

INDUSTRIAL WATER EQUIPMENT

Controller for reverse osmosis plants



Operating manual

Software version 1.04

Contents

1. System description	1
1.1. General.....	1
1.2. Functionality overview	1
1.3. Diagram of the unit	2
1.4. Unit configuration	2
1.5. Description of the unit.....	2
2. Picture of front side.....	4
3. Measurement and function display	5
3.1. LCD display	5
4. General operation.....	8
4.1. Main screen	8
4.2. Menu.....	8
4.3. Window	9
4.3.1. Set value or text	9
4.3.2. On / off option.....	9
4.3.3. Set dropdown list.....	9
4.3.4. Confirmation	10
4.4. Alarm window	10
5. Unit Configuration.....	11
5.1. Inventory.....	12
5.1.1. Security switch	13
5.1.2. Analogue control	14
5.2. Programming.....	15
5.2.1. Components	15
5.2.2. Units (phases).....	16
6. Components.....	17
6.1. Valves.....	17
6.1.1. Inlet valve	17
6.1.2. Concentrate valve	17
6.1.3. Permeate rinse valve	18
6.1.4. Permeate block valve.....	18
6.1.5. Permeate 3-way valve.....	19
6.2. Pumps	19
6.2.1. High pressure pump	19
6.2.2. Booster pump	19
6.2.3. Dosing pump	20
6.3. Alarm	21
6.4. Switches	22
6.4.1. Low pressure	22
6.4.2. Exceeded pressure	23
6.4.3. Pressure before membrane	23
6.4.4. Pressure after membrane	23
6.4.5. Pressure permeate.....	23
6.4.6. Motor security.....	23
6.4.7. Stop	24
6.4.8. Concentrate	24
6.4.9. Regeneration	25
6.4.10. Alarm reset	25
6.5. Tanks.....	26
6.5.1. Storage tank.....	26

6.5.1. Raw water tank.....	27
6.5.2. Dosing tank	28
6.6. Conductivity meter / Temperature meter.....	30
6.6.1. Conductivity permeate	30
6.6.2. Conductivity feed.....	31
6.6.3. Conductivity 3.....	31
6.6.4. Conductivity 4.....	31
6.6.5. Conductivity settings	31
6.6.6. Properties conductivity measurement.....	32
6.6.7. Monitoring minimum conductivity	33
6.6.8. Monitoring maximum conductivity	33
6.7. Temperature	34
6.7.1. Temperature permeate	34
6.7.2. Temperature feed.....	34
6.7.3. Temperature 3.....	34
6.7.4. Temperature 4.....	34
6.7.5. Temperature settings	34
6.7.6. Temperature measurement properties	35
6.7.7. Monitoring minimum temperature	35
6.7.8. Monitoring maximum temperatures	35
6.8. Relative conductivity.....	36
6.8.1. Properties relative conductivity	36
6.8.2. Monitoring minimum relative conductivity	36
6.8.3. Monitoring maximum relative conductivity	36
6.9. Recorder outputs.....	37
6.10. Flow meter.....	38
6.10.1. Flow Feed.....	38
6.10.2. Flow Concentrate	38
6.10.3. Flow Permeate	38
6.10.4. Flow 4.....	38
6.10.5. Flow 5.....	38
6.10.6. Flow 6.....	38
6.10.7. Flow meter settings	39
6.10.8. Properties flow meter	39
6.10.9. Monitoring minimum flow	40
6.10.10. Monitoring maximum flow	40
6.11. Pressure meter.....	41
6.11.1. Pressure Feed.....	41
6.11.2. Pressure BP.....	41
6.11.3. Pressure PU.....	41
6.11.4. Pressure Concentrate	41
6.11.5. Pressure Permeate	41
6.11.6. Pressure meter settings	42
6.11.7. Properties pressure meter.....	42
6.11.8. Monitoring minimum pressure.....	43
6.11.9. Monitoring minimum pressure.....	43
6.12. pH meter.....	44
6.12.1. pH meter settings	44
6.12.2. Properties pH meter	44
6.12.3. Monitoring minimum pH	45
6.12.4. Monitoring maximum pH	45
6.13. Additional.....	46
6.13.1. Additional program	46
6.13.2. Additional program 2	46
6.13.3. Additional program 3	46
7. RO Unit	47
7.1. Properties	47
7.2. Production	47
7.3. Rinse (after production).....	49
7.4. Rinse during Standby	49
7.5. Rinse during production	50

