Pulse-Frequency, or continuous controller 3-point controller
Set points	2 set points with adjustable acting direction (except 3-point controller)
Relays	2 potential-free contacts 6A, 250 V, max. 550 VA
Hysteresis	Adjustable within the measuring range (only positive values)
Proportional range (X_P)	Adjustable within the measuring range (only positive values)
Integral time (T_N)	0 … 2000 seconds
Derivative time (T_V)	0 … 2000 seconds
Min. pulse	0,2 … 9,9 seconds
Pulse+Pause time	2 … 99 seconds
Max. frequency	1 … 7200 pulses/h
Start delay	0 … 200 seconds
Dosage monitoring	0 … 99 minutes

Add-on volume based dosing	
Dosing	0.00000 bis 9.99999
Flow measurement	0,000 … 9,999 l/pulse
Dosing rate	0,0 … 999,9 l/h
Min. pulse	0,2 … 9,9 seconds

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Add-on volume based dosing	
Pulse+Pause time	2 … 99 seconds
Max. frequency	1 … 7200 pulses/h
Relays	2 potential-free contacts 6A, 250 V, max. 550 VA Relay 1 – control variable Relay 2 – circulation pump

1.4. Technical Data

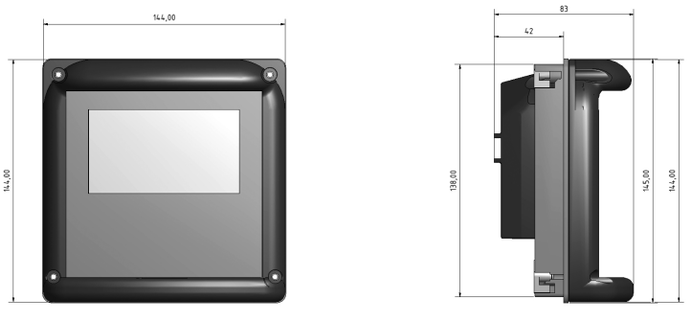
Feature	**Neon® panel mounted**	**Neon® wall mounted**
Ansicht		
Installation	panel-mounted housing	wall-mounted housing
Dimensions	138x138x83 mm	144x144x156 mm
Weight	0,6 kg	1,0 kg
Connections	Cable inlet: 2x M16, 2x M12 + optionally: 2x M12 and 1x M25 Terminals Basic function: rigid/flexible 0.2-2.5 / 0.2-2.5 mm² Measurements: rigid/flexible 0.2-1 / 0.2-1.5 mm²	
Protection class	Front IP54	IP65
Power supply	85.. 250 V AC, +6/-10%, 40.. 60Hz Option: 24 V DC	
Power consumption	10 VA	
Contact rating	3 relays, potential-free N/O contacts, max. 250 V, 6A, 550 VA	
Operation temperature	0.. 50°C	
Storage temperature	-20.. +65°C	
Rel. humidity	max. 90% rH at 40°C (non-condensing)	

2. Instructions for installation and connections

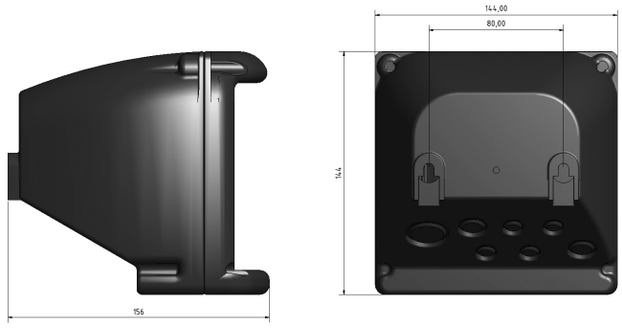
Attention **Install the instrument in a place where it is not put under mechanical or chemical strain!**

Note **Mind the protection class!**

2.1. Dimensions



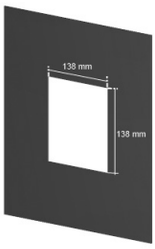
Picture 1 Dimensions Neon® panel-mounted housing



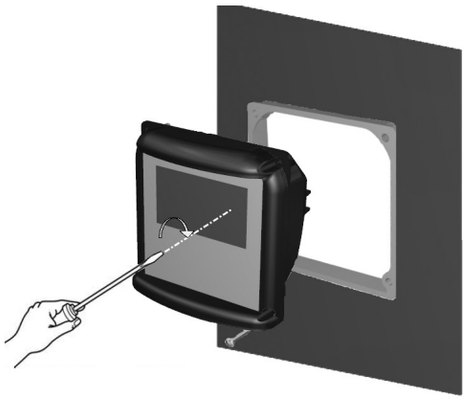
Picture 2 Dimensions Neon® wall-mounted housing

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2.2. Installation panel-mounted housing



Prepare an opening of 138 x 138 mm. Clip the installation frame into the opening.



Place the instrument inside the frame and secure it with the M4 x 25 screws. Tighten the screws until the instrument is firmly fixed.

Attention **To preserve the protection class, the flat gasket of the housing and the sealing ring of the frame must be used!**

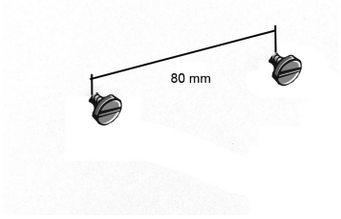
2.3. Installation wall-mounted housing



Pierce the pre-cut openings of the housing for as many cable glands as you wish to use and remove any remaining pieces from the openings.

Place the installation plate into the back frame and screw in the cable glands.

Drill two holes at 80 mm horizontal distance. Screw two screws into the holes and mount the instrument on the screws.





Or you can open the instrument and put the screws through the holes at the back of the instrument. Mind to replace the covers before closing the instrument.

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2.4. Connections

A detailed connection diagram can be found on the following pages.

Before connecting the power supply check the information on the instrument label!

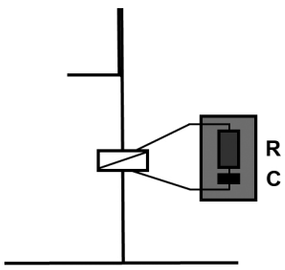
Warning **Input, output, and control cables must be installed separate from each other and especially apart from power lines!**

For inputs and outputs use screened cables, and connect the screens on one side only.

The measurements are interference-sensitive. Use only our special cables with a very high insulation for short distances, and for longer distances an impedance converter.

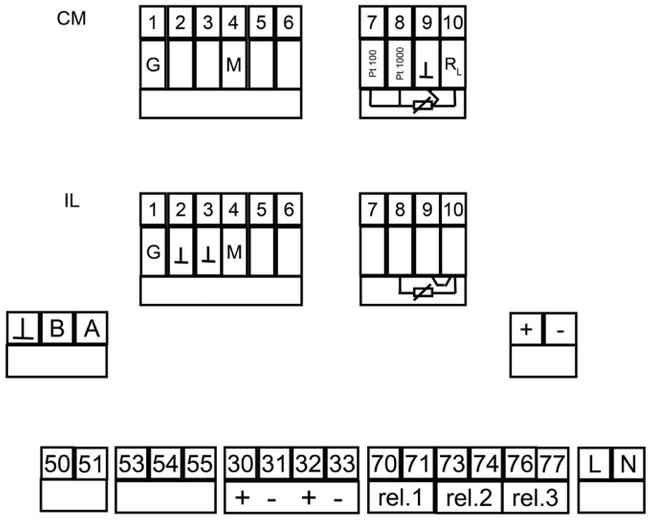
For the connection of temperature sensors use a low-resistance cable with a large diameter.

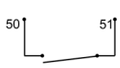
When using the relays, mind that with inductive loads, interference must be suppressed. If that is not possible, the relay must be protected at the terminal block by a resistance-capacity filter or, in case of direct current, by a free-wheeling diode.



Current up to	Capacitor C	Resistance R
60 mA	10 nF 260 V	390 Ohm 2 Watt
70 mA	47 nF 260 V	22 Ohm 2 Watt
150 mA	100 nF 260 V	47 Ohm 2 Watt
1,0 mA	220 nF 260 V	47 Ohm 2 Watt

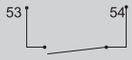
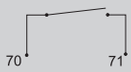
2.4.1. Connection diagram



Connection	Terminals	Notes
Conductive	1+4	1 = measuring electrode 4 = counter electrode
Inductive	1-4	1 = voltage = red 2 = voltage = black 3 = measurement = white / screen 4 = measurement = green
Pt 100 (only for CM)	7,9+10	7 = T1 (Pt 100) 9 = T2 (Pt 100) 10 = RL – for 3-wire connection/cable*
Pt 1000 (only for CM)	8,9+10	8 = T1 (Pt 1000) 9 = T2 (Pt 1000) 10 = RL – for 3-wire connection/cable*
NTC 214k	8-10	8 = T1 (NTC 214k) 9 = T2 (NTC 214k) 9+10 = jumper
Digital input 1	50+51 	50 = +, 51 = -, low water, level monitoring, or controller stop

* For 2-wire-connection there should be a jumper between terminal 9+10

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Connection	Terminals	Notes
Digital input 2	53-55 	53 = +, 54 = -, low water, level monitoring, or controller stop Volume based dosing 53 = Signal 54 = GND 55 = + 15 VDC
Analog output 1	30+31	30 = + und 31 = -, max. load 500 Ohm
Analog output 2	32+33	32 = + und 33 = -, max. load 500 Ohm
Relay 1	70+71 	Controller: control variable set point1 Volume based dosing: control variable set point 1 Max. 2 A, AC 250 V/550 VA DC 30 V / 60 W
Relay 2	73+74 	Controller: control variable set point 2 (with 3-point controller control variable set point 1) Volume based dosing: circulation pump Max. 2 A, AC 250 V/550 VA DC 30 V/60 W
Relay 3	76+77 	Alarm relay Max. 2 A, AC 250 V/550 VA DC 30 V/60 W
Power supply	L+N	85-265 V AC
Power supply 24 V DC	+/-	24 V DC
Modbus RTU	A+B ⊥	A = + B = - ⊥ = Screen

Add-ons (marked in grey)

Controller or volume based dosing, second digital input, up to 2 mA outputs, data logging, and RS 485

2.4.2. SD card

You will find the SD card slot at the back of the housing.



Press the SD card – with angled edge top right – into the slot until it is into place.

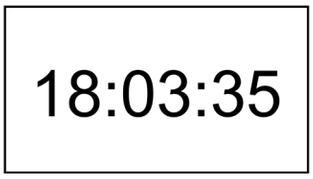
By pressing the SD card the mounting is loose and the SD card will be ejected.

Note **Never remove the SD card while the logging is running! Always set the mode to OFF (not stop!) before removing the card. Otherwise data loss might occur, and an error message will appear.**

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3. Operation

When the power is switched on, the instrument initialises. During that process, the time is displayed.

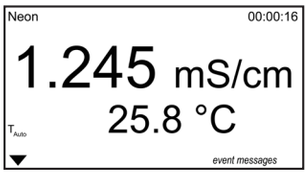


After approx. 20 seconds the process is finished, and the measured values are displayed.

3.1. Desktop

With factory settings, the display shows at the top the instrument name and the time, followed by the current measured value and the temperature.

In the bottom line, the triangular symbol shows the way to the menu (key DOWN, or just touch the triangle if you have a touch screen instrument). On the right side of the bottom line, current events are displayed.



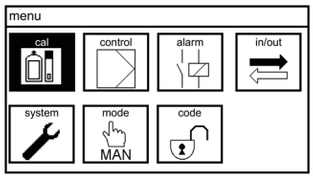
3.2. Key pad operation

The key pad version is operated via four keys: DOWN, UP, ESC (= one step back), and OK (= enter).



Starting from the desktop (display of the measured values), enter the menu with key DOWN.

3.2.1. Main menu



With each symbol, the four keys mean:

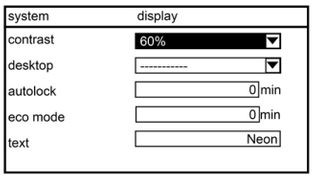
> **OK** – opens the selected (dark) submenu or changes the mode

> **ESC** – retraces the last step

> **DOWN** – moves to the adjacent symbol

> **UP** – moves to the adjacent symbol in the other direction

3.2.2. Submenus



In submenus you will find on the left side the parameters and on the right side the corresponding settings. The dark background indicates your current position in the submenu.

If the submenu contains more parameters than can be shown, a scroll bar on the right side gives access to the parameters currently not shown. When moving through the submenu with keys UP and DOWN, the scroll bar follows automatically. Select a parameter with the OK key to enter a value or select a setting from a drop-down list.

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3.3. Touch screen operation

Neon® touch is operated via touch screen. The screen is of the resistive type, with the advantage that a touch is recognized via pressure – it can be operated even with gloves, and does not respond to mere splashes of water. Press your finger on the screen gently but firmly, and keep the pressure until the instrument shows that the touch has been recognized.

In the desktop (display of the measured values), touching various areas of the screen gives access to different functions and submenus:



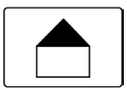
Touch

> **text** to switch to another desktop design
> **time** to enter the time setting menu
> **event message** to get suggestions for trouble-shooting
> **the triangle** to enter the main menu

Note **Mind that access might be limited via code. If the current code does not permit access to a selected area, the touch will only yield an empty display. In that case you have to enter the main menu and set a valid code first (0202 for the calibration level, 1612 for full access)**

3.3.1. General

All submenus show on the right side of the top line two symbols:

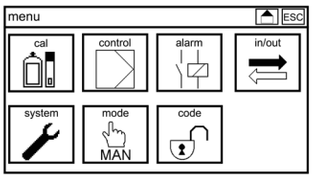


Home – Touching this symbol takes you back to the desktop from any position



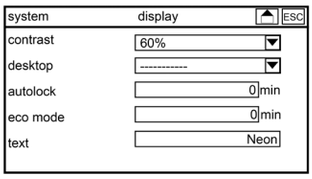
ESC – Touching ESC takes you back to the previous menu.

3.3.2. Main menu



Press the triangle on the left side of the bottom line of the desktop to enter the main menu. In the main menu, select submenus by touching the corresponding symbols.

3.3.3. Submenus



In submenus you will find on the left side the parameters and on the right side the corresponding settings. If the submenu contains more parameters than can be shown, a scroll bar on the right side gives access to the parameters currently not shown.

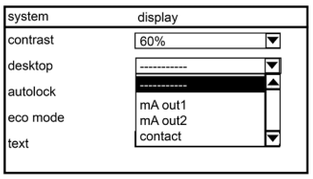
Move the scroll bar by pulling the bar with your finger or by touching the triangles at the top and bottom of the bar.

3.4. Settings

Parameters are set either by entering a value via keyboard or by selecting a setting from a drop-down list or by activating or deactivating an item from an action list, depending on the nature of the parameter.

Drop-down lists

Drop-down lists appear whenever you have to select a single option from a variety of options, for example when you choose a display design:



Drop-down lists are indicated by a triangle on the right side of the parameter setting.

Move the cursor with the UP and DOWN keys in the submenu until the setting of the desired parameter turns black. If you press OK, the drop-down list appears. Move the cursor with UP and DOWN keys in the list until the desired parameter turns black. Press OK to choose the parameter.

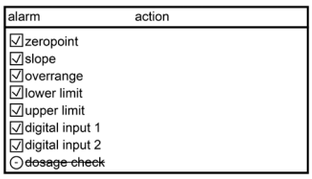
With a touch screen instrument open the drop-down list by touching the triangle. A list of possible settings appears. Select the desired setting via touch.

Press ESC if you want to cancel and leave without changing the setting.

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Action lists

Action lists appear whenever you can select more than one option from a list, for example alarm actions:



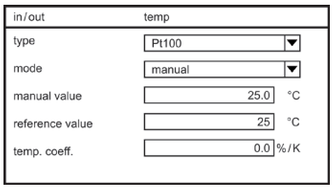
Action lists contain all selectable items. On the left side, each item has a box that can be ticked.

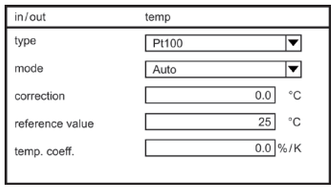
With key pad instruments, scroll through the options with the UP and DOWN keys until the desired option turns black, then press OK to tick the box or to remove the tick. With touch screen instruments, press the desired option with your finger to tick or untick its box.

Note Options that are not activated in your instrument are crossed out and cannot be ticked.

Neon®´s support with the settings:

Parameters that do not fit to previous selections are hided, e. g. in the TEMP menu correction and manual Temperature depending on the mode.





Entering a value / keyboard

For settings of a freely adjustable parameter, like buffer values or contact data, a keyboard appears if you select the input field – with key pad instruments with the UP and DOWN keys and OK, with touch screen instruments by touching the settings box of the parameter.

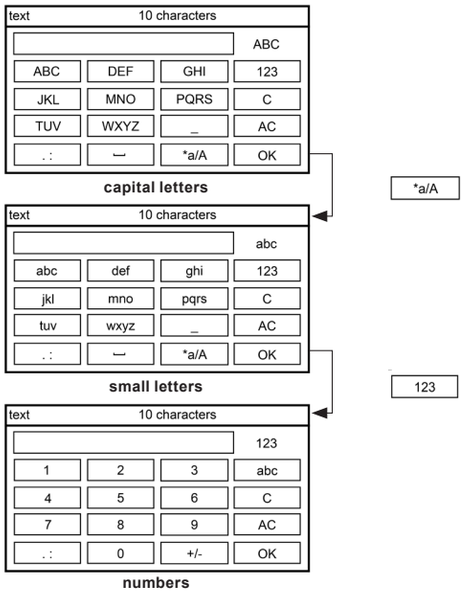
On the right side of the keyboard, four function keys are shown:

> The upmost function key shows „123“ or „abc“ and allows changing from characters to numbers and vice versa.