7.6. Maintenance	51
7.7. Regeneration	52
7.8. Standby	52
7.9. Standby Stop	52
7.10. Alarm	53
8. Alarms	54
8.1. General overview	54
8.2. Alarm window	54
8.3. Overview alarms	56
9. Manual operation of the unit	57
9.1. Standby stop	57
9.2. Maintenance	57
9.3. Standby	57
9.4. Production	58
9.5. Rinse	58
9.6. Rinse during Standby	58
9.7. Rinse during production	58
10. Retrieve information	59
10.1. General	59
10.2. Service number	59
10.3. Inputs	59
10.4. Outputs	60
10.5. Counters	60
10.6. Alarm history	60
10.7. Ethernet	61
10.8. E-mail	61
10.9. RS485	61
10.10. RS232	62
10.11. Recorder outputs	62
10.12. Inputs 0-20mA	62
10.13. Inputs pulses	63
10.14. Print composition in the controller	63
11. User settings	64
11.1. LCD Display	64
12. Clock	65
12.1. General	65
12.2. Time setting	65
12.3. Date setting	65
13. Language setting	66
13.1. Change language setting	66
14. Ethernet	67
14.1. Configuration	67
14.1.1. DHCP function	67
14.1.2. IP address	67
14.1.3. Subnetmask	68
14.1.4. Default gate-way	68
14.1.5. HTTP port number	68
14.2. Access via internet (WAN)	68
14.2.1. IP address of the modem (WAN)	69
14.2.2. IP address of the modem (LAN)	70
14.2.3. NAPT	70
14.2.4. DHCP Lease	71
15. SD card	72

15.1. Arrangement of the cards	72
15.2. Directories	72
15.3. Software files	73
15.4. Log functions	73
15.4.1. Alarm log function	74
15.4.2. Data log function	74
15.4.3. Process log function	75
16. E-mail	76
16.1. Configuration	76
16.1.1. Switch on / off e-mail function	76
16.1.2. IP address of SMTP server	76
16.1.3. E-mail sender	76
16.1.4. E-mail address of the recipient	77
16.2. Log functions	77
16.2.1. Alarm log function	77
17. RS485	78
17.1. Configuration	78
17.1.1. Configuration in the controller	78
17.1.2. Configuration of the "Hyperterminal"	78
17.2. Log functions	78
17.2.1. Alarm log function	78
17.2.2. Data log function	79
17.2.3. Process log function	79
18. RS232	80
19. Hard disk	80
19.1. Back-up via the fitting contractor	80
19.2. Back-up by the end user	80
20. Logging	81
20.1. Alarm data	81
20.1.1. CSV format	81
20.1.2. XML format	82
20.2. Data information	82
20.2.1. CSV format	83
20.2.2. XML format	83
20.3. Process data	84
21. Internet	85
21.1. Access via the local network (LAN)	85
21.2. Access via internet (WAN)	85
21.3. Security	85
21.4. Head page	86
21.5. Unit display	87
21.6. Controller display / operation	87
21.6.1. "Observer" mode	88
21.6.2. "Terminal" mode	88
21.6.3. "Configurator" mode	88
21.6.4. Protection	89
21.7. Getting log files	90
21.8. "Internet key"	90
22. Service	91
22.1. Service number	91
22.2. Maintenance	91
22.3. Names	92
22.4. Resets	92
22.5. Hard disk	92

22.6. Hardware test	93
22.6.1. Inputs	93
22.6.2. Relay outputs	93
22.6.3. Conductivity meter	94
22.6.4. Temperature meter	94
22.6.5. Outputs 0-20mA	94
22.6.6. Inputs 0-20mA	95
22.6.7. Inputs pulse	95
22.6.8. Back light	95
22.6.9. Media	96
23. Security	97
23.1. Controller	97
23.1.1. Pass word	97
23.1.2. Menu	98
23.1.3. Process	98
23.2. Internet	98
24. Power failure	99
24.1. Clock	99
24.2. Alarms	99
24.3. Programming	99
25. Messages	100
25.1. Hardware changed	100
26. Boot software	101
26.1. General	101
26.2. Changing application software	101
27. Frequently asked questions	102
27.1. General	102
27.2. Relay outputs	102
27.3. Digital inputs	102
27.4. E-mail	102
27.5. Internet	103
27.6. RS485	103
27.7. RS232	103
28. Terminology	104
29. Overview menu	105
30. Opening casing	106
31. Terminal block connection	107
31.1. Schematics	107
31.2. Remarks	109
32. Electrical connection examples	109
33. Installation and Start up	111
33.1. General	111
33.2. Installation	111
33.3. Ethernet connector	111
34. Maintenance	112
35. Spare parts	112
35.1. Order codes	112
35.2. Pictures	112

36. Technical specifications	113
36.1. Casing dimensions	114
37. Index	115
38. Declaration of conformity	117
39. Warranty conditions	118



1. System description

1.1. General

The RGS8000 is applicable for the automatic control and monitoring of reverse osmosis units. Thanks to the flexible programmable software this controller is suitable for a large number of various water treatment applications.