> The „C“ (clear) key erases the last input

> The „AC“ (all clear) key erases the complete input

> The „OK“ acknowledges the selection



Note **With numerical parameters, the keyboard automatically shows only numbers.**

Navigate through the keyboard by pressing the UP and DOWN keys. By pressing OK you choose the inverted field. If a key represents several characters, touch it twice for the middle character or three times for the right character. With touch screen operation simply select numbers and characters by pressing the field.

Example: abc key

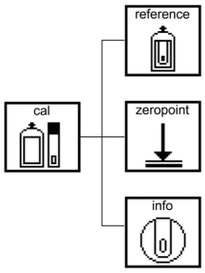
Key pad instrument	*Touch screen instrument*
OK key once: a appears	*abc key touch once: a appears*
OK key twice: b appears	*abc key twice: b appears*
OK key three times: c appears	*abc key three times: c appears*

Touch OK when the input is complete. Now the instrument checks if the input is within the allowed limits. If it is, the new value is stored, and the setting is finished. The keyboard disappears.

If the value does not lie within the allowed limits, the value is not stored. The input field turns dark, and the keyboard remains open until you enter a correct value or cancel the setting and touch ESC or home.

Note **For maximum comfort the instrument adds zeros automatically. An input of pH 4, for example, is automatically turned into 4.00, and an input of 1 for the datalog interval is automatically interpreted as 00:00:01 (hours:minutes: seconds). Unfortunately, for date, code, add-on codes, text, and contact data, this support is not feasible.**

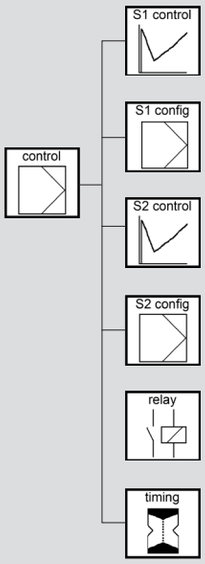
3.5. Menu overview – where to look?



Run calibration with reference value.

Zeropoint calibration.

List of the last 10 calibration results.



Settings of control parameters for set point 1.

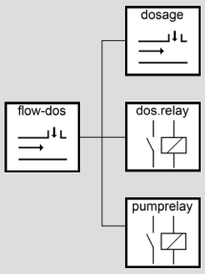
Settings of output parameters for set point 1.

Settings of control parameters for set point 2.

Settings of output parameters for set point 2.

De-/activating of relay and setting of acting direction.

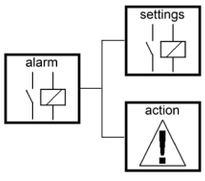
Settings of delay and dosing check.



Settings for volume based dosing.

Settings for dosage relay.

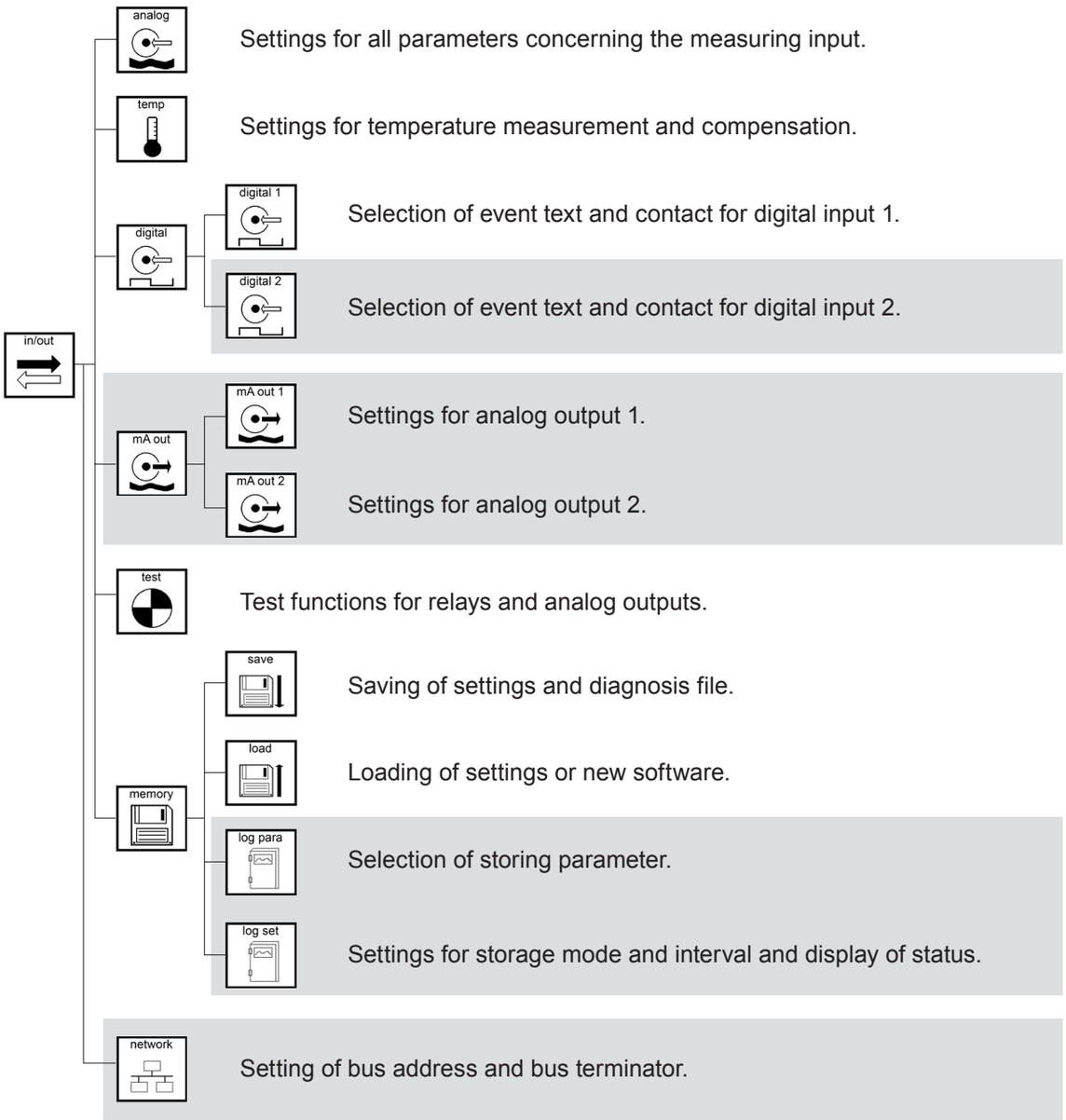
Settings for pump relay.



Setting of limit value, delay time and contact of relay 3.

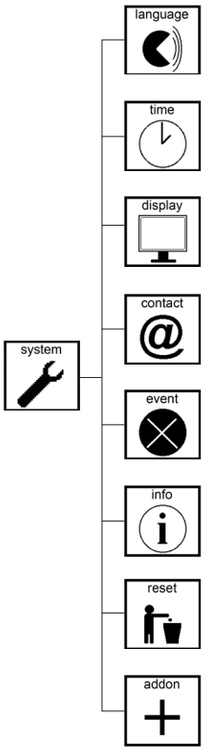
Selection of events which cause an alert.

Add-ons (marked in grey)
Controller or volume based dosing, second digital input, mA output, Datalogger and Modbus RTU.



Add-ons (marked in grey)
Controller or volume based dosing, second digital input, mA output, Datalogger and Modbus RTU.

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Language selection.

Adjustment of date and time.

Setting of contrast, auto lock function, eco mode, text and desktop.
For touch additionally the calibration.

Setting of contact data.

Help with active event messages.

Device information, eventlog, list of settings and
overview on in- and outputs.

Restore to factory settings.

Activating of add-on codes.



Selection of device mode: Man, Hold or Auto
(Auto only available for add-on controller or volume based dosing).



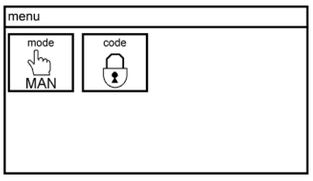
Entering a code.

Add-ons (marked in grey)
Controller or volume based dosing, second digital input, mA output, Datalogger and Modbus RTU.

3.6. Menu appearance depending on code and options

The main menu and the submenus appear different, depending on code, add-ons, and settings.

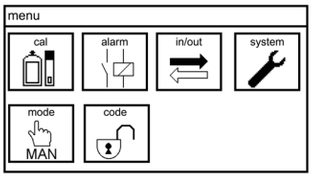
No valid code



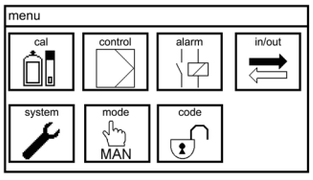
If no valid code is set, the main menu shows only two symbols, one to enter another code, and the other to stop the controller.

When the code is set to 1612 to give full access to all functions, the main menu shows all functions of the instrument. In the entry-level version the main menu shows six symbols. In the maximum version with all available add-ons, the main menu contains seven symbols.

Entry-level version



Maximum version

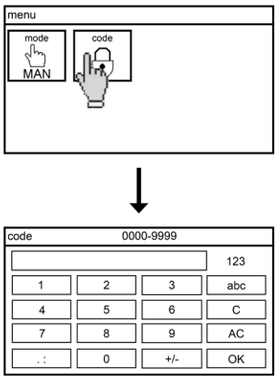


With code 0202, access is restricted, and the number of symbols decreases.

If you use the Neon® for ORP measurements, all unnecessary submenus disappear, such as the CAL symbol in the main menu.

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4. Code



To enter a code, select the symbol CODE from the main menu, and enter the code via the keyboard.

The Neon® instruments have two access levels:

Calibration level code: 0202

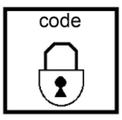
On this level you can calibrate, save settings, events and the diagnosis file, and view various settings.

Full access code: 1612

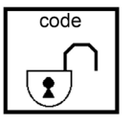
On this level you can enter and change all functions and settings.

If the full access code is set, the CODE symbol in the main menu shows an open lock instead of a closed one.

Invalid code or calibration level



Full access

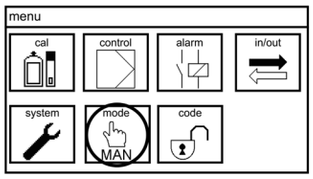
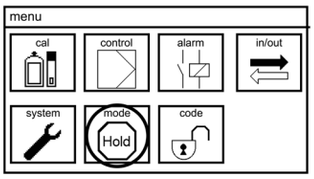
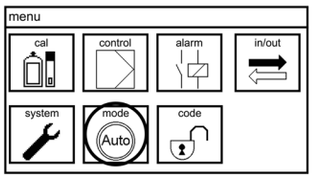


Autolock function

On delivery, the autolock function is deactivated. If you activate it via menu, the code is reset to 0000, to prevent unauthorized operation, after a defined interval without operation, or whenever the power supply was cut off. For more information, see the chapter “System functions”.

5. Mode

There are two, with the option controller three modes of operation. To change the operation mode, select the symbol MODE. The symbol changes according to settings.

MAN	Hold	Auto
		
> Desktop display active > Alarm relay active > Test functions active > Limits active > Data log active > mA outputs active > Controller OFF > Modbus RTU active	> Desktop display active > Alarm relay deactivated > Test functions deactivated > Limits deactivated > Data log on HOLD > mA outputs on HOLD > Controller OFF > Modbus RTU on HOLD	> Desktop display active > Alarm relay active > Test functions deactivated > Limits active > Data log active > mA outputs active > Controller ON > Modbus RTU active

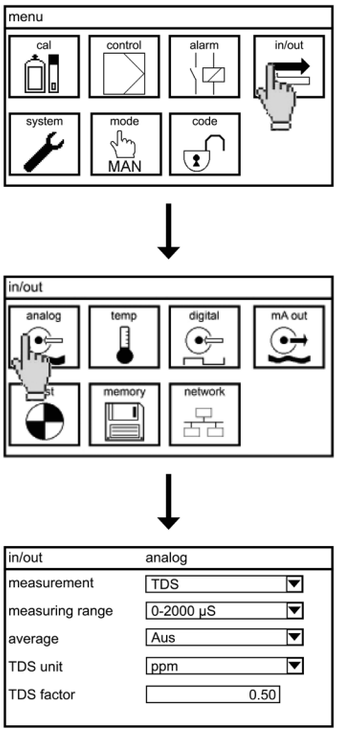
Note **The instrument shows always only the features that you have purchased. In the entry-level version, the instrument contains the desktop, the alarm relay, the test functions, and the limits.**

In operation mode auto Neon® stops automatically the controller if

> the digital input switches (low water, level or ext. Controller stop)
> there is no measuring value (check measuring input, check temperature input)
> dosage check is activated
> by Neon® Des during automatic cleaning

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6. Analog input – conductivity and TDS measurement



Select the symbol IN/OUT in the main menu and then the symbol ANALOG.

Measure

To select the parameter conductivity or TDS. TDS is the abbreviation for total dissolved solids and is consisten with the residual after complete water evaporation.

Measuring range

IL	0-2.000/20.00/200.0/2000 mS/cm
CM	0-20.00 mOhm/0-2.000/20.00/200.0µS/cm (c=0.05)
	0-2000 µS/cm bzw. 0-2.000mS/cm (c=0.2)
	0-20.00 mS/cm (c=1)
	0-200.0 mS/cm (c=10)

Averaging

To activate the averaging function, select:

> OFF: no averaging
> low: mean of 5 values
> medium: mean of 10 values
> high: mean of 20 values

Cell constant

The cell constant takes account of the sensor geometry and allows to standarzise the measurment. You adjust the cell constant via menu or calibration.

TDS unit

The TDS value is the untiy of soluted organic and anorganic compunds in a solvent. Common unit for TDS is ppt (parts per thousand), ppm (parts per million) and ppb (parts per billion).

The unit depends on the measuring range

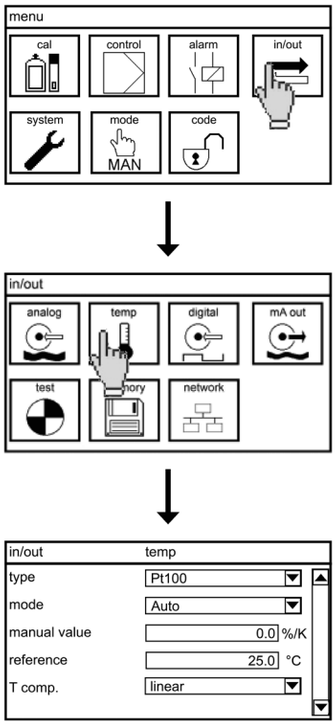
Measuring range	µg/l = ppb	mg/l = ppm	g/l = ppt
0-2.000 µS/cm	0-1000	0-1.000	
0-20.00 µS/cm		0-10.00	
0-200.0 µS/cm		0-100.0	
0-2.000 mS/cm		0-1000	0-1.000
0-20.00 mS/cm			0-10.00
0-200.0 mS/cm			0-100.0

TDS factor

If you choose TDS the complete conductivity will be converted in TDS by an adjustable factor. The TDS determination via conductivity mainly informs about the salinity of the solution because only solved salts contribute to the conductivity. This is an approximation which you can adjust to the real conditions by changing the factor. A factor of 0.5 is recommended for a pure sodium chloride solution.

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7. Temperature measurement



All settings concerning temperature measurement and compensation are found in the submenu IN/OUT =>TEMP. Select the symbol IN/OUT in the main menu, and TEMP in the submenu.

Type

For Neon® CM you can select Pt100 or Pt1000. For Neon® IL NTC is shown as sensor type – other temperature probes are not supported.

Select Pt100 if you have connected a Pt100, or Pt1000 if you have connected a Pt1000. Other temperature sensors cannot be used.

Note **You can connect temperature sensors with 2-wire or 3-wire connection. If you use 3-wire connection, make sure that your sensor supports this type of connection.**

Correction

If the sensor is connected with a 2-wire cable, slight deviations might occur between measured and real temperature. Check the temperature once during installation, and calibrate the temperature measurement if necessary by entering a correction value between -10°C and +10°C.

Note **If the mode is manual the input for the correction value is hided.**

Reference

The reference temperature is the temperature to which the measurement iscompensated.

Mode

In the automatic mode, the measured temperature values are used to compensate the temperature influence on the measurement, and in the manual mode, a manual temperature setting is used.

Note **On the desktop is shown whether the shown value is set manual (Tman) or measured (Tauto).**

Manual value

Enter the temperature of your solution for manual compensation. If you want to deactivate temperature compensation, set the manual value to the same value as the reference temperature and set mode to manual.

Note **If the mode is auto, the input for the manual value is hided.**

Temperature compensation

The temperature dependence is relative to the solution composition thats why the compensation runs approximately linear. For ultra pure water is compostion of the probe known and non-linear compensation is used. Choose for measurement below 2 µS ultra pure water.

Temperature coefficient (only for linear compensation)

Via the temperature coefficient you can adjust the compensation. The coefficient defines the amount of compensation as % correction per degree and depends on temperature and concentration. For many applications, a coefficient of 2.1-2.5 % / K has proved advantageous.

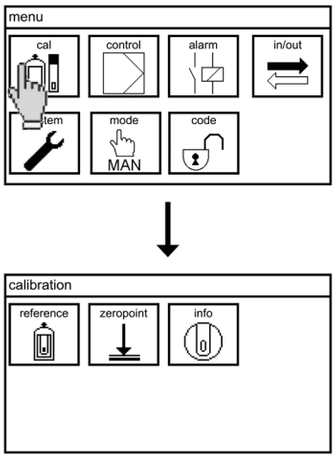
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8. Menu Cal – calibration

Note **The calibration of a conductivity cell is meant as validation and only during start-up as adjustment, because a change of the cell constant ususally caused by pollution of the cell. Obviously an adjustment to the current pollution shouldn´t be done instead cleaning the cell.**

Set the controller to MAN or HOLD: MAN stops the controller, all other functions are still active. HOLD stops the controller, all outputs are frozen to the last value and the alarm relay is deactivated.

You can calibrate conductivity and TDS with a reference measurement or a reference solution to determine the c value or the TDS factor. Additionally a Zeropoint calibration is possible to eliminate possible influences by e.g. cable.

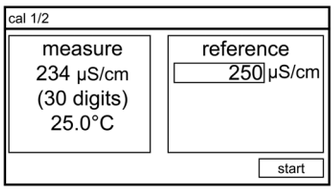


Select the symbol CAL to enter the submenu calibration. Here you find three symbols: REFERENCE, ZEROPOINT, and INFO.

8.1. Conductivity calibration – reference

Note **You can leave the calibration menu any time with ESC, and with touch screen operation also with the HOME symbol.**

> Select the symbol reference to start the calibration.

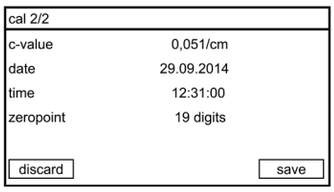


> If you use a solution with known conductivity take care that the sensor is free hanging and a least the electrodes or for a metal sensor the complete shaft immerses. There should be no gas bubbles at the electrodes and the probe should be complete mixed.

> I you use a reference measurement for calibration measure the conductivity at the same place where the online measurement measures. If this is not possible take a representive sampel. Keep in mind to use for both measurements the same compensation and reference temperature.

> Enter the value of the solution or the reference measurement.

> With OK you execute the calibration and reach the info screen, showing the results of the calibration.

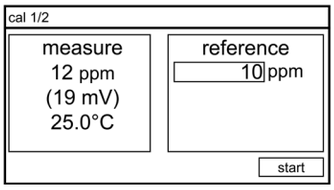


> With the SAVE button you store the results. With DISCARD you reject the results and keep the previous calibration values.

Note **If the TDS factor not between 0.01 and 2.00 (for higher measuring ranges between 0.1 and 20.00) saving is not possible.**

8.2. TDS calibration – reference

> Select the symbol RUN to start the calibration

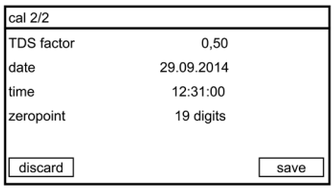


> If you use a solution with known TDS take care that the sensor is free hanging and a least the electrodes or for a metal sensor the complete shaft immerses. There should be no gas bubbles at the electrodes and the probe should be complete mixed.

> I you use a reference measurement for calibration measure TDS at the same place where the online measurement measures. If this is not possible take a representive sampel. Keep in mind to use for both measurements the same compensation and reference temperature.

> Enter the value of the solution or the reference measurement.

> With OK you execute the calibration and reach the info screen, showing the results of the calibration.



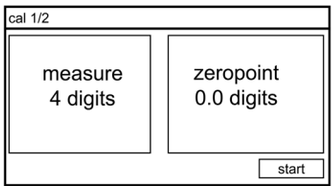
> With the SAVE button you store the results. With DISCARD you reject the results and keep the previous calibration values.

Note **If the TDS factor is not between 0.1 and 5.00 saving is not possible.**

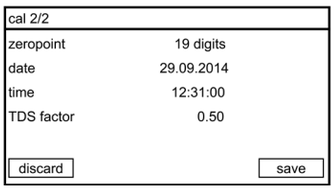
8.3. Zeropoint

> For Zeropoint calibration take the sensor out of the water and wipe it dry. There should be no humidity connection between the electrodes. For plugable connection you can remove the cable from the sensor for zeropoint calibration.

> In the CAL menu, select ZEROPOINT.



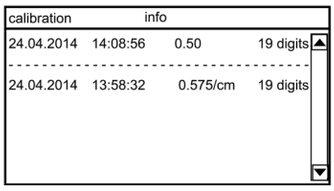
> With OK you execute the calibration and reach the info screen, showing the results of the calibration.



> With the SAVE button you store the results. With DISCARD you reject the results and keep the previous calibration values.

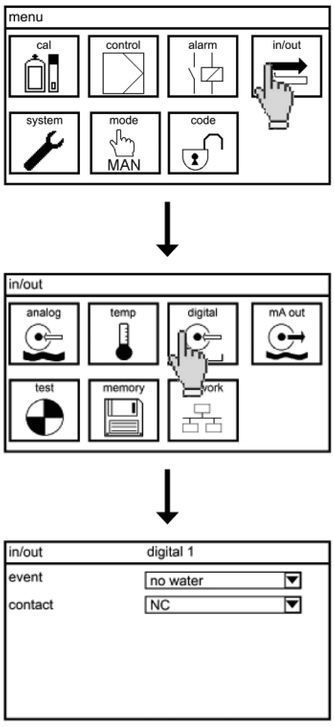
Note **After zeropoint calibration you have to carry out a reference calibration.**

8.4. Calibration – Info



If you select the symbol INFO in the submenu CAL, you get a list of the last calibrations. This is helpful with regard to predictive maintenance.

9. Digital inputs



In the entry-level version, the Neon® instrument has one digital input. All settings concerning the digital input(s) are found in the submenu IN/OUT=>DIGITAL. If you have two digital inputs, separate symbols will appear for them.

Contact

For both inputs you can define whether the input should work as a normally open (NO) or normally closed (NC) contact.

Event

You can select one of three text messages that will appear if the input is closed: low water, or level, or controller stop.

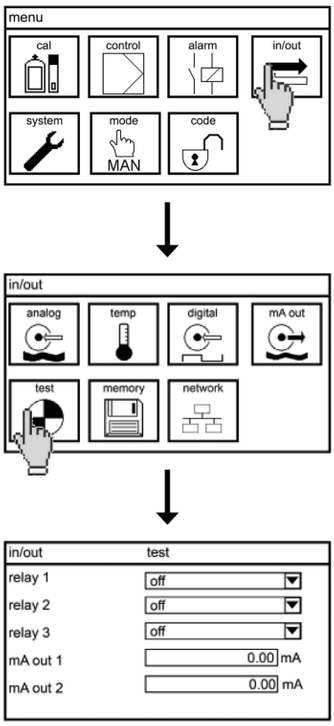
Note **Switching of the digital input will stop the controller no matter what text you have selected.**

Note **If you have activated the add-on volume based Dosing, then the second digital input is used for the flow measurement. In that case no symbol for the second digital input appears.**

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10. Test menu

The menu TEST is only accessible in the MAN Mode. In all other modes, the symbol is not shown. The test menu always shows a list of the maximum available analog and digital outputs. Naturally, you can operate only those outputs that are activated in your instrument. In the entry-level version this means only relay 3.



Set the mode to manual. Select the symbol TEST in the submenu IN/OUT.

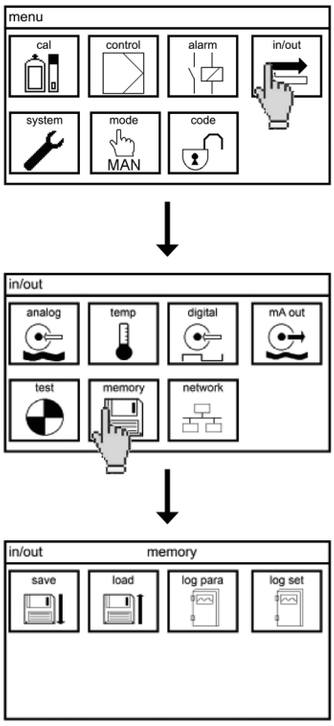
In the submenu TEST you can switch all available relays and define mA values for the analog outputs. To switch a relay, select ON from its drop-down list.

To check an analog output, select its settings to open the keyboard. Set the output to a value between 0.00 and 22.00 mA. This value is then sent out via the selected analog output.

Note **When you leave the menu, all relays and all analog outputs are reset to their previous settings.**

11. Memory

In the menu MEMORY you can find all functions and settings concerning the SD card.



Select the symbol IN/OUT in the main menu, and then in the submenu the symbol MEMORY.

NOTE **The submenus LOG PARA and LOG SET are shown only if the datalog function has been activated.**

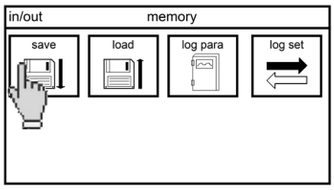
11.1. Store and load settings

You can save all settings on the SD card, for safekeeping, or to duplicate the settings into another instrument of the same type. This way you can easily restore your settings with a new instrument, or after a software-update, or after adding additional functions. With an appropriate PC program, you can even do all settings on the PC and then load them into the Neon® instrument via SD card.

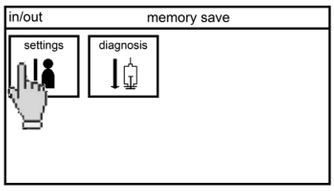
Note **Settings can be duplicated only to instruments of the same type, and in case of pR instruments only if they are set to the same parameter, i.e. either pH or ORP.**

11.1.1. How to save settings

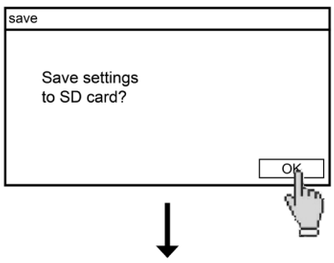
Make sure that an industry-standard SD card (max. 2 GB) with free storage space is plugged into the instrument.



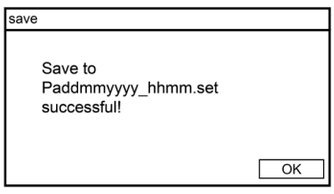
In the menu IN/OUT=>MEMORY select the symbol SAVE.



Select the symbol SETTINGS.



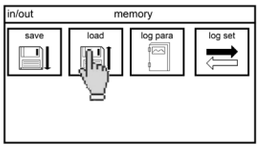
Acknowledge with OK.



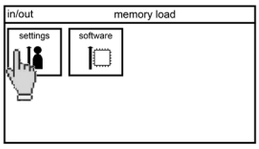
The display shows the name of the created file. The name consists of the parameter and the date, for example pH210812_2339.set. Acknowledge with OK.

11.1.2. How to load settings

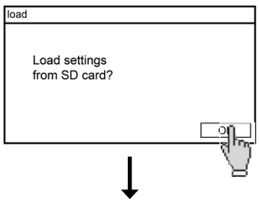
Make sure that the SD card with the settings-file is plugged into the instrument.



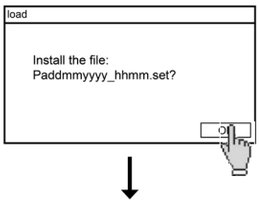
In the submenu MEMORY select the symbol LOAD.



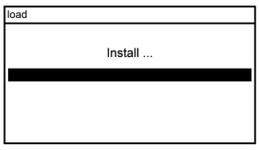
In the submenu select the symbol SETTINGS.



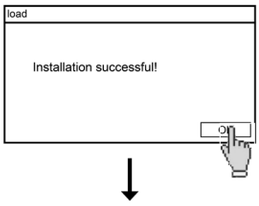
Acknowledge with OK.



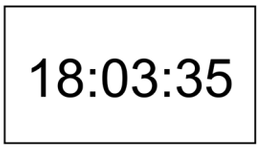
The display shows the name of the file that will be loaded. The name consists of the parameter and the date, for example pH210812_2339. set. Acknowledge with OK.



Progress is indicated by a status bar.



Acknowledge with OK.



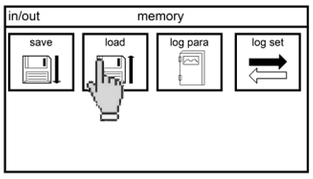
After installation, the instrument initializes. During that process, the time is displayed on the desktop.

Note **You can only load settings files for the same parameter.**

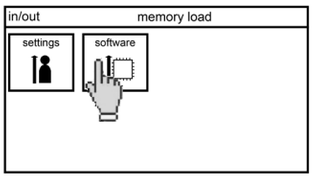
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11.2. Software update

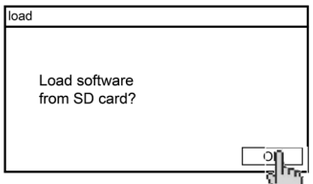
For a software-update we will send you two files. Save both files on an industrystandard SD card – directly, use no subfolder! Plug the SD card into the instrument.



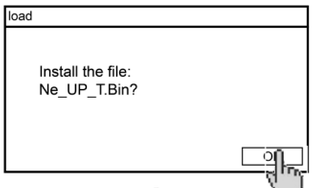
In the submenu MEMORY select the symbol LOAD.



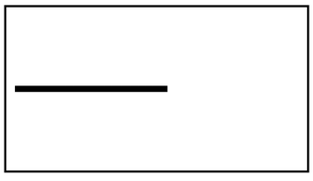
Select the symbol SOFTWARE.



Acknowledge with OK.



The display shows the name of the file that will be loaded. Acknowledge with OK.



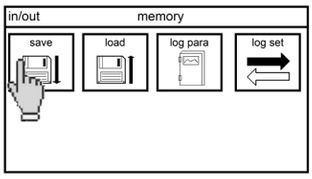
Progress is indicated by a status bar.



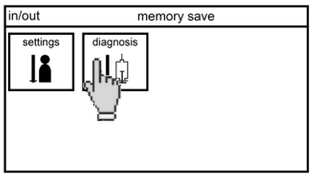
After installation, the instrument initializes. During that process, the time is displayed on the desktop.

11.3. How to save the diagnosis file

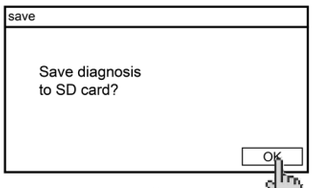
If the measurement does not run as planned, it is useful to assess the situation by checking all settings and current values. To collect all the information and maybe have it ready for a contact person, you can save a diagnosis file on the SD card.



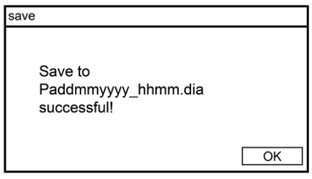
In the submenu MEMORY select the symbol SAVE.



Select the symbol DIAGNOSIS.



Acknowledge with OK.



The display shows the name of the created file. The name consists of the parameter and the date, for example pH210812_2339.dia. Acknowledge with OK.

Note **The .dia file is a binary file and can only be read with an appropriate configuration program.**

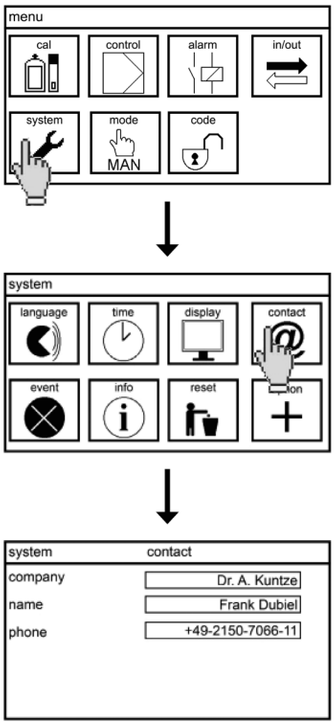
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12. System functions

Note **System settings can only be changed with the full access code.**

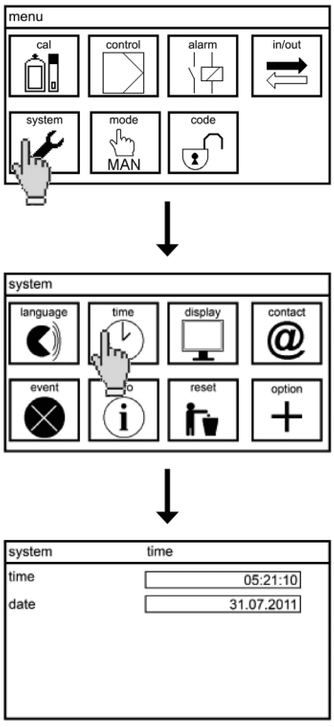
12.1. Language

For the menu, a variety of languages are available. The entry-level version contains English and German.



To change the language, select the symbol SYSTEM in the main menu and in the submenu the symbol LANGUAGE. A drop-down list shows all languages that are available on your instrument.

12.2. Time



To set the internal clock, select the symbol SYSTEM in the main menu, and in the submenu the symbol TIME.

When you select the field of either time or date, a keyboard appears to enter the desired time or date.

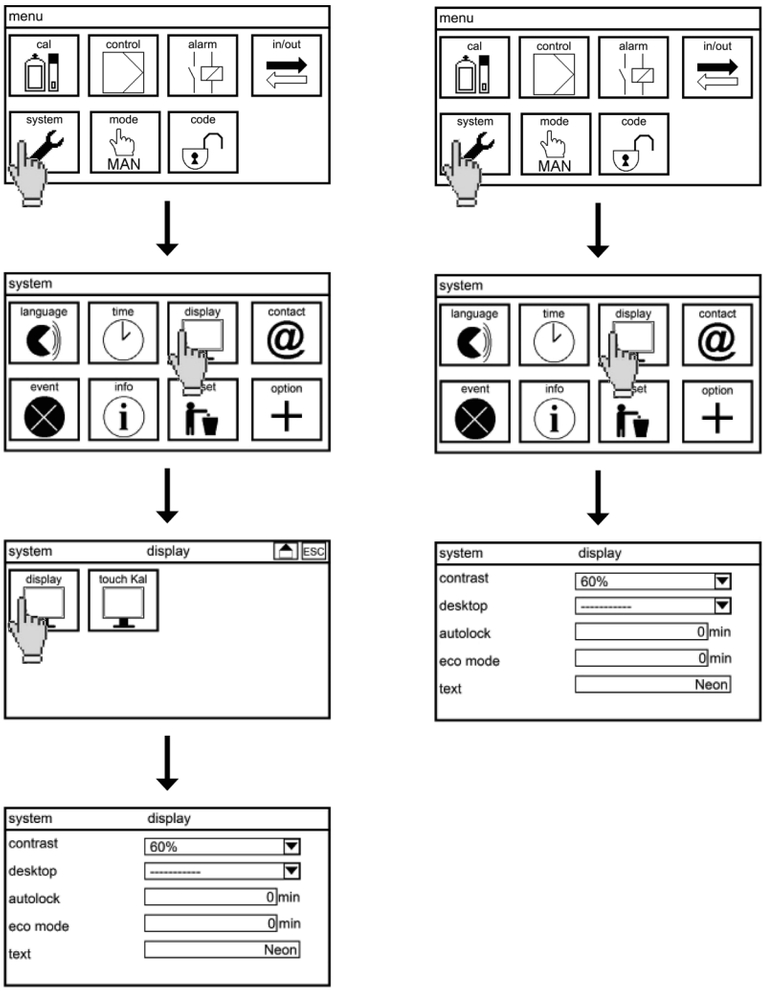
For your convenience, the instrument adds zeros automatically. If you enter 6, for example, the time will be set to 06:00:00.