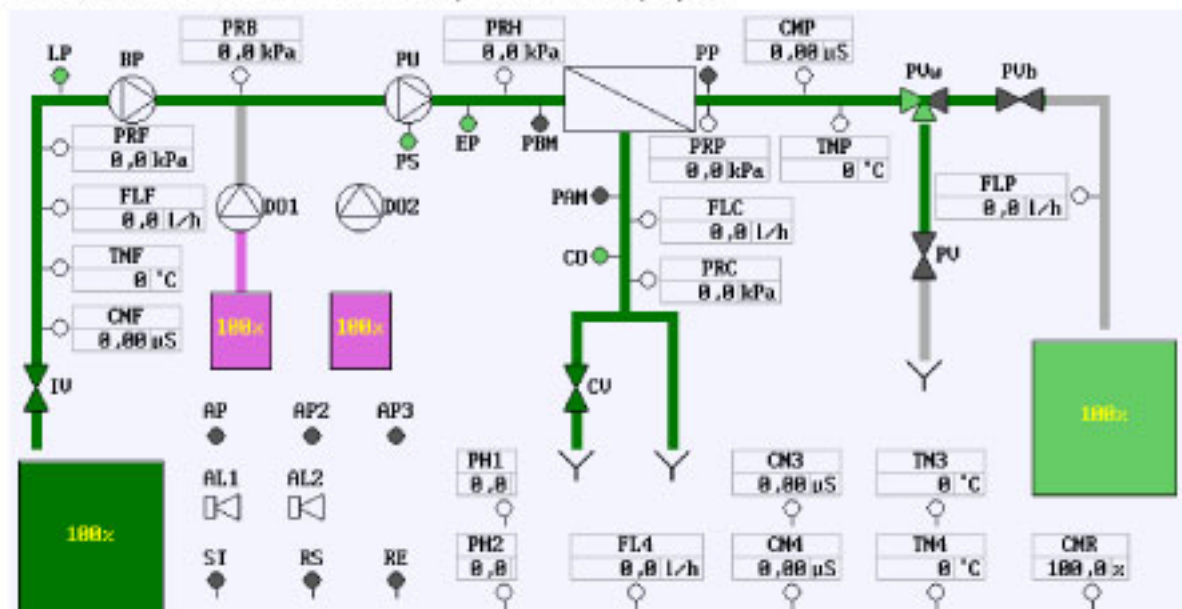
1.2. Functionality overview

- Menu-driven operating and programming of controller graphic colour TFT display (800x480).
- Operates via touch panel.
- Choice of languages.
- Universally applicable to reverse osmosis plants.
- Flexibly programmable for specific user requirements.
- Desalinated water production via manual controls or level switches
- Locking of maintenance (rinsing phase) via code possible
- Free programmable service telephone number.
- Programming locally and via web browser
- Schematic diagram via web browser
- Measurement data logging via RS232, RS485 and SD card.
- Alarm logging via RS232, RS485, SD card and E-mail.
- 8 free programmable inputs for potential free switches.
 - Available input functions: High-level switch, Low-level switch, Low pressure, Overpressure, Concentrate flow monitoring, Motor protection, Alarm reset, Regeneration, Pressure before membrane, Pressure after membrane, Permeate Pressure, Security switches for valves / pumps and Level switch for dosing tank
- 7 free programmable relay outputs
 - Available relay functions: High-pressure pump, Inlet valve, Concentrate valve, Permeate rinse valve, Permeate block valve, Permeate 3-way valve, Dosing pump, Booster pump, Alarm, additional program
- Optional: 2 x print with 3 outputs 0(4)-20mA for writer or control frequency regulator.
- Measurements: 1 conductivity meter and 1 temperature meter.
 - Optional : 2nd, 3rd and 4th conductivity meter with temperature meter
- Integrated conductivity meter with automatic measurement range switching
- Conductivity measurement range according to the sensor used (0,5 – 100.000 $\mu\text{S/cm}$).
- Cell constant of the sensor programmable from 0,01 – 10,00 cm^{-1}
- Manual or automatic temperature compensation
- Optional: 4 prints with :
 - 3 programmable inputs 0-20mA :
 - Available measuring functions: Level of the clean water tank, Level of the raw water tank, level of dosing tank, conductivity measurements, Flow measurements, Pressure measurements and pH measurements.
 - or paddle wheel measurement for flow measurements.
- Alarm history: last 20 alarms are stored with date and time
- Update of software via SD card
- Date and time with battery
- Securing program information in the event of a loss of voltage, the program information is stored without battery.
- Manufactured according to EMC guidelines.
- Casing suitable for wall mount, mounting and panel mounting.
- Available in 24-230V, 115/24V, 230/24V, 240/24V