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12.3. Display

All settings concerning the display are found in the submenu SYSTEM=>DISPLAY. If you have a touch screen instrument, the touch screen calibration is also found in this submenu.

12.3.1. Settings



Contrast

With CONTRAST you can adjust the brightness of the display, between 0% and 100%.

Desktop

This submenu contains a drop-down list of various desktop designs. The selection is activated as soon as you leave the menu.

With touch screen instruments, you can switch the display design by touching the instrument name on the desktop. To ensure that this selection is permanent, set the display design in the DESKTOP submenu to --------. Otherwise the design will be reset to the one specified in this menu whenever you enter any menu.

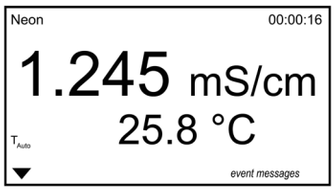
Bei dem Touchgerät können Sie die Ansicht über Drücken des Gerätenamens oben links wechseln. Nach Betreten und Verlassen von Menüs wird jedoch der Bildschirm angezeigt, der in der Auswahlliste im Menü angewählt ist.

Selection: ----------

If you select the line (---------), the desktop remains in its previous design.

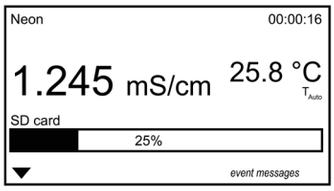
Note **Text, time, the triangle, and the event messages are part of all desktop designs.**

Selection: default



The default design shows the measured value and the temperature.

Selection: SD card



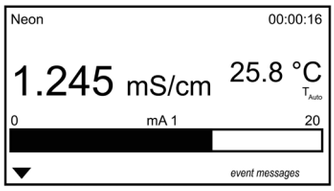
This adds a status bar indicating the remaining storage space on the SD card.

Selection: Contact



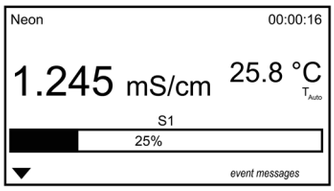
This adds the contact data that is stored in the submenu SYSTEM=>CONTACT.

Selection: mA1 or mA2 (add-ons)



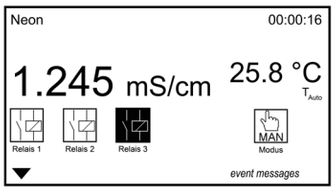
This adds an analog bar indicating the mA output of output 1 or 2, respectively.

Selection: S1 or S2 (add-on controlller)



This adds an analog bar indicating the controller output for set point 1 or 2, respectively, in %.

Selection: Relays (add-on controller)



This adds the status of all three relays and the mode. Active relays are shown white on black, and the symbol shows whether the relay is open or closed. See relay 3 in the example shown.

Selection: Flow (add-on volume based dosing)



This adds the calculated flow rate, the controller output in %, and the status of relay 2.

Autolock

The autolock function ensures that an invalid code is set after an adjustable interval without operation, even if you have forgotten to change the code manually before leaving the instrument. Autolock sets the code back to 0000, and the display shows the desktop with the measured values. If you set the interval to 0, the autolock function is deactivated.

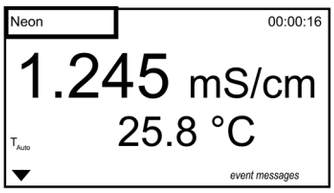
Eco mode

Eco mode turns off the display illumination after an adjustable interval. If you set the interval to 0, eco mode is deactivated, and the illumination remains on permanently.

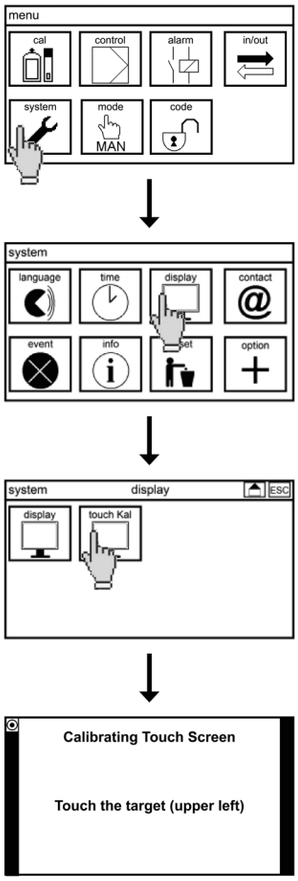
Note **The eco mode not only saves energy, it also extends the life span of the display.**

Text

Here you can enter an identification or location, which will be shown on the left side of the top line of the desktop



12.3.2. Touch Cal – for instruments with touch screen



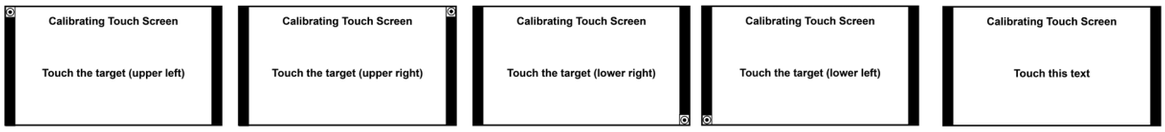
To calibrate the touch screen, select in submenu SYSTEM=>DISPLAY the symbol TOUCH CAL to start the calibration. The touch screen calibration texts are available in English only.

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Note **When started, the calibration routine cannot be left until it is finished, it has to be carried out completely.**

The routine comprises five steps. You have to touch each corner of the display, and finally the center of the displayed text.

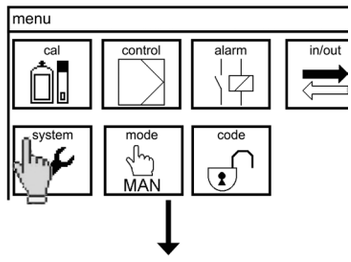
Step 1 Step 2 Step 3 Step 4 Step 5



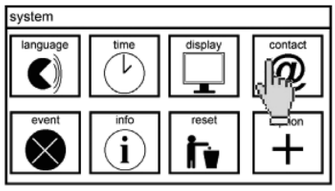
Note **The touch screen calibration can also be started by touching the screen for more than 30 seconds.**

12.4. Contact

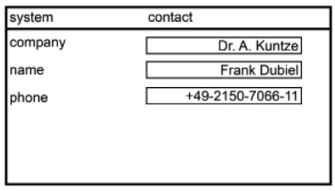
In the submenu SYSTEM=>CONTACT you can store contact data of your contact person, including company name, personal name, and phone number.



Hier fehlt ein Stück vom Bild.



Select in the submenu SYSTEM the symbol CONTACT. For each field a keyboard opens to enter the name or number.



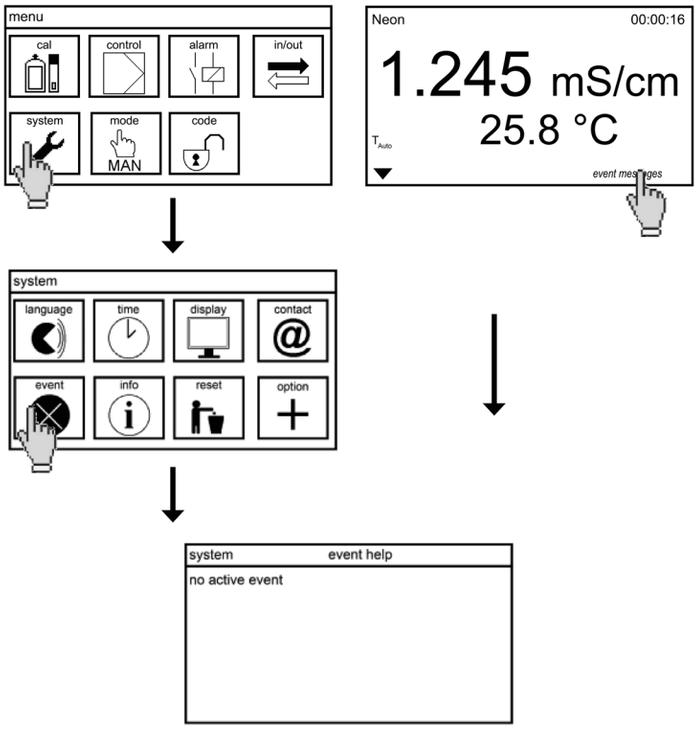
Note **Contact data can be shown on the desktop, if you select the display design “Contact”.**

Note **With restricted access (Code 0202) you can view this menu but not change the settings.**

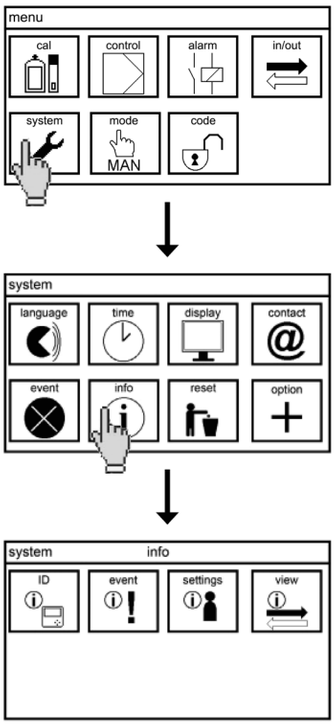
12.5. Event-related support

If an event message appears on the desktop, the submenu SYSTEM=>EVENT provides information on the event and suggestions how to solve it.

Select in the submenu SYSTEM the symbol EVENT. With touch screen instruments you can reach this submenu directly by touching the event message on the desktop. If there are no event messages, the event help will only show “no active event”. If more than one event is currently indicated, you can scroll up and down to view all events.



12.6. Info



The submenu INFO is found in the submenu SYSTEM.
It contains four symbols:

ID

This shows the serial number, the software version, and the operating hours of the instrument.

Eventlog

The event log stores up to 100 events, with the time they appear (*) or leave (#).

Settings

This submenu shows a complete list of all settings. Press UP and DOWN to view the complete list.

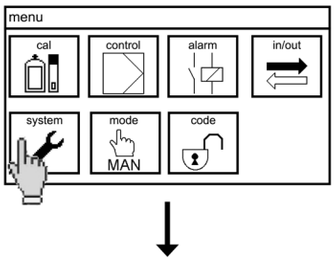
View

This submenu shows the raw signals of the sensors, the output signals of the mA outputs, and the status of the digital inputs.

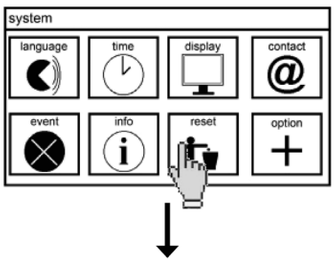
Note **The analog outputs and the second digital output are add-ons, and are shown only if the instrument is equipped with these features.**

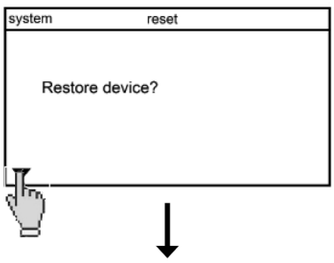
12.7. Reset to factory settings

The reset resets all settings to factory settings, except the time, date, and contact. Activated add-ons will remain activated, of course.

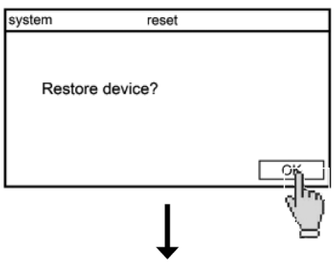


Select the symbol SYSTEM in the main menu, and in the submenu the symbol RESET.

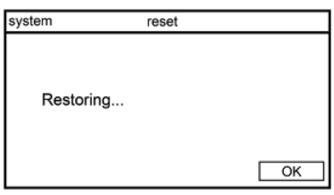




Go DOWN as indicated.



Acknowledge with OK.



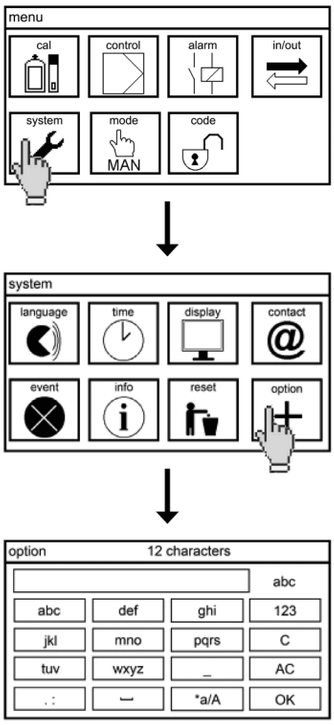
All settings are reset, and the instrument initializes.

Note **With touch screen instruments, the touch screen has to be calibrated after reset. The calibration routine starts automatically.**

12.8. Add-on activation

In this menu you can activate add-ons. Enter the 12-character code you have received with the purchase to add one or more of the following features:

- Second digital input
- Analog output
- Second analog output
- Data log
- PID controller or volume based dosing
- Modbus RTU (RS 485) – needs additional hardware



To activate add-ons, select the symbol SYSTEM in the main menu, and in the submenu the symbol ADD-ON.

A keyboard appears to enter the code.

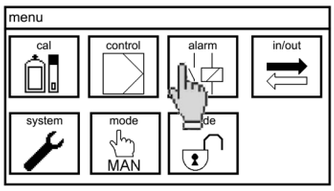
Note **The input is case-sensitive! Observe capital and small letters.**

After a successful activation, the display shows which features have been activated, and the instrument initializes. If the entered code was incorrect, no message appears, and the previous settings are maintained.

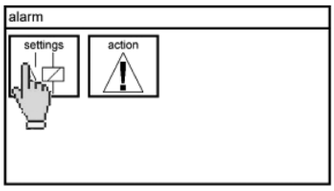
Note **We recommend to reset all settings to factory settings after activating add-ons.**

13. Alarm relay

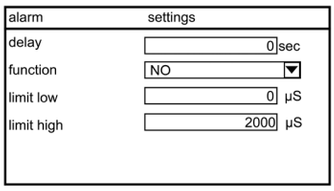
13.1. Settings



Select the symbol ALARM in the main menu.



In the submenu, select the symbol SETTINGS.



Here you can set the following parameters:

Delay

This defines a delay time – in case of an event, the alarm relay switches only after a specified interval. Display of the text message on the desktop and output of 22mA error current are not affected by this setting and will occur immediately.

Function

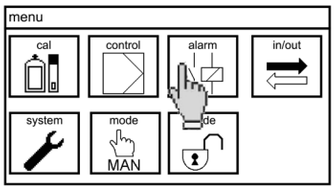
Here you can turn the normally open contact into a normally closed contact. That means that the relay is actively closed in case of normal operation and opens in case of alarm – with the advantage that power failure also leads to an alarm.

Lower limit / upper limit

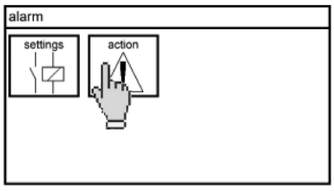
You can define an upper and a lower limit. If the measured value is higher than the upper limit or lower than the lower limit, an alarm is issued via the alarm relay– if you have specified the limits as alarm actions.

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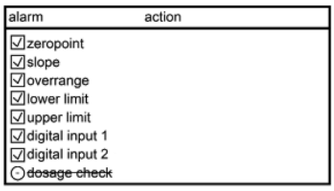
13.2. Alarm action



Select the symbol ALARM in the main menu.



Select the symbol ACTION.



A list of all possible actions appears.

By activating the check boxes you can define actions as alarm actions. If a box is marked with a tick, the action or event will cause the alarm relay to switch. An empty box means that the action or event does not cause the alarm relay to switch. Overrange refers to both inputs, the message and alarm will occur if either input is affected.

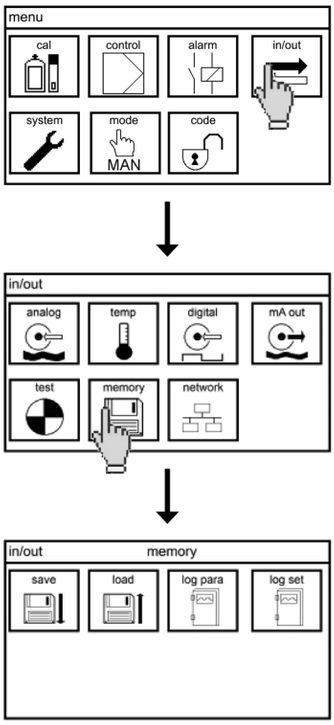
Note **If an action concerns an add-on that you have not activated, the box is crossed out and cannot be selected.**

The following events always cause the alarm relay to switch:

> Communication error
> Unknown measuring module

14. Add-on Datalog

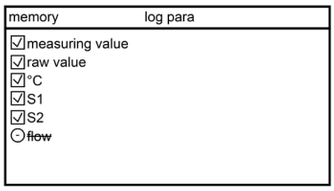
Note **The symbols DATALOG and STATUS are shown only if the add-on datalog has been activated.**



Select the symbol IN/OUT in the main menu, and in the submenu the symbol MEMORY.