1.3. Diagram of the unit

The unit is schematically represented in the following diagram

The diagram features all the components defined in the controller. Only the components that are connected to the available in- and outputs can be displayed.



§ 28 "Terminology" on page 104 offers an overview of the meaning of the abbreviations used. These abbreviations may differ from the picture, because they have been modified by the user.

1.4. Unit configuration

In the controller the unit configuration can be configured via the menu option "Unit" (in the main menu). First of all, an inventory has to be made of the components that have to be driven by the controller, and to which pins these components are connected. The inventory is described in § 5 "Unit Configuration" on page 11

Subsequent to the inventory any delays, limits etc. can be set for the various components under the "Programming - Components" option. This is described in § 6 "Component" on page 17.

Next the various phases ("Production", "Rinse" etc.) can be programmed.

The functions that are switched on or switched off can be set for each phase. A time duration may also be entered. This is described in § 7 "RO Unit" on page 47.

1.5. Description of the unit

The controller distinguishes different phases:

- | | |
|----------------------------|--|
| - Production | Production of desalinated water |
| - Rinse (after Production) | Rinsing the membrane after production |
| - Rinse during Standby | Rinsing the membrane when stopped |
| - Rinse during Production | Rinsing the membrane during production |
| - Maintenance | Unit maintenance |
| - Regeneration | Switch off through pre-switched softening installation.
Regeneration input active |
| - Standby | Installation out of service : no production of desalinated water |
| - Standby Stop | Installation out of service : only be switched on manually. |
| - Alarm | Installation out of service : no production of desalinated water |



The controller is routinely delivered in the "Standby Stop" phase. The unit will not be automatically started until this is switched on manually (see § 9.1 "Standby stop" on page 57). Once it is switched on, the controller will no longer start in this phase after a power failure, unless this phase is activated via the programming (see § 7.9 "Standby Stop" on page 52).

Desalinated water can start to be produced depending on the level switch (es) (HL and LL) or manually. During production a service hour counter is maintained which can be read off under the menu option "Information" (see 10.5 "Counters" on page 60). A maintenance-related counter will also be maintained, if this is programmed (see § 22.2 "Maintenance" on page 91). This can be read off in the same window as the service hours counter.

During the "Production" phase the unit can be switched off manually (see § 9.4 "Production" on page 58), irrespective of the status of the level switches in the storage tank. The unit will go, depending on programming, into the "Rinse" phase or the "Standby" phase.

The lower bar in the main window will then show that unit has been manually switched off. The unit will no longer be automatically switched on until the unit is manually turned on again.

It is also possible to activate a rinse during production (see § 7.5 "Rinse during production" on page 50) and a rinse during Standby (see § 7.4 "Rinse during Standby" on page 49).

For maintenance activities by a maintenance technician the "Maintenance" phase is available in the controller. This phase is accessible only via the "Standby" phase (see § 9.3 "Standby" on page 57). Maintenance is not automatically started straightaway, as the unit first of all starts in the "rest" position. The actual maintenance phase can be started from this position (see 9.2 "Maintenance" on page 57). In § 7.6 "Maintenance" on page 51 and § 22.2 "Maintenance" on page 91 there is more information about the phase "Maintenance".

A special phase is available to show if a water softening system is in regeneration. The "Regeneration" input then has to be activated. All outputs are switched off in this phase. Only a limited number of inputs are controlled.

See also § 7.7 "Regeneration" on page 52.

If a phase is interrupted because of an alarm situation the top bar will show there is an alarm situation. Also shown is the phase when the alarm occurred, the cause of the interruption and how the unit is switched on again.

§ 7.10 "Alarm" on page 53 In § 7.6 "Maintenance" on page 51 and § 22.2 "Maintenance" on page 91 there is more information about the phase "Maintenance".