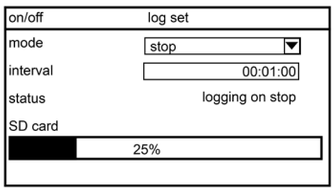
If the datalog add-on is activated, four symbols appear. In the menu LOG PARA you define which parameters you want to log. In LOG SET you define interval and log mode, and view the log status.

Log para



You decide which parameters are logged. Tick the boxes to log the parameter.

Log set



In the submenu LOG SET you can make the following settings:

Mode

Start data logging by setting the mode to either stop or ring. Stop means that the logging stops when the card is full. Ring means that when the card is full, the oldest data will be overwritten.

Note **Never remove the SD card while the logging is running! Always set the mode to OFF (not stop!) before removing the card. Otherwise data loss might occur, and an error message will appear.**

Note **Always use a card with sufficient storage space, even with ring mode, otherwise the logging will not start.**

Interval

The INTERVAL defines the time between subsequent data logs. You can enter an interval of 1 second up to 24 hours.

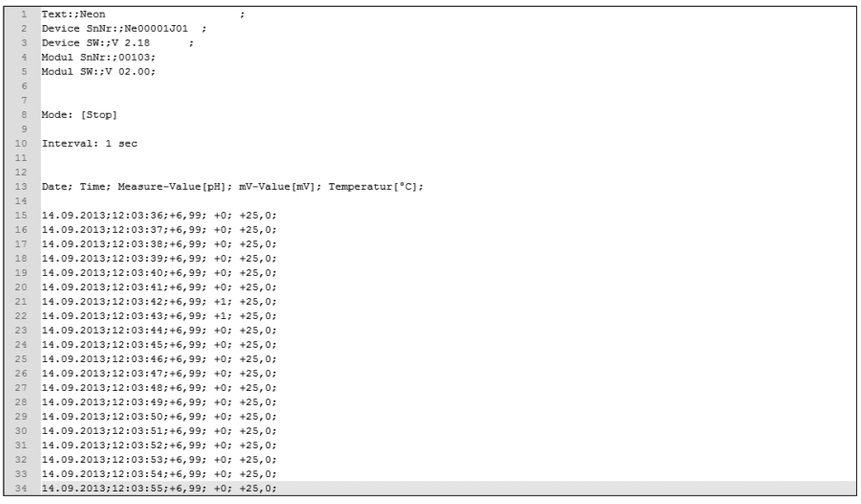
Example:
00:00:01 means that each second the values are logged.
00:01:00 means that each minute the values are logged.
01:00:00 means that once every hour the values are logged.

Note **The instrument fills in zeros automatically.**
Example: 1 is interpreted as 00:00:01 / 1: is interpreted as 00:01:00/ 1:1: is interpreted as 01:01:00

14.1. View logged data

To remove the SD card, first set mode to OFF, then press the SD card to take it out of the instrument.

Note **If you remove the card without deactivating the logger, data loss might occur, and the instrument displays an error message.**



```
Text:;Neon                    ;
Device SnNr:;Ne00001J01  ;
Device SW:;V 2.18      ;
Modul SnNr:;00103;
Modul SW:;V 02.00;


Mode: [Stop]

Interval: 1 sec


Date; Time; Measure-Value[pH]; mV-Value[mV]; Temperatur[°C];

14.09.2013;12:03:36;+6,99; +0; +25,0;
14.09.2013;12:03:37;+6,99; +0; +25,0;
14.09.2013;12:03:38;+6,99; +0; +25,0;
14.09.2013;12:03:39;+6,99; +0; +25,0;
14.09.2013;12:03:40;+6,99; +0; +25,0;
14.09.2013;12:03:41;+6,99; +0; +25,0;
14.09.2013;12:03:42;+6,99; +1; +25,0;
14.09.2013;12:03:43;+6,99; +1; +25,0;
14.09.2013;12:03:44;+6,99; +0; +25,0;
14.09.2013;12:03:45;+6,99; +0; +25,0;
14.09.2013;12:03:46;+6,99; +0; +25,0;
14.09.2013;12:03:47;+6,99; +0; +25,0;
14.09.2013;12:03:48;+6,99; +0; +25,0;
14.09.2013;12:03:49;+6,99; +0; +25,0;
14.09.2013;12:03:50;+6,99; +0; +25,0;
14.09.2013;12:03:51;+6,99; +0; +25,0;
14.09.2013;12:03:52;+6,99; +0; +25,0;
14.09.2013;12:03:53;+6,99; +0; +25,0;
14.09.2013;12:03:54;+6,99; +0; +25,0;
14.09.2013;12:03:55;+6,99; +0; +25,0;
```

Logged data are stored in CSV files. The file name consists of the measuring parameter, the date, and the time, for example pH060812_1322.csv for pH, or mV060812_1345 for ORP measurements.

Each file starts with the device name, the instrument number, and the software versions, followed by the log mode and the interval. Measured values are listed line by line, separated by semicolons.

CSV files can be opened with commercially available spreadsheet software such as OpenOffice Calc or Microsoft Excel or in a simple text program.

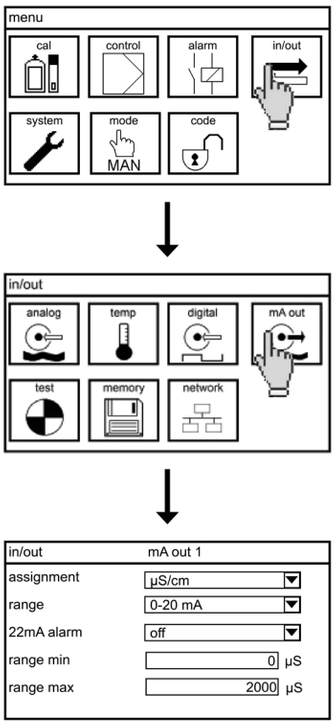
For each day, a new file is created. Additionally, a new file is created if:

> Power was turned off
> The measuring parameter changed, for example from pH to ORP
> The logging was stopped and restarted
> Other parameters for the datalogging were selected

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15. Add-ons mA output

Up to two analog outputs are available as add-ons. As soon as at least one mA output has been activated, the symbol mA OUT appears in the submenu IN/OUT.



Select the symbol IN/OUT in the main menu and then select the symbol mA OUT. Here you can set the following parameters:

22 mA alarm

If you activate this function, the mA output rises to 22mA whenever the measuring inputs receive no proper signals.

Range

Select either 0-20mA or 4-20mA from the drop-down list.

Note **While 4-20mA gives slightly less resolution, it helps identifying cable breaks.**

Assignment

Select which parameter you want to read out via the mA output: measured value, temperature, flow (volume based Dosing) or controller output (controller).

Note **If the mA output is assigned to the controller there is not 22 mA alarm alarm. By changing the assignement back to measured value the 22 mA alarm has to be activiated again.**

Range min and max

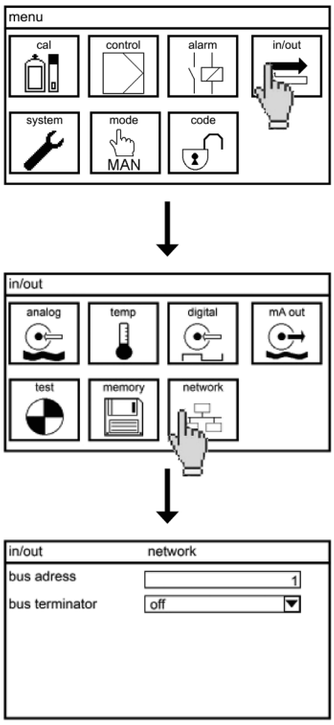
You can zoom by defining which measured values correspond to 0/4mA and which to 20mA. With these settings you can even invert the output, by assigning 20mA to a smaller value than 0/4mA. In case of controller output the output is in %, so you cannot set range min and max.

16. Add-on Modbus RTU

Neon® instruments are optionally available with a serial interface RS 485 Modbus RTU. To use this function you have to install the RS 485 circuit-board, observing the ESD-directive, and activate the software with the appropriate add-on code obtained from Dr. Kuntze.

When setting up a bus with several instruments, mind that the instruments are connected in line, not radially. Both ends of a long bus connection should be terminated with termination resistors of 120 Ohm. With Neon® instruments, you can activate the termination via menu.

Note **Activate the bus termination only at the ends of the line. If you activate terminations somewhere inbetween, this might cause malfunction in the bus communication.**



Select the symbol IN/OUT in the main menu and in the submenu, select the symbol NETWORK. Here you can set the following parameters:

Bus address

Assign a different number to each instrument in your bus system. With this number, you can address the instrument from the master instrument to read out data.

Bus termination

If you select ON from the drop-down list, the termination is activated for this instrument.

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16.1. How to read out data

Request

Function code	1 Byte	0x03
Start register	2 Bytes	0x0000 to 0xFFFF
Quantity of registers	2 Bytes	1 to 125 (0x7D)

Response

Function code	1 Byte	0x03
Bytes	1 Byte	2 x N*
Register value	N* x 2 Bytes	

*N = quantity of registers

Write single register

Function code	1 Byte	0x06
Register	2 Bytes	0x0000 to 0xFFFF

Write multiple registers

Function code	1 Byte	0x10
Start register	2 Bytes	0x0000 to 0xFFFF
Quantity of registers	2 Bytes	1 to 125 (0x7D)

16.2. Communication parameters

Baudrate: 19200 bps

Data bits: 8

Stopp- Bits: 1

Parity: even

MODBUS address: selectable between1-31, factory settings: 1

16.3. Registers

Neon® provides the following variables:

- Measured values: measuring parameter, temperature, and raw value
- Controller outputs: S1 and S2 for add-on controller and S1 for add-on volume based dosing
- Status of digital inputs and outputs: digital inputs 1 and 2, relays 1-3
- Event messages
- Calibration results as in the Cal/Info menu
- Instrument data incl. activated add-ons

All parameter settings can be read and most parameters can be set via the interface.

All test functions can be activated via the interface.

16.3.1. How to read variables

Each variable has at least three registers. The first register contains the value, the second in the lower 8 bit the number of decimal places and in Bit 8 the percentage flag, which is set if a value is expressed as percentage of a given range. In that case, the value of the first register lies within 0 (0%) and 10000 (100%). The third register conatins a code indicating a unit or text – refer to table “units and texts”.

Numerical values with a limited range have two additional registers specifying the minimum and maximum value of the range.

Example for a numerical value without percentage flag:

The temperature is listed as follows:

1. register: 4160, quantity of registers: 5

If you read these five registers, the response is as follows:

Reg. 1 (4136)	Reg. 2 (4137)	Reg. 3 (4138)	Reg. 4 (4139)	Reg. 5 (4140)
250d	1d	1001d	-300d	1400d
Value	Number of decimal places	Code of unit (°C)	Minimum of range	Maximum of range

The 1 in the second register means:

- Value and range limits have to be divided by 10 to achieve one decimal place.
- The percentage flag is not set. Otherwise the number in the second register would be 257 (=256+1; expressed as hexadecimal value 0101h). The value is not a percentage of the range but already the true measured value.

The first register gives the value 250. This represents a temperature of 25.0 and from the third register the unit °C.

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Registers four and five show the range of the temperature measurement, which is -30.0…140.0°C.

Example *for a numerical value with percentage flag:*
The lower limit is listed as follows:
1.register: 6304, quantity of registers: 5
If you read these five registers, the response is as follows:

Reg. 1 (6304)	Reg. 2 (6305)	Reg. 3 (6306)	Reg. 4 (6307)	Reg. 5 (6308)
1111d (0457h)	258d (0102h)	1422d (058Eh)	65336d (FF38h)	1600 (0640h)
Value	Number of decimal places	Code of unit (pH)	Minimum of range	Maximum of range

The 258 in the second register means:

> Percentage flag is set, the value is increased by 256 (expressed as hexadecimal value 0102h). The value is a percentage of the range. The true value has to be calculated from the range.

> After deducting the 256, in the second register remains a 2. Measured value and range limits have to be divided by 100 to achieve two decimal places.

Registers 4 and 5 show the range of the lower limit, which is -2.00…16.00, and the third register shows the unit pH. The value of the first register is 1111, which is 11.11% of the range. Calculate 11.11*(18)/100 and you will find that the value is 2pH above the minimum of the range = pH 0.

Note **Text variables have 25 registers, each containing one character expressed in Ascii code. Text variables have no registers for decimal place, unit, or range.**

16.3.2. Measured values, controller outputs and status of digital inputs and outputs

For measured value and temperature, an additional HOLD-value is given out. The HOLD-Value equals the true value in the operation modes MAN and AUTO but is frozen whenever the instrument is set to HOLD. We recommend the use the HOLD-value if you have set alarm values in the PLC that you do not want to be activated during maintenance.

Note **The operation mode can be found in register 2240, refer to table “parameters”.**

Name	1. register	Quantity of registers	Type	Bytes
Measured value	4136	5	i_16	2
HOLD-value	4568	5	i_16	2
Temperature	4160	5	i_16	2
HOLD-value of temperature	4584	5	i_16	2
Raw value	4440	3	i_16	2
Add-on controller: controller output S1	6848	5	i_16	2
Add-on controller: controller output S2	7128	5	i_16	2
Add-on volume based dosing: controller output S1	7296	5	i_16	2
Status digital input 1	6152	3	u_8	1
Status digital input 2	6184	3	u_8	1
Status relay 1 (controller)	6544	3	u_16	2
Status relay 2 (controller)	6568	3	u_16	2
Status relay 3 (alarm relay)	6592	3	u_16	2

16.3.3. Event messages and calibration results

Up to 100 event messages (current and logged) as well as the up to 10 logged calibration results of the Cal/Info menu are available via interface.

The index (registers 200 and 100) shows which entry is the first.

The time has three registers: Day+month contains the day in the upper 8 bits and the month in the lower 8 bits. Year+hour contains the year in the upper 8 bits and the hour in the lower 8 bits. Minute+second contains the minutes in the upper 8 bits and the seconds in the lower 8 bits.

For event messages, a code indicates the nature of the event – refer to table „event codes“.

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Name	Register	Type	Bytes
Event log, index first entry	200	u_8	1
first entry day+month	201	u_16	2
first entry year+hour	202	u_16	2
first entry minute+second	203	u_16	2
first entry code (refer to the following table)	204	u_16	2
second entry day+month	205	u_16	2
…			
100. entry code	600	u_16	2
Calibration log, index first entry	100	u_8	1
first entry day+month	101	u_16	2
first entry year+hour	102	u_16	2
first entry minute+second	103	u_16	2
First entry slope	104	u_16	2
First entry zero-point	105	u_16	2
second entry day+month	106	u_16	2
…			
10. entry zero-point	150	u_16	2

Table event-codes

Code	Event
5	Start
10, 11, 13, 14, 16, 17, 18 und 45	Internal error
20	No communication with the measurement module
25	Unknown measurement module
30	Check measuring input
35	Check temperature input
40	Out of measuring range (below range)
41	Out of measuring range (above range)
50	Zero-point
51	Slope
60	No SD card for saving
61	No SD card
62	SD card: write error
63	SD card: read error
65	SD card: invalid format
66	SD card: load error
85	Lower limit
86	Upper limit
90	Dosage check
93	Digital input 1 „no water“
94	Digital input 1 „level“
95	Digital input 1 „External Stopp"
96	Digital input 2 „no water“
97	Digital input 2 „level“
98	Digital input 2 „External Stopp"
105	Relay 3 (alarm relay)

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Code	Event
115	mA 1 out of range
118	mA 2 out of range
120	Calibration
121	Start delay controller
122	Start delay cleaning
123	Cleaning
124	Cleaning – base load dosing

Note **For events listed as „going“ in the eventlog, the numerical value is increased by 126.**

16.3.4. Instrument data

Via the interface, all information on the instrument is available, including which add-ons are activated (read-only). Information on the measurement module and the add-ons are coded as 32-bit, refer to tables “Add-ons” and “Measurement module type”.

Name	Register	Quantity of registers	Type	Bytes
Serial number	1024	12	string	24
Hardware version	2464	4	u_32	4
Production date	2448	4	u_32	4
Activated add-ons	2128	4	u_32	4
Software version	1056	10	string	20
Operating hours	2080	4	u_32	4
Measurement module				
Type	2088	4	u_32	4
Serial number	4272	3	u_16	2
Software version	4280	3	u_16	2
Hardware version	4304	3	u_16	2

Table activated add-ons (register 2128)

The add-ons are coded as 32-Bit value as follows:

Bit number	Option
17	Add-on Second digital input
18	Add-on First analog output
19	Add-on Second analog output
20	Add-on Controller
21	Add-on volume based dosing
22	Add-on Modbus RTU
24	Add-on Data log
25	Add-on ASR®

Table measurement module type (register 2088)

The measurement module type is coded as 32-Bit value as follows:

Bit number	Option
10	Module pR
11	Module DES
12	Module CM
13	Module IL
14	Module Gas
15	Module Standard

16.3.5. How to read and write parameter settings

Parameter registers are similar to the registers described above, but here you can change the settings via interface. Mind the ranges and the percentage-flag – if a variable is expressed as percentage of a range, a new value must also be expressed that way. Besides the percentage calculation, the range indicates what values are possible for a variable. Since the ranges can change according to settings or selections, the range has to be read prior to writing, to get the range, the percentage-flag setting, and the number of decimal places.

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Text variables contain one character per register, in ASCII code. Mind the maximum text length.