2. Picture of front side

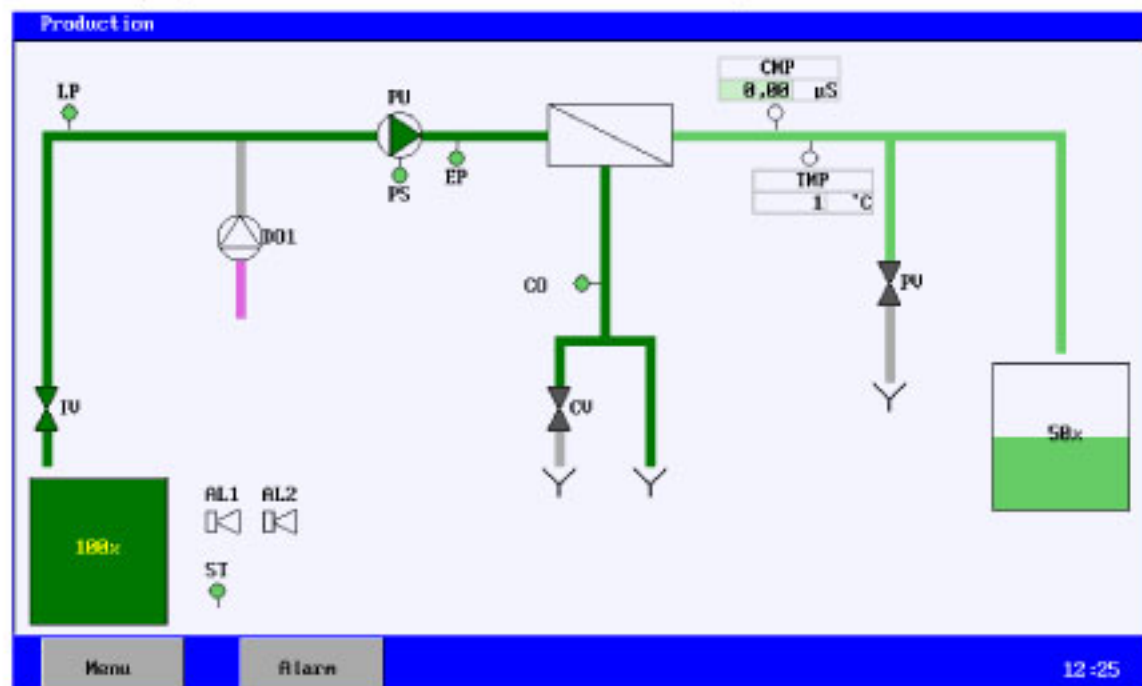


1 LCD display + touch panel

3. Measurement and function display

3.1. LCD display

The LCD display features further information about the active process.



The top bar displays the process the unit is in. Also shown are the measurement values or statuses of the connected components.

Piping

The pipes can have various colours.

These colours have the following meanings:

	no medium
	unrefined water
	permeate
	chemicals
	air

Measured Values



The measured values can be displayed with various background colours.





These colours have the following meanings:

- white : the measured value is not monitored.
- green : the measured value is monitored and is in order.
- orange : the measured value is too high or too low, but the delay time is not over yet.
- red : the measured value is too high or too low and the delay time is over.



Positions of the inputs:

The (digital) inputs can have the following statuses:

- 
ST The input function is not supervised (grey).
- 
ST The input function is supervised and inactive (green).
- 
ST The input function is supervised and active, but the time delay is not finished yet (yellow).
- 
ST The input function is supervised, active and the time delay is finished (red).

Positions of the outputs:

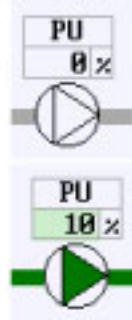
The symbols can be displayed in the following colours.

Pumps:



- white : The pump is turned off.
- dark green : The pump is turned on and unrefined water is being pumped.
- purple : The pump is turned on and chemicals are being pumped.
- red : The pump is turned off. There is a malfunction in the pump.

If the pump is controlled via a frequency regulator and the reference for the frequency regulator is set via the controls, then the set percentage is displayed.



The pump is turned off.

The pump is turned on and the set percentage is displayed.

Shut-off Valves:



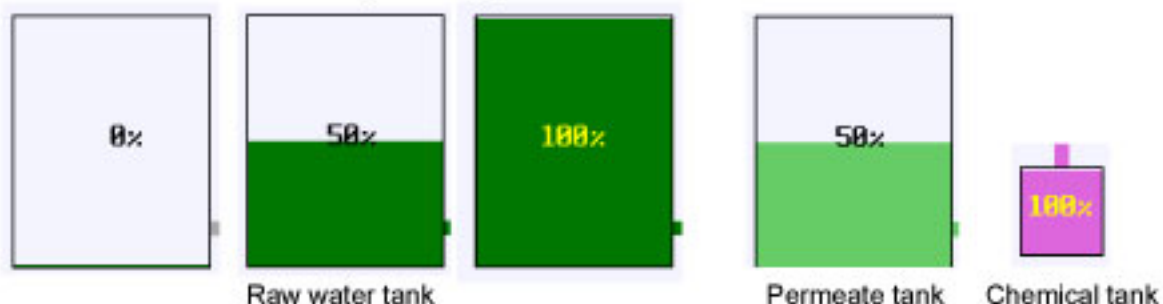
- dark gray : The valve is closed.
- dark green : The valve is opened and unrefined water runs through.
- light green : The valve is opened and permeated water runs through.
- orange : The security of the valve is activated, but the delay time has not yet passed.
- red : The security of the valve is activated and the delay time is over.

Attention: If the pulse function for the dosing pump output is activated a "I" will also be displayed next to the deactivated relay.



Situation of the tank

The tanks can be displayed with different background colours.
These colours have the following meanings:



If the tank is equipped with level measuring (0(4)-20mA), the level will be indicated per ratio.

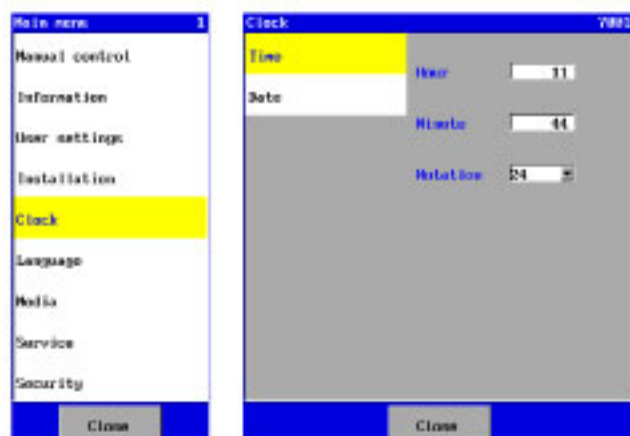
Status bar



There are keys on the status indicators that allow you to activate the menu or the alert window.
The lower bar is used to display an exceptional situation (such as a manual stop or the remaining interval time until a rinse) and the current time. The warning corresponds to the phase running at that time. The corresponding phase in § 7 "RO Unit" on page 47 offers further information about any warning there may be.

Menu

In the menu, the windows have been provided with a unique number in the top right-hand corner.



This can be used to check whether the correct window is selected at all times (in the case of telephone support, for example).

4. General operation

A touch panel is used for the operation and programming of this controller.

Details are provided below about the general arrangement of the screen, the meaning of the various "keys" and the general display /input windows.

4.1. Main screen



In the main screen the keys have the following functions:

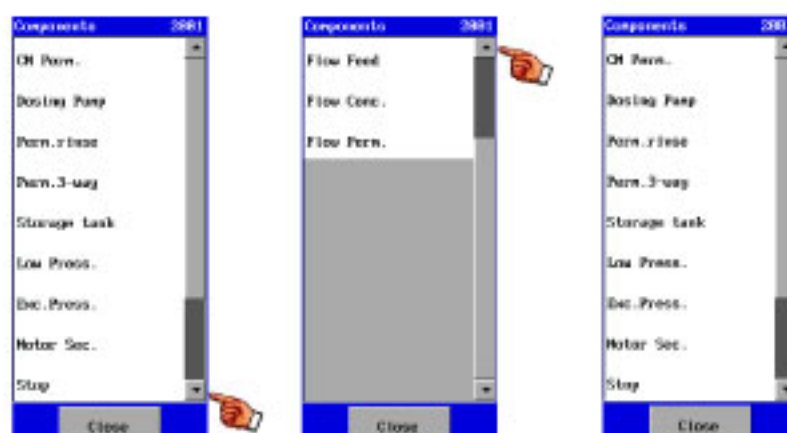
Menu To the menu. **Alarm** To the alarm window

4.2. Menu



You can select the different items within the menus. The selected item will be displayed in yellow and the subordinate menus or windows will be displayed.

If the selected menu consists in several submenus, the two last menus will be displayed. The menu can be closed by pressing the **Close** button.



If the number of menus is bigger than the number of available positions, the menu will appear in a scroll bar. The previous or next (invisible) items are reachable through the up and down arrows.

4.3. Window

The various settings can be made in windows.

The different types of settings are: values, texts and dropdown lists.