Note **The parameters are listed in the order of their description in this manual, i.e. Code, Mode, IN/OUT, System, Alarm, and Add-ons. Mind that not all parameters listed are available in your instrument, according to settings and activated add-ons.**

Digital inputs	1. register	Quantity	Type	Bytes	Read/ write	range
Code	2096	8	u_32	4	no	yes
Operation mode	2240	3	u_8	1	yes	no
Settings for the measurement:						
Parameter: pR						
Buffer 1	4400	5	i_16	2	yes	yes
Buffer 2	4408	5	i_16	2	yes	yes
Internal buffer	4416	5	i_16	2	yes	yes
Connection	4336	3	u_16	2	yes	no
Measure	4552	3	u_8	1	yes	no
Averaging	4328	3	u_16	2	yes	no
Parameter: DES						
Measure	4464	3	u_16	2	yes	no
Unit	4616	3	u_8	1	yes	no
Measuring range	4536	3	u_16	2	yes	no
Averaging	4328	3	u_16	2	yes	no
Cleaning	4624	5	u_8	1	yes	yes
Start time	4632	4	u_32	4	yes	no
Start date	4648	4	u_32	4	yes	no
Base-load	4640	3	u_8	1	yes	no

Digital inputs	1. register	Quantity	Type	Bytes yes	Read/ write	range
Parameter: LF (IL und CM)						
Measurement	4464	3	u_16	2	yes	no
Measuring range	4536	3	u_16	2	yes	no
Averaging	4328	3	u_16	2	yes	no
C value	4664	5	u_16	2	yes	yes
TDS unit	4616	3	u_8	1	yes	no
TDS factor	4656	5	u_16	2	yes	yes
Parameter: STD						
Measurement	1408	12	string	24	yes	no
Input signal	4680	3	u_8	1	yes	no
Measuring range	4536	3	u_16	2	yes	no
Unit	4616	3	u_8	1	yes	no
Parameter: Gas						
Measurement Analog 1	4464	3	u_16	2	yes	no
Slope Analog 1	4496	5	u_16	2	yes	yes
Sensor test Analog 1	7544	5	i_16	2	yes	yes
Measurement Analog 2	4688	3	u_16	2	yes	no
Slope Analog 2	4504	5	u_16	2	yes	yes
Sensor test Analog 2	7552	5	i_16	2	yes	yes
Temperature compensation						
Mode	4352	3	u_16	2	yes	no
Sensor type	4360	3	u_16	2	yes	no
Reference temperature	4376	5	u_16	2	yes	yes
Correction	4384	5	i_16	2	yes	yes
Manual value	4392	5	i_16	2	yes	yes
Temperature compensation	4672	3	u_16	2	yes	no

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Digital inputs	1. register	Quantity	Type	Bytes	Read/ write	range
Temperature coefficient (Des/LF/STD)	4472	5	u_16	2	yes	yes
Digital inputs						
Dig. input 1 event	6176	3	u_8	1	yes	no
Dig. input 1 contact	6168	3	u_8	1	yes	no
Add-on dig. input 2 event	6208	3	u_8	1	yes	no
Add-on dig. input 2 contact	6200	3	u_8	1	yes	no
System						
Language	2200	3	u_8	1	yes	no
Time	0	2	u_32	4	yes	no
Displaycontrast	2208	3	u_8	1	yes	no
Desktop design	2216	3	u_8	1	yes	no
Autolock time	2224	5	u_8	1	yes	yes
Eco-mode time	2232	5	u_8	1	yes	yes
Text	1216	10	string	50	yes	no
Company	1120	12	string	50	yes	no
Name	1152	12	string	50	yes	no
Phone	1184	12	string	50	yes	no
Alarm						
Lower limit	6304	5	i_16	2	yes	yes
Upper limit	6312	5	i_16	2	yes	yes
Alarm relay function	6320	3	u_8	1	yes	no
Alarm delay	6328	5	u_16	2	yes	yes
Alarm action	6336	4	u_32	4	yes	no

The alarm action list (register 6336) is coded as 32 Bit-value as follows:

Bit number	Alarm action
0	Dig. input 1
1	Dig. input 2
4	Zeropoint
5	Slope
6	Overrange
8	Lower limit
9	Upper limit
12	Dosage check

Activated add-ons

Register 2128 indicates which add-ons are activated, as recently described.

Dependent on that, some or all of the following parameters are available:

Name	1. register	Quantity	Type	Bytes	Read/ write	Range
Add-on: Data log						
Interval	6488	8	u_32	4	yes	yes
Mode	6496	3	u_8	1	yes	no
Logparameter Meas. value	6504	3	u_8	1	yes	no
Logparameter Temperature	6512	3	u_8	1	yes	no
Logparameter Raw value	6520	3	u_8	1	yes	no
Logparameter S1	7456	3	u_8	1	yes	no
Logparameter S2	7464	3	u_8	1	yes	no
Logparameter Flow	7472	3	u_8	1	yes	no
Add-on: analog outputs						
mA1 22mA alarm	6368	3	u_8	1	yes	no

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Name	1. register	Quantity	Type	Bytes	Read/ write	Range
mA1 range	6376	3	u_8	1	yes	no
mA1 assignment	6384	3	u_8	1	yes	no
mA1 range min.	6392	5	i_16	2	yes	yes
mA1 range max.	6400	5	i_16	2	yes	yes
mA2 22mA alarm	6432	3	u_8	1	yes	no
mA2 range	6440	3	u_8	1	yes	no
mA2 assignment	6448	3	u_8	1	yes	no
mA2 range min.	6456	5	i_16	2	yes	yes
mA 2 range max.	6464	5	i_16	2	yes	yes
Add-on: Modbus RTU						
Bus address	6608	5	u_16	2	no	yes
Bus termination	6640	3	u_8	1	yes	no
Add-on: controller						
Start delay	6680	5	u_16	2	yes	yes
S1 control type	6704	3	u_8	1	yes	no
S1 direction R1	6712	3	u_8	1	yes	no
S1 setpoint	pH: 6720 ORP: 7392 Des/Std/LF: 7488	5	i_16	2	yes	yes
S1 hysteresis	6728 ORP: 7424	5	i_16	2	yes	yes
S1 p-range	6736 ORP: 7440	5	i_16	2	yes	yes
S1 integral time	6744	5	i_16	2	yes	yes
S1 differential time	6752	5	i_16	2	yes	yes
S1 dosage check	6784	5	u_16	2	yes	yes
S1 pulse type	6864	3	u_8	1	yes	no
S1 pulse-frequency	6872	5	u_16	2	yes	yes

Name	1. register	Quantity	Type	Bytes	Read/ write	Range
S1 pulse-pause	6880	5	u_16	2	yes	yes
S1 pulse min	6888	5	u_16	2	yes	yes
Rel. 1 on/off	6904	3	u_8	1	yes	no
S1 motor run time	6920	5	u_16	2	yes	yes
S2 control type	6984	3	u_8	1	yes	no
S2 direction R2	6992	3	u_8	1	yes	no
S2 setpoint	pH:7000 ORP: 7400 Des/Std/LF: 7496	5	i_16	2	yes	yes
S2 hysteresis	7008 ORP: 7432	5	i_16	2	yes	yes
S2 p-range	7016 ORP: 7448	5	i_16	2	yes	yes
S2 integral time	7024	5	i_16	2	yes	yes
S2 differential time	7032	5	i_16	2	yes	yes
S2 dosage check	7064	5	u_16	2	yes	yes
S2 pulse type	7144	3	u_8	1	yes	no
S2 pulse-frequency	7152	5	u_16	2	yes	yes
S2 pulse-pause	7160	5	u_16	2	yes	yes
S2 pulse min	7168	5	u_16	2	yes	yes
Rel. 2 on/off	7184	3	u_8	1	yes	no
Add-on: volume based dosing						
Dosage l/l (pR/LF)	7256 (higher bits) 7257 (lower bits)	8	i_32	4	yes	yes
Pulses	7264	5	u_16	2	yes	yes
Pump output	7280	5	u_16	2	yes	yes
Concentration (DES/Std)	7288	5	i_16	2	yes	yes

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Name	1. register	Quantity	Type	Bytes	Read/ write	Range
Setpoint (DES/Std)	7504	5	i_16	2	yes	yes
Circulation stop delay	7312	5	u_16	2	yes	yes
Pulse type	7320	3	u_8	1	yes	no
Pulse-frequency	7336	5	u_16	2	yes	yes
Pulse-pause	7344	5	u_16	2	yes	yes
Pulse min	7352	5	u_16	2	yes	yes
Rel. 1 on/off	6904	3	u_8	1	yes	no
Rel. 2 on/off	7184	3	u_8	1	yes	no

16.3.6. Units and texts

The following table contains the codes of the units and texts of register 3 of the variables:

Code	Unit
1001	°C
1054	s
1058	min
1059	h
1211	mA
1243	mV
1283	MOhm
1302	mS/cm
1342	%
1353	l/h
1422	pH
1423	ppm
1552	µS/cm
1558	mg/l

Code	Unit
1559	µg/l
1660	Times per week
1662	g/l
1663	cbm/h
1993	Pulses/h
1994	l/Pulse
1995	l/l
1996	- (no unit)
Text as enumeration, variable value determines which text applies, starting with 0:	
3001	NO / NC
3002	OFF / ON
3003	pH / mV
3004	Off / low / medium / high
3005	Coax / Triax
3006	PT100 / PT1000
3007	Man / auto
3008	No water / level / ext. stopp
3009	4-20 mA / 0-20 mA
3010	20% / 40% / 60% / 80% / 100%
3011	---- / default / SD card / contact / mA 1 / mA 2 / S1 / S2 / Relay / Flow
3012	Stop / Ring / OFF
3013	ON/OFF / P / PI / PID / 3point
3014	Pulse-pause / pulse-frequency
3015	Reduce / raise
3016	1 = 0-1000 / 2= 0-5 / 4= 0-10 / 8= 0-20 / 16 = 0-30
3017	µg/l / mg/l / ppm
3018	Chlorine / Chlorine dioxide / Ozone / H2O2

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Code	Unit
3019	Chlor / Chlordioxid / Ozon / H2O2
3023	0-20 mA, 4-20 mA, 0-2000 mV
bit masks:	
3802	0-9.999 mg/l, 0-99.99 mg/l, 0-999,9 mg/l, 0-9,999 ppm, 0-99.99 ppm, 0-999.9 ppm, 0-99.99 NTU, 0-999.9 NTU
3803	-,-,-,-,0-2.000 mS, 0-20.00 mS, 0-200.0 mS, 0-2000 mS, 0-9999 ppt, 0-9999 ppm, 0-9999 ppb
3804	0 -2.000 µS, 0-20.00 µS, 0-200.0 µS, 0-2000 µS , 0-2.000 mS, 0-20.00 mS, 0-200.0 mS, 0-2000 mS, 0-9999 ppt, 0-9999 ppm, 0-9999 ppb

16.3.7. Test functions

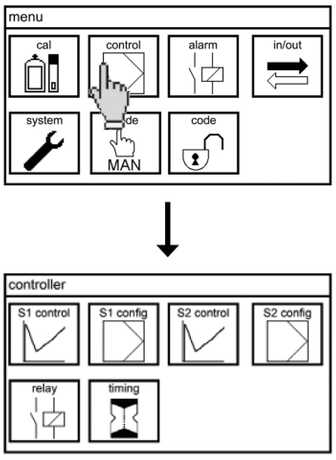
To test the installation, you can operate all relays and current outputs manually, provided that these add-ons are activated in your instrument, and define relay status and current values via interface as in the test menu.

With register Test mode you switch the test mode on and off.

Name	1. register	Quantity	Type	Bytes	Read/ write	Range
Test mode	2152	3	u_8	1	yes	no
Relay 1	6552	3	u_16	2	yes	no
Relay 2	6576	3	u_16	2	yes	no
Relay 3	6600	3	u_16	2	yes	no
mA 1	6360	5	u_16	2	yes	yes
mA 2	6424	5	u_16	2	yes	yes

17. Add-on Controller

The add-on Controller offers a concentration-based controller with two independently configurable control relays. When you activate the add-on, the main menu shows an additional symbol CONTROL.



In the main menu select the symbol CONTROL. In the CONTROL menu you find the following submenus:

S1/S2 CONTROL, in which you can define the set point, the controller type, and its corresponding parameters.

S1/S2 CONFIG, in which you define the controller output via the relays, i.e. pulse-pause or pulse-frequency.

In the submenu RELAY you define the acting direction, i. e. whether dosing should happen when the measured value is above or below the set point. In this menu you can also turn off relays if you want to use the current outputs as controller output.

In the submenu TIMING you can define a start delay and dosage-check times.

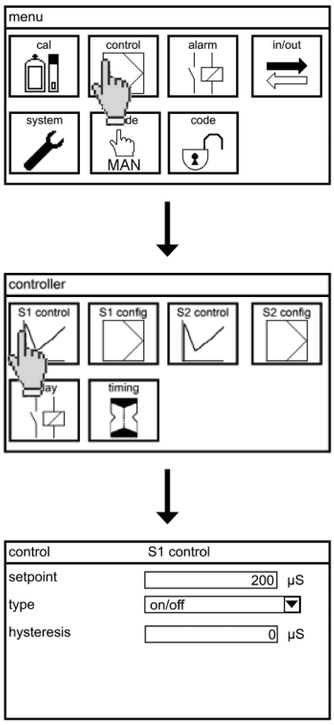
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17.1. S1/S2 control – set-point configuration

Note **S1 refers to relay 1, S2 to relay 2.**

Note **Although the description always refers to S1, the procedure for S2 is the same.**

Note **If S1 was configured as 3-point controller, S2 cannot be used, since relay 2 is used for S1.**



In the menu CONTROL select the symbol S1 CONTROL. Here you can set the following parameters:

Set point

Define which value the measured value should reach.

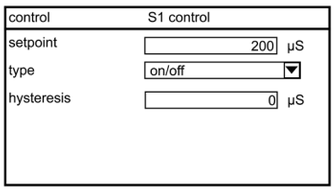
Type

Choose between on/off, P, PI, PID, and 3-point controller. This selection defines the parameters displayed in this menu and in CONFIG. Only those parameters relevant for the selected controller are shown.

Note **To help you with the configuration, Neon only shows those parameters relevant for your controller choice. Same for the CONFIG menu which shows only the required information.**

17.1.1. ON/OFF controller

The ON/OFF controller doses with 100% until the measured value reaches the set point, and then stops.



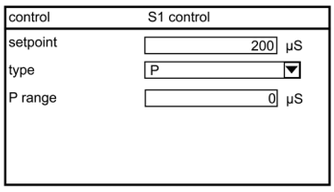
Besides set point and controller type you can set the following parameter:

Hysteresis

For the on/off controller you can define a hysteresis. This prevents constant switching of the relays in the vicinity of the set point – the relay switches only when the difference between set point and measured value exceeds half the hysteresis value.

17.1.2. P controller

The P controller reduces the dosing when the difference between set point and measured value is smaller than the specified P range. Within the p range, the controller output is proportional to the remaining deviation. When the measured value reaches the set point, dosing stops.



Besides set point and controller type you can set the following parameters:

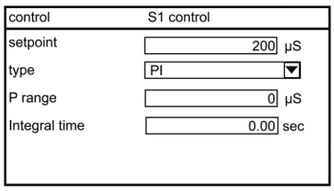
P range

The P range or proportional range is the range in which dosing is reduced proportional to the deviation between set point and measured value. The bigger the P range, the softer the control.

To find the ideal setting, start with a big P range and reduce it until the measured value oscillates around the set point in a stable manner. The ideal value is then twice the current value. If the measured value still oscillates, use a slightly higher value.

17.1.3. PI controller

The PI controller is a P controller with additional I function. The I function sums up the previous dosing, so that the controller output drops to zero only after the measured value already exceeds the set point. This eliminates in applications with constant inflow the otherwise unavoidable control deviation.



Besides set point and controller type you can set the following parameters:

P range

For settings and information refer to P controller.

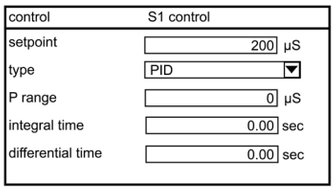
Integral time

The shorter the integral time, the stronger the I function.

Start by setting a P controller, then reduce the proportional range until the measured value fluctuates constantly around the set point. Measure the time between subsequent maximum measured values. The ideal P range is then 2.2times the current setting and the ideal integral time is 0.85 times the measured time between maximum values. If the measured value still oscillates set slightly higher values.

17.1.4. PID controller

The PID controller is a PI controller with additional D function. The d function acts swifter and compensates the inertia of the I function. This allows the controller to react faster to large control deviations.



Besides set point and controller type you can set the following parameters:

P range

For settings and information refer to P controller.

Integral time

For settings and information refer to PI controller.

Differential time

The higher the differential time, the stronger the D function.

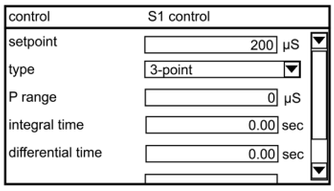
Start by setting a P controller, then reduce the proportional range until the measured value fluctuates constantly around the set point. Measure the time between subsequent maximum measured values. The ideal P range is then 1.66 times the current setting, the ideal integral time is 0.5 times and the ideal differential time 0.12 times the measured time between maximum values. If the measured value still oscillates set slightly higher values for P and I and slightly lower values for D..

17.1.5. 3-point controller

Note **Set point S2 cannot be used when S1 is configured as 3-point controller.**

Note **Relay 1 is assigned to OPEN and relay 2 to CLOSE.**

The 3-point controller is used for actuators that have not only two states (ON and OFF) but three: OPEN, OFF, and CLOSE, such as motor-operated valves.



Besides set point and controller type you can set the following parameters:

P range, integral time and differential time

3-point controllers can be configured as PI or PID controller. Settings are the same as described above. If you set the differential time to zero, the controller type is PI.