4.3.1. Set value or text

The box with the required settings has to be selected to change a value or text and calling up a new window where the value / text can be changed.



This window invariably has three choices with a special meaning:

- Confirm the (changed) setting. You then quit the window.
- If you exit a window, the modified values will not be saved.
- (Backspace) Erase last character.

The changed setting is stored in the memory after you quit the main menu.

4.3.2. On / off option

The menu features the so-called "on/off" options.



If the "check" mark appears the option is switched on. Other settings can be activated and appear by switching on this option.

4.3.3. Set dropdown list

A dropdown list is identified by a field with an arrow pointing downwards on the right-hand side.





Pressing the dropdown item thus calling up a window with a list of options.





Confirming the choice calls up another window for the final confirmation.



-  Confirm the choice again.
-  Cancel the choice.

The changed setting is stored in the memory after you quit the main menu.

4.3.4. Confirmation

In some cases confirmation is required subsequent to a choice or change. The  key can be used to confirm the choice or change. The  key can be used to cancel the choice or change.

Example:



4.4. Alarm window

The operation in the alarm window is described in § 8.2 "Alarm window" on page 54.

5. Unit Configuration

This chapter describes how the unit may be configured.

The unit configuration option is featured in the main menu.



If the unit configuration is selected you will be asked if the unit may be placed in Standby. The configuration may be accessed only if the unit is in Standby.

If the unit is placed in Standby the following window will appear where a choice is made between the inventory of the connected components and the programming of the components and the phases of the RO unit.

The inventory first of all has to be made after which the inventoried components are programmed and activated during the RO unit's various process phases.



The inventory menu may be secured against unauthorised changes, upon which a key appears after "Inventory" to show the option is secured (see also § 23.1.2 "Menu" on page 98).

5.1. Inventory

Before the components and process phases can be programmed, an inventory has to be made of the components with the corresponding properties.



Selecting the item "Inventory" calls up a list of potential components that may be connected. If a specific component from the list is connected to the controller the component's corresponding window can indicate which pins the component is connected to.

The specific properties of a component may also be entered, such as a cell constant or whether a switch is "normally open" or "normally closed".



An own name or code can be set for each component (maximum 6 characters). This name will be displayed in the diagram and in the log data.

When a component is connected to the controller "Hardware" can show which pins the component is connected to.

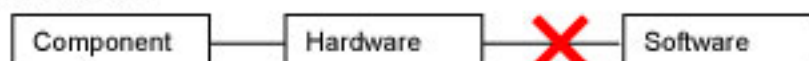
An overview is provided of the hardware to which the corresponding component can be connected. It also indicates which hardware is already occupied.



Example:

Inlet valve connected to OUT2.

If a component is not connected, then the "—" option should be chosen. This disconnects hardware and software.

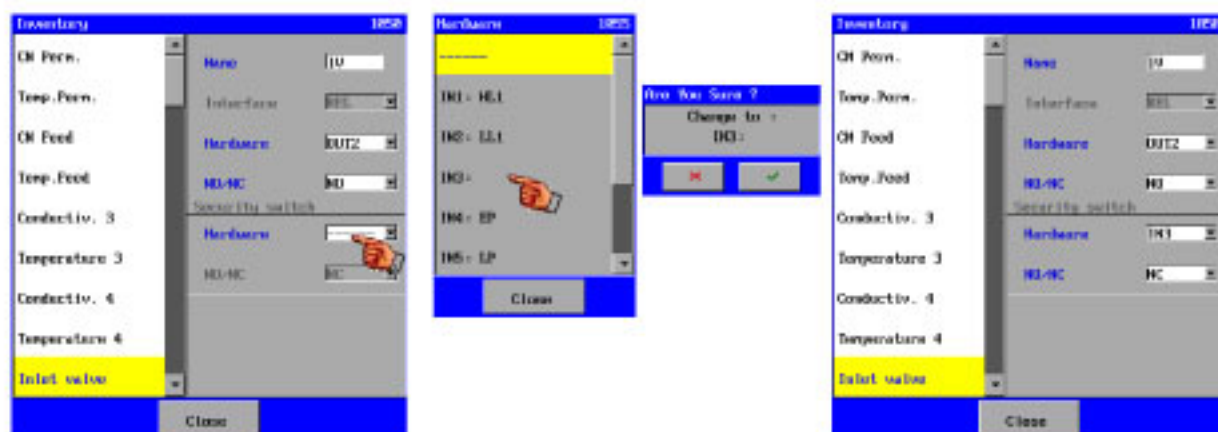


The component will then no longer be listed in the remaining settings, unless the component was connected to another component in the settings for that other component. In that case, the text will be "crossed out".