Hysteresis

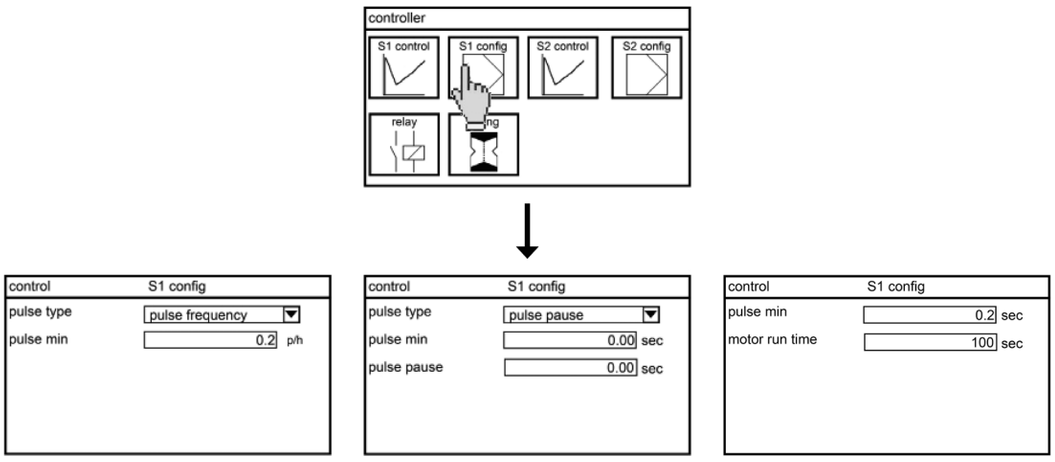
For 3-point controllers you can define a hysteresis to prevent constant movement of the actuator in the vicinity of the set point. The relay switches only when the difference between set point and measured value exceeds half the hysteresis value.

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17.2. S1/S2 CONFIG – configurating the controller output

Note **In this menu you define the controller output via relays. If you want to use an analog output as controller output, you can ignore the CONFIG menu. Instead, you have to assign the analog output to control variable S1 or S2 in the menu IN/OUT-> mA OUT. In that case you can shut off the relay completely in the menu CONTROL->RELAYS.**

In the menu CONTROL select the symbol S1 CONFIG. Depending on your choice of controller type, the CONFIG menu shows parameters for P /PI /PID or 3-point controller.



Note **To help you with the configuration, Neon® only shows those parameters relevant for your controller choice.**

Note **If you have selected an ON/OFF controller, no configuration is required, and you cannot access the CONFIG menu.**

17.2.1. CONFIG – pulse-pause or pulse-frequency for P/PI/PID

Select the controller type P or PI or PID in the menu S1/S2 CONTROL. Enter the menu S1/S2 CONFIG and set the following parameters:

Pulse type

When using the relays to control actuators, proportional reduction can be achieved in two ways: via time frames in which the relay is ON (pulse) and OFF (pause) in relation to the controller output (pulse-pause controller) or via the switching frequency of the relay (pulse-frequency controller).

Pulse min (only for pulse type = pulse pause)

Define a minimum pulse, i.e. the minimum time the relay has to be on to allow the actuator to react.

Pulse pause (only for pulse type = pulse pause)

For a pulse-pause controller define as Pulse-Pause time a time-frame in which the relay is on (pulse) and off (pause) according to the control variable.

Note **The pulse-pause time must be at least twice as long as the minimum pulse.**

Pulse frequency (only for pulse type= pulse frequency)

Enter the frequency that corresponds to maximum dosing.

17.2.2. CONFIG – Motor run time and minimum pulse for 3-point controller

Select the controller type 3-point controller in the menu S1 CONTROL. Enter the menu S1/S2 CONFIG and set the following parameters:

Pulse min

Define a minimum pulse, i. e. how long the relay has to be ON to allow the actuator to react.

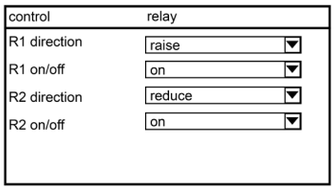
Motor run time

To control a motor-operated valve, the instrument needs to know how long it takes the motor to completely open the valve when it had been completely closed.

Determine that time by closing the valve completely and then opening it in manual operation, or vice versa. This time is the motor run time.

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17.3. Configuration of the relays



In the menu CONTROL select the symbol RELAYS. In the submenu you can define the following parameters:

R1/R2 direction

With this setting you define whether dosing occurs above or below the set point.

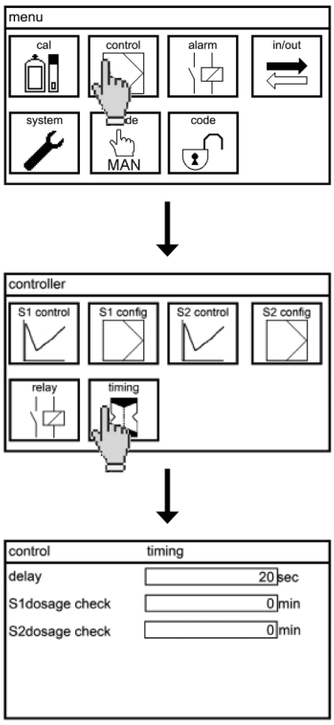
Select RAISE if the dosing increases the measured value. The controller doses whenever the measured value is lower than the set point.

Select REDUCE if the dosing decreases the measured value. The controller doses whenever the measured value is higher than the set point.

R1/R2 on/off

You can shut off the relays completely to prevent unnecessary wear and tear. This is useful if you use the analog outputs as controller output.

17.4. Start delay and dosage control



Select CONTROL in the main menu, and in the control menu the symbol TIMING. In this you can define three important times for the controller:

Delay

The delay is the time that has to pass after a controller stop before dosing starts. A controller stop happens when the power is cut off or as a result of certain events, for example the switching of a digital input. At the end of this chapter you will find a list of these events.

Note **Changing the operation mode does not activate the start delay.**

Dosage check

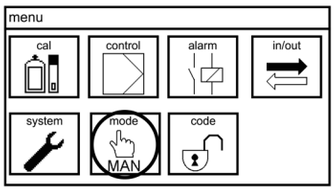
With the parameter dosage check you define how long the instrument may dose with 100% feed rate without raising alarm. If after that time the measured value still has not reached the set point or at least the P range, so that the controller output is still 100%, an alarm is issued and the controller is stopped. This is a safety measure to prevent the release of hazardous chemicals in case of damaged feed lines – if the dosing does not seem to have any effect, the reason might be that there is a leak somewhere and the chemicals do not reach the water.

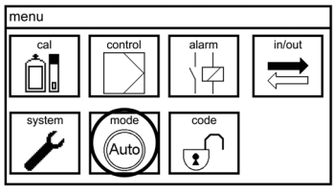
NOTE **Dosage check alarm stops only the corresponding controller/set point. The other remains active.**

NOTE **If you set the time to 0 min, the function is deactivated for the corresponding controller.**

17.5. Activating and deactivating the controller

To activate or deactivate the controller you have to change the operation mode. You can change the mode in the main menu by pressing the symbol MODE. The symbol changes its design according to the selected mode.





In the AUTO mode the controller is active and operates the relays and/or current outputs and ultimately the connected actuators. Manual operation of the relays and current outputs via the test function is not possible.

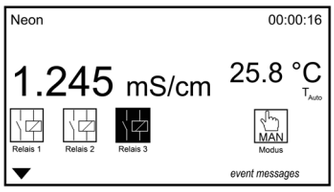
In the manual mode the controller is deactivated and you can operate the relays and current outputs manually via the test function.

In the maintenance mode – HOLD – the controller is deactivated.

NOTE **More information on the operation modes can be found in chapter 5 – Mode.**

17.6. Relay display and manual operation of the control relays

For control applications, we advise to use the desktop design “Relay” in the menu SYSTEM.



Below the measured values the configuration and status of the relays are displayed, and a button appears with which you can change the operation mode.

Note **More information on the various display designs can be found in chapter 12 – system functions.**

In the manual mode you can operate the relays manually. With touch screen instruments press the symbol of a relay to switch it. With instruments with key operation press key up until the desired relay is highlighted, then switch the relay with the OK key.

Warning **Manually activated relay remain activated until they are manually switched off or the operation mode is set to automatic!**

17.7. Automatic controller stop

The instrument provides various safety measures to recognize problems and to stop the dosing if no reliable measured values are available. Such situation occurs in case of the following events:

> If the measuring input or the temperature input receives no signal (no measured value available)
> If a digital input switches (no water, no reagent, or external controller stop – while the last option is not a problem it still means that the dosing has to be stopped)
> Dosage check (possible damage on the feed lines)

It is your responsibility to ensure through set-up and settings that all these safety features can work as planned and to check their proper function through regular tests! Also use the safety features that are not controller-related, such as the alarm relay, the limits, and the 22mA alarm current.

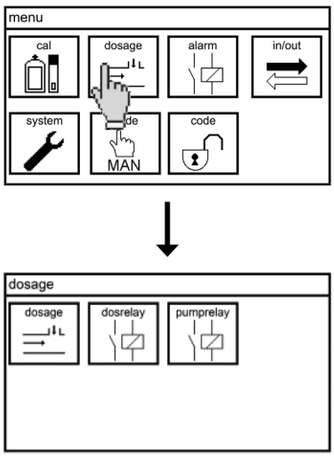
WARNING **In the AUTO mode the controller actuates the dosing of possibly hazardous chemicals! Check all connections, feed lines, and all settings before you activate the controller, and make sure that the control works properly before leaving the instrument!**

18. Add-on volume based dosing

The add-on volume based dosing offers a control version that is based on the volume and flow rate of the water that is to be treated. Relay 1 is used to operate the dosing pump. With relay 2 you can operate the circulation pump that provides water for the concentration measurement.

Note **It needs a flow meter that turns the flow rate into digital pulses, connected to the digital input 2. (NPN, max 180 Hz)**

If you have activated the add-on, the main menu shows the symbol DOSAGE.



In the menu DOSAGE you will find the following submenus:

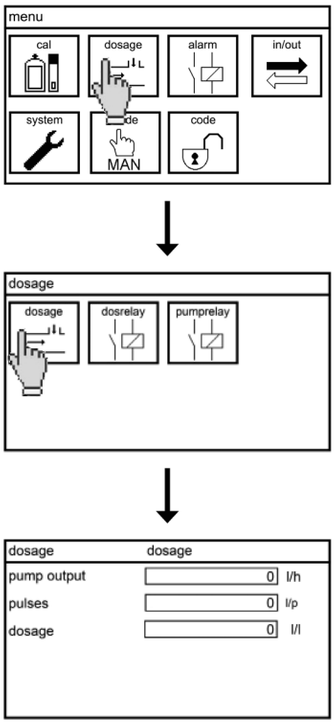
DOSAGE, where you define all parameters necessary to calculate the flow and the dosing volume.

DOSRELAY, where you define the output as pulse-pause or pulse-frequency.

PUMP RELAY, where you define parameters for your circulation pump.

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18.1. Dosing parameters



In the DOSAGE menu select the symbol DOSAGE. Here you have to set the following parameters:

Pump output

Define how many liters per hour the pump feeds.

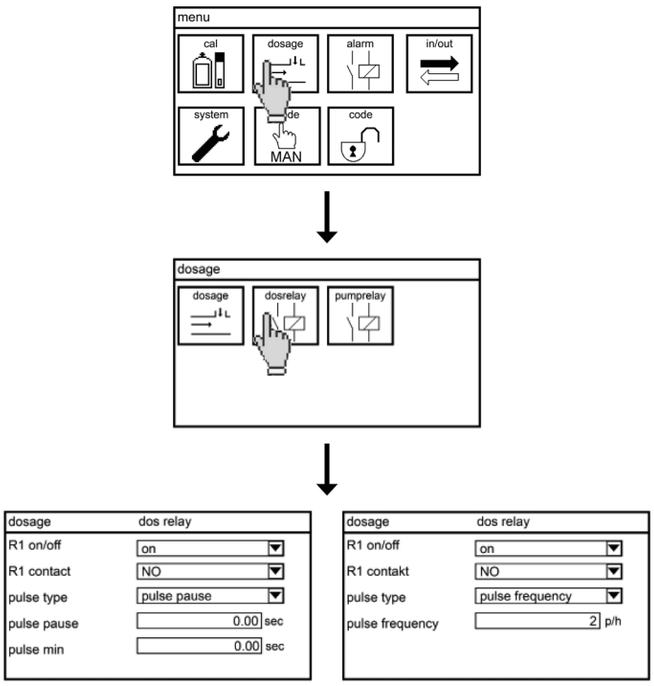
Pulses

Define how many pulses the flow meter gives per liter. This information allows the instrument to calculate and display the flow rate.

Dosage

Define how many liters of reagent should be dosed per liter of water. Based on this setting and the pump output the controller calculates how long or how fast the pulses must be to dose the proper amount of chemicals.

18.2. Configuration of the dosing relay



R1 on/off

If you do not want to use the relay as controller output, you can switch it off completely.

Relay 1 contact

Relay 1 is a normally open contact. In the menu you can invert it so that it is actively closed. If you select NC (normally closed contact) the relay will open to dose and close to pause.

Note **To use an analog output as controller output you have to enter the mA menu in the IN/OUT menu and assign the mA output to control variable S1 or S2, respectively – see chapter analog output.**

Warning **If you invert the relay you must take precautions that the dosing is stopped in case of power interrupt! If the instrument does not get power, the relay will open, sending dosing pulses to the pump!**

Pulse type

The controller output via the relay can be realized in two ways: via time frames in which the relay is part-time ON and OFF (pulse-pause type), or via the switching frequency (pulse-frequency type).

Pulse min (only for pulse type = pulse pause)

Define a minimum pulse, i.e. the minimum time the relay has to be on to allow the actuator to react.

Pulse pause (only for pulse type = pulse pause)

For a pulse-pause controller define as Pulse-Pause time a time-frame in which the relay is on (pulse) and off (pause) according to the control variable.

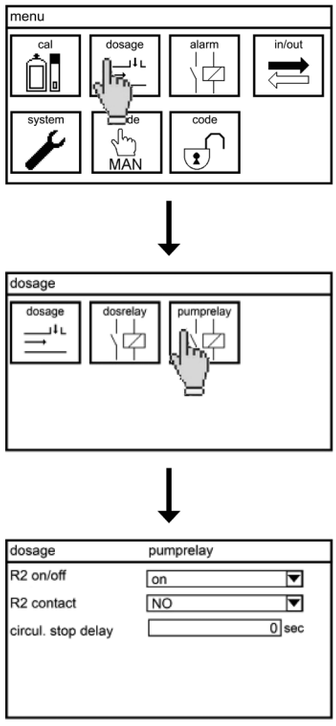
Note **The pulse-pause time must be at least twice as long as the minimum pulse.**

Pulse frequency (only for pulse type= pulse frequency)

Enter the frequency that corresponds to maximum dosing.

18.3. Pump relay

In applications with volume based dosing, the measuring point is usually installed in a bypass, and measuring water is supplied by a circulation pump. Via the pump relay you can switch off the pump if no water is available in the main pipe.



In the menu DOSAGE select the symbol PUMP RELAY.

R2 on/off

If you do not want to control the circulation pump with the relay, you can switch it off.

Relay 2 contact

Relay 2 is a normally open contact. In the menu you can invert it so that it is actively closed. If you select NC (normally closed contact) the relay will open to activate the pump and close to stop it.

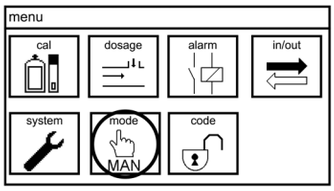
Attention **If you invert the relay and the instrument does not get power, the relay will open, turning on the circulation pump regardless of the water situation! In that case you have to take other precautions that the pump cannot run dry.**

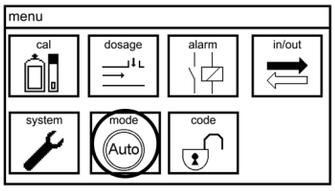
Circulation stop delay

Here you can define how long the circulation pump should keep on running after the flow meter has indicated that the flow has stopped.

18.4. Activating and deactivating the controller

To activate or deactivate the controller you have to change the operation mode. You can change the mode in the main menu by selecting the symbol MODE. The symbol changes its design according to the selected mode.





In the AUTO mode the controller is active and operates the relays and/or current outputs and ultimately the connected actuators. Manual operation of the relays and current outputs via the test function is not possible.

In the manual mode the controller is deactivated and you can operate the relays and current outputs manually via the test function.

In the maintenance mode – HOLD - the controller is deactivated.

NOTE **More information on the operation modes can be found in chapter 5 – Mode. Durchflussanzeige**

18.5. Flow display

For applications with volume based dosing, we advise to use the desktop design “Flow” in the menu SYSTEM.

Below the measured values the flow rate, the controller output in % and the status of relay 2 are displayed.



Note **More information on the various display designs can be found in chapter 12 – system functions.**

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18.6. Automatic dosage stop

Since the control is based on the flow measurement, the concentration measurement and the temperature measurement have no influence on the controller.

Warning **In the AUTO mode the controller actuates the dosing of possibly hazardous chemicals! Check all connections, feed lines, and all settings before you activate the controller, and make sure that the control works properly before leaving the instrument!**

Use all safety measures that the instrument provides, such as the alarm relay, the limits, the 22mA alarm current etc. We advise to take precautions that measurement-related events and limit alarms also lead to a dosing stop.

19. Operation and Maintenance of Neon® LF

19.1. Mode

Never carry out maintenance while the controller is set to automatic. Select either manual mode or Hold.

In the manual mode only the controller is deactivated. All other functions such as the alarm relay and the test functions are still active. This mode is ideally suited to test the wiring to your PLC and to check the alarm functions.

With Hold, all alarm functions are deactivated. This mode is ideally suited to carry out maintenance such as calibration without issuing an alarm. With Hold, the controller is deactivated, and all analog and digital outputs are frozen to the last value, in case you are using these outputs as inputs for an external control.

19.2. Maintenance of the measurement

Maintenance of the measurement comprises cleaning of the various components, regular testing of safety features and gaskets, regular exchange of consumables.

Note **Maintenance intervals depend on the application, the installation, the accuracy requirements etc.**

Operation	Interval suggestion
Cleaning of sensors and assemblies	8 weeks
Cleaning of valves, filters, tubing etc.	8 weeks
Checking the gaskets	Weekly
Testing the safety features	2 weeks
Exchange of consumables	Six months / yearly

19.2.1. Cleaning of sensors

If the water contains substances that stick to the electrodes´ surfaces, they will affect the measurement, since the measured value depends on the size of the active surface area. Make sure to remove such coatings regularly.

Take care that the electrode surfaces are not damaged through mechanical or chemical cleaning. Electrodes made of stainless steel get corroded by acids and lyes, and sensors with plastic body might get damaged by organic solvents. To remove lime or hydroxides, use a mild acid such as citric acid or vinegar or very diluted hydrochloric acid. To remove fat or grease, use a commercially available dish detergent. Rinse thoroughly with water after cleaning and allow the measurement to settle after reinstallation before restarting control.

19.2.2. Cleaning of assemblies, filters, etc.

An important part of maintenance is the cleaning of all parts that come in contact with the water. Besides the sensors, this includes assemblies, pipes and tubes, filters, flow meters, cocks, valves etc. Coatings, deposits, and biofilm can adulterate the measurement, impede the water flow and at worst even damage the sensor.

Attention **We recommend to use only water and perhaps a soft brush for cleaning. Many synthetic materials are affected by acids or organic solvents!**

19.2.3. Checking the gaskets

Especially in pressurized applications all gaskets and sealing rings must be checked regularly and replaced at needs. Make sure to use only spare parts consistent with your application and your equipment. Check the proper placement before reapplying pressure!

19.2.4. Testing the safety features

Regularly test all safety features, especially when using control functions. Check the function of water level or flow sensors and verify that the controller is automatically shut down in a low-water situation.

Simulate such an event by impeding the water flow temporarily or by lifting the level sensor out of the water. Switching of the level sensor or loss of the flow signal has to lead to the text message “low water” or “level” or “ext. controller stop” according to settings, and to an automatic controller stop.

Regularly test the function of the alarm relay and ensure that in case of an alarm, the instrument issues the alarm and the connected control center registers the alarm correctly. With the aid of the test menu, such test is easily accomplished.

Note **In the Hold mode, the alarm function is deactivated.**

19.2.5. Exchange of consumables

Wearing parts in conductivity measurements are the seals. The sensors do not contain liquids and the electrodes are made from materials that do not age, expect through rough treatment such as abrasive cleaning or corrosion, and are therefore not considered wearing parts. Treatment-caused changes are apparent in the info list of calibration menu – if the measurement required regular recalibration and the C value results show a downward or upward trend, an exchange of the sensor will be necessary in the near future.

If you have to exchange a sensor, make sure that the new sensor fits your application and requirements and the instrument settings. Mind that you might have to calibrate after changing the sensor. Calibration will probably also be necessary if you exchange an instrument.

Note **Cables also tend to wear out, especially if they are frequently unplugged. Find more information in the “ Trouble-Shooting”**

19.3. Restarting

Restarting is to be carried out like the original start-up. Follow all steps described in this manual.

Before opening the water inlet, make sure that the flow is not impeded or interrupted anywhere. When using assemblies that can hold several sensors, make sure that all holders are occupied or closed with a blind. Make sure that all valves are in the right position (for example, inlet and outlet open, sampling point closed). Check that all screw connections are sealed tight before applying pressure.

Sensors are delivered with a fix and tested C value. You do not have to determine the C value prior to measurement. The tolerances in the C values are within 1.5-2% of the measuring range. For very precise measurements the C value can be determined and calibrated using Potassium chloride solutions with a known conductivity.

After installing the sensors, wait until all measurements are stable, and check if the measured values are plausible, before activating the controller. Also check all settings, especially for controller and alarm, and make sure that the feed lines are properly connected and undamaged.

Use all safety features the instrument provides, such as the alarm relay, the limits, the dosage check, and the controller stop.

19.4. Decommissioning and disposal

If you want to take the measurement out of service for a while, mind the storage conditions listed in the data sheets, especially regarding temperatures. Store sensors always in solution, preferably in 3M KCl, never in deionized water or aggressive solutions. We advise to use for storage the protective covers in which the sensors were delivered. If you want to use other beakers, use plastic instead of glass to avoid damage to the glass membrane, and ensure that the storage solution always covers the junction.

Store instruments and cables in a cool, dry, and dark place, protected against dust.

If you want to dispose of the instrument permanently, mind that it contains electrical components that have to be disposed of following national directives.

19.5. Facilitating functions

19.5.1. Store and load settings via SD card

You can store your settings on an SD card and reload them anytime to ensure that the settings are not lost during maintenance.

This function can also be used to duplicate settings into other instruments of the same type and parameter or to recover your settings after a software update or an upgrade via add-on. Additionally, you can do all settings comfortably on your PC, using the Kuntze configuration software, and then load the settings into the instrument via SD card. The configuration software is available free of charge.

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19.5.2. Software-update via SD card

With the SD card you can also install software updates. Copy the two software files you have received from us onto the SD card (not in a subdirectory). Plug the SD card in the instruments slot, and load the files via SYSTEM=>MEMORY=>LOAD=>SOFTWARE.

19.5.3. Test menu

During start-up, or in case of an alarm in your control center inconsistent with the measured values, the test menu will help you test the communication between instrument and control center.

In the test menu you can operate all relays manually, and set fix values for each available mA output.

The test menu can only be used in the Manual mode. The test menu is a submenu of the menu IN/OUT.

20. Trouble-Shooting

In case of an event, the Neon® instrument provides a variety of functions to assist you:

> Event messages on the display, declaring the nature of the event.

> An event help containing suggestions how to solve the problem.

> An event log that stores up to 100 event messages

> An info menu, showing all settings and current values

> A reset function to restore factory settings

> A diagnosis file in case that you need external help. The diagnosis file will allow your contact person to assess the situation.

20.1. Useful accessories for trouble-shooting

> Test resistor: With conductivity instruments you can check the measuring input by connecting a test resistor to the terminals of the measuring input.

> Spare sensor: Sensors are consumables, and fragile. Exchanging a sensor can speed up trouble-shooting: If the problem remains, it was probably not caused by the sensor. If it has vanished, the sensor needs to be replaced or at least cleaned and regenerated.

> Conductivity cables: Cables are among the most common sources of trouble – torn wires or damaged insulations lead to measuring problems similar to those caused by sensor damages. With a second cable such problems can easily be located and eliminated.

> Conductivity test solutions: We recommend using commercially available ready-to-use KCl solutions to avoid errors caused by dilution or contamination.

20.2. Contact

In SYSTEM=>CONTACT you can store contact data of a contact person who might help in case of problems. With restricted access (code 0202) this data can be viewed if not altered.

Note **You can have the contact data displayed on the desktop, if you select “contact” as desktop design in the menu SYSTEM=>DISPLAY.**

20.3. Diagnosis file

In case of problems, it might be useful to provide an external contact person with an overview of the current situation. To that purpose save the diagnosis file on your SD card. It contains all current values and settings and the eventlog.

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20.4. Info

The Menu SYSTEM=>INFO contains all information on your instrument, the settings, and the current values, such as:

ID

Here you can find the instrument number, the software versions, and the operation hours. This information is important for repair, updates, etc.

Eventlog

The eventlog lists up to 100 events with the times of their appearance and disappearance. Further details are supplied on the following pages.

Settings

This menu lists all settings. In case of trouble, check if all settings are as you had intended, and check if the instruments behavior is consistent with the settings. If for example the alarm relay is not activated when the measured value drops below the lower limit, this might be because you have not activated the lower limit as an alarm action in the alarm action list.

View

This menu shows all current values of analog and digital inputs and outputs, including the raw signals of the sensors. The later are invaluable for trouble-shooting since they are not affected by any user settings such as calibration, temperature compensation etc. If for example you get a slope error after calibration, even though the raw signals of the sensor were plausible, then the problem might well be a defective or missing temperature measurement, and an exchange of the pH sensor would be quite useless.

The raw data is also especially useful if the instrument has been hopelessly miscalibrated.

The information on mA output values and status of the digital inputs help locating communication problems with the control center. mA values can be measured at the terminals of the instrument with an amperemeter.

Note **The mA outputs and the second digital input are add-ons. They are displayed only if the functions have been activated.**

20.5. Event messages

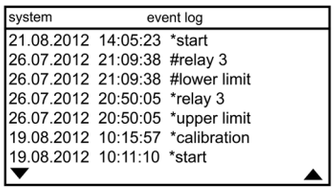
In case of trouble, the instrument displays an event message on the desktop. If there are more than one message, they are displayed alternately.

Not all events will cause the alarm relay to switch. For many events you can decide for yourself if the relay should switch by defining the event as an alarm action in the alarm action list – see Alarm relay.

20.6. Eventlog

Up to 100 events are saved in an eventlog. The *-sign indicates appearance, the #-sign disappearance. Besides the event messages, this also lists power interrupts, calibrations, and similar operations, with date and time.

This helps to interpret events – for example a deviation of the measured value shortly after a power interrupt may simply be due to the unfinished polarization of the measurement.



The eventlog provides information on frequency and duration of events. You can see what events have occurred in the past, and how long they lasted. The appearance and disappearance times allow to check what other events had happened at that time, for example the start-up of a dosing pump, frequency inverter, etc.

Note **You can save the eventlog by saving the diagnosis file.**

20.7. Event help

As an addition, the instrument provides help for all events: information on possible causes, and suggestions for possible remedies. These can be found in the menu SYSTEM=>EVENT, or – with touch screen instruments – by touching the event message on the desktop.

We advise to follow the suggestions in the order in which they are presented.

Event message	Cause	Suggested remedies
Check measuring input	The measuring input receives no proper signal	Check sensor plug, check cable, check sensor

This message appears if the measuring circuit is interrupted.

Note: **With conductivity measurements, in case of an overload of the measuring input, 32767 might be displayed instead of the usual error message. Such message indicates an overload of the measuring input. Take the sensor out of the process water to check if the problem might be caused by a stray current. If the message remains, a short-circuit is the most probable explanation, either within the cable or in the sensor. If the message disappears when you disconnect the sensor from the cable, the short-circuit is located in the sensor.**

Event message	Cause	Suggested remedies
Check temperature input	The temperature input receives no proper signal	Check Pt100/Pt1000 Check cable Without sensor use manual compensation

If the temperature input does not receive an appropriate signal, you may have selected automatic temperature compensation although no temperature sensor is connected. In that case switch to manual compensation. It is also possible that a Pt100 was connected but the compensation was set to Pt1000, or vice versa.

If you have connected a Pt100 or Pt1000, check if you have used the right terminals for connection and the right settings in the temperature menu.

As with the measuring input, a defective cable or sensor can be the cause for this message. You can check temperature sensors with an Ohmmeter – a Pt100 has a resistance of approx. 109 Ohm at room temperature, a Pt1000 approx 1080 Ohm.

With inductive measurements, an NTC is used. At ambient temperature, it should be at approx. 214kOhm.

Event message	Cause	Suggested remedies
Out of measuring range	Measured values exceed the measuring range	Trend indication only

If the measured value lies outside the measuring range but can still be processed by the instrument, it will be displayed together with this message. Please note that all information on accuracy, linearity, influences of temperature etc specified in the data sheets, only apply to values within the measuring range. Outside this range, the deviations and cross-influences might be higher, and the measurement can only be used as an indication.

If your instrument allows to select from a variety of measuring ranges, select the next higher range.

If the instrument displays 32767 the measuring input receives signals it cannot process. Such display has the same meaning as the error message “Check measuring input” and should be treated as such.

If the measured value gets so high that it can no longer be processed, the message „check measuring input” will appear.

Event message	Cause	Suggested remedies
Upper limit (or lower limit, respectively)	The measured value is higher than the upper limit (or lower than the lower limit, respectively)	Check dosage check controller parameters keep in mind delay settings

If the measured value exceeds the limits, this might mean that the feeding of control chemicals has been interrupted, because a reagent is empty, or the controller was stopped, or a feed line is damaged.

Warning **If this message was caused by a defective feed line, hazardous chemicals might leak from the break!**

Note **In that case a second message „dosage check“ is probably displayed, if you have activated this function and your controller settings do not impede the function.**

If the message occurs shortly after start-up and possibly quite frequently, please check the settings for control and limits to make sure that they match both each other and the requirements and conditions of your equipment. Perhaps the controller has to be set to slower reactions by choosing a larger proportional range to prevent overdosing.

Note **Temporary limit exceedance that might happen regularly during normal operation can be ignored by setting a delay time in the menu Alarm relay.**

Event message	Cause	Suggested remedies
Digital input 1 Low water Level Ext. controller stop	The digital input was closed by a connected sensor or switch	Digital input 1 / low water: check water flow, check sensor/connection Digital input 1 / level: check container level, check sensor/connection

The digital input allows connection of a flow sensor or level sensor or an external switch. According to its intended function, you can assign the digital input one of three different texts: „Low water“ if you have connected a flow or water level sensor, „level“, if you use a level sensor to control the level of a chemical, or „ext. controller stop“, if you use an external switch to activate and deactivate the controller.

Note **Independent of what text you have selected, the controller is automatically shut down whenever the digital input switches.**

Depending on these settings, the suggested remedies differ: If you have selected „low water“ or „level“, the instrument suggests checking the availability of water or reagent, and if that is ok, the proper function of the flow or level sensor.

Note **If you have activated a second digital input, this will lead to similar messages, starting with „digital input 2“.**

Further messages with activated add-ons:

Event message	Cause	Suggested remedies
mA out of range	The current measured value corresponds to an output outside the 0(4)-20mA range	Check settings

This message appears if the measured value is higher than the one assigned to 20mA or lower than the one assigned to 0/4mA.

Example:
You have set the mA output to 100-400 µS. The output is 0(4)mA at 100 µS, and 20mA at 400 µS. If your measured value is 510 µS, this message will appear.

Check the settings for the analog outputs, and change the settings if necessary.

Event message	Cause	Suggested remedies
Dosage check	Controller ouput was 100% for longer than the specified time	Check dosing, especially feed lines and pump

Dosage check is a safety measure to shut down the controller in case of defective feed lines to prevent leaks of hazardous chemicals.

The instrument monitors the time of dosing with 100% controller output – if you are using the instruments controller and have activated this function by setting the time to a value >0. If within that time the controller output does not go below 100%, the instrument shuts down the controller, stops the dosing, and displays this message.

So if you read this message on the display, you have to expect problems with the feed lines, including the release of dangerous chemicals!

Warning **The dosage check monitors only those times when the controller is dosing with 100%! If your proportional range is higher than the maximum possible difference between set point and measured value, this condition can never be met!**

Finally, there are some event messages indicating fundamental problems that you cannot solve on site:

Event message	Cause	Suggested remedies
Communication error	The internal communication between instrument parts does not work	Contact your supplier

Event message	Cause	Suggested remedies
Unknown measurement module	The measurement module does not fit the instrument or does not work properly	Contact your supplier

If such a message appears, the instrument has to be sent in for repair.

20.8. Events with Popup messages

In some events, a window pops up, displaying a message. Take note of its contents and follow the instruction. To close the window, you have to acknowledge with OK.

Popup message	Cause	Suggested remedies
Check measuring input	Calibration without measuring signal.	No measuring signal, check measuring input and rerun calibration with valid signals.

If you try to calibrate while the event message „check measuring input" ist displayed and the measured value shows ?, this message appears. Without valid measuring signal calibration is not possible. Check the sensor connection, that the sensor is immersed in the buffer up to the junction and that it is not damaged.

Rerun calibration only when the event message and the question marks have disappeared.

Popup message	Cause	Suggested remedies
Check temperature input	Calibration without temperature signal.	No temperature signal, check temperature input or switch to manual temperature.

If you try to calibrate while the event message „check temperature input" ist displayed and the temperature shows ?, this message appears. Without valid temperature signal calibration is not possible. Check the sensor connection, that the right sensor type was set and that it is not damaged.

Rerun calibration only when event message and the question marks have disappeared.

Or switch to manual temperature compensation.

Popup message	Cause	Suggested remedies
C value out of range	C value settings e xceed the allowed range.	Check measuring range and repeat reference measurement.

If you calibrate and try to save the calibration results even though the C value exceeds the allowed range, this pop-up appears. The allowed range is wide enough to include all usual conductivity sensors. Therefore, the message is an indication that something is wrong with either the measurement or the reference value.

Popup message	Cause	Suggested remedies
TDS factor out of range.	TDS factor exceeds the allowed range.	Check measuring range and repeat reference measurement.

If you calibrate and try to save the calibration results even though the TDS factor exceeds the allowed range, this pop-up appears. The allowed range covers all the usual settings. Therefore, the message is an indication that something is wrong with either the measurement or the reference value.

Popup message	Cause	Suggested remedies
SD card error	The instrument cannot use the SD card	No SD card Invalid format Invalid file SD card full

Check if an industry-standard SD card has been plugged into the slot, and that it was plugged properly. If you want to load settings or update files, check that the files are available on the SD card directly and not in a subfolder. Delete and restore the files, if necessary. If you want to store settings on the SD card, check if there is enough storage space left on the card.

This message appears also if you remove the card without deactivating the logger first.

Popup message	Cause	Suggested remedies
No appli	The software files cannot be loaded	Please renew the 2 data files on the SD card and try again.

For updates, both files have to be stored on the SD card, not in a subfolder. Check that the files are available, and delete and restore them if necessary.

Popup message	Cause	Suggested remedies
Memory stop data logging	The SD card is fulll.	SD card full, data logging stopped.

If you have set the logger to STOP mode, then the instrument stops the logging when the SD card is full.

Change the SD card, or remove some of its contents, or select the mode RING to overwrite older data.

20.9. Reset

As a last resort it is sometimes necessary to restore factory settings. With the RESET function you erase all settings by operators. Activated add-ons will of course remain activated.

With the Reset function, the system is set to a defined condition. User settings that might severely impede an evaluation of the measured values, such as a calibration gone wrong, are erased.

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