When a component has to be moved to other terminals, where a component is still connected, an automated process has to be used to release the component that is detached. The component can then be connected to the terminals made available.

If an inventory window for a specific component differs from the windows shown here more information about this can be found in the corresponding component in § 6 "Component" on page 17.

5.1.1. Security switch



Circuit breakers can be activated in certain components, such as valves and pumps. These can be linked to one of the available inputs and it can be indicated whether the switch is "normally closed" or "normally opened".

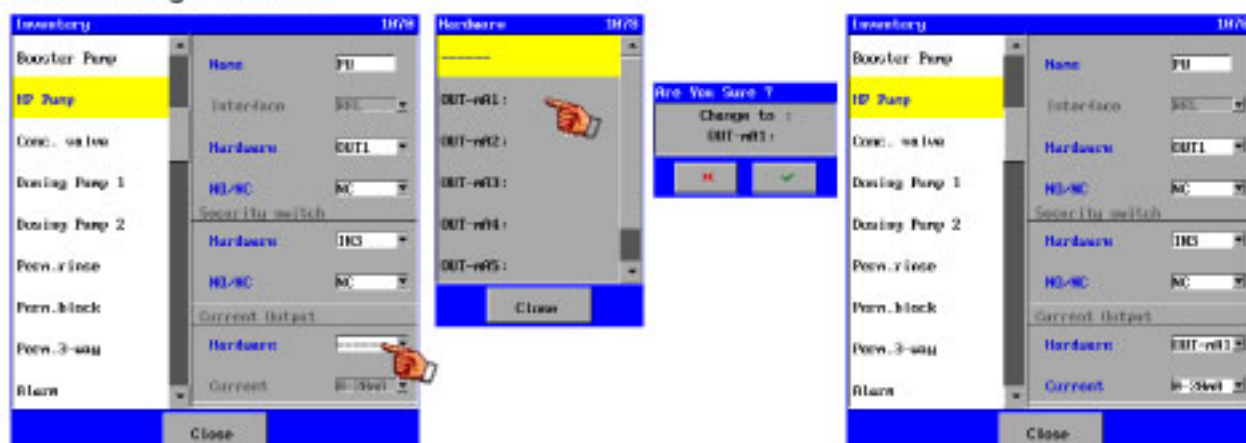
The delay on an alarm indication for the valves is fixed at 4 seconds. For the pumps it is 1 second by default.

If a circuit breaker has been defined, it will always be monitored.

If an alarm situation occurs, then the name of the respective valve will be displayed as a notification.



5.1.2. Analogue control



Certain components can be controlled via an analogue output (such as a pump via a frequency regulator). An analogue output can be selected for these components. In the settings of the processes (see § 5.2.2 "Units (phases)" on page 16) it can subsequently be set to any percentage of the current range (0-20mA or 4-20mA); the output current must be set.

This output in a frequency converter can, for instance, be used as a "target value". The flow or pressure that must be regulated can, via the "recorder function", also be directed to the frequency regulator.

If an analogue output has been activated for the relevant component, then a percentage of the range of the analogue output can be set.

If a percentage of 0% is entered, then the relevant relay output can be switched off; at a different value, the relay output is activated.

If an inventory window for a specific component differs from the windows shown here more information about this can be found in the corresponding component in § 6 "Component" on page 17.

5.2. Programming

Subsequent to the inventory of the components and entering the specific properties of the components, you may enter other properties in the component programming and the various phases of the RO unit can be set.



The program menu can be secured against unauthorised changes. A key then appears after "Programming" to show the option is secured (see also § 23.1.2 "Menu" on page 98).



5.2.1. Components

The features of a component can be programmed.



If other settings are required for the component the component is not displayed in the programming list for the components. Nor will a component be displayed in the list if this is not connected (not linked to the hardware)

More information about the programming of a component can be found in § 6 "Component" on page 17.



5.2.2. Units (phases)

Once the components have been inventoried and programmed the various process phases of the RO unit may be programmed.



Only the programmable phases will be displayed.

During a "time" phase the time is entered (0-999) in seconds or minutes. If a time of 0 is entered the corresponding phase is omitted.

It may also be shown in each phase which components are activated.

If a component is not displayed this means it is not connected or the component cannot be set for this phase.

If an analogue output has been activated for the relevant component, then a percentage of the range of the analogue output can be set.

If a percentage of 0% is entered, then the relevant relay output can be switched off; at a different value, the relay output is activated.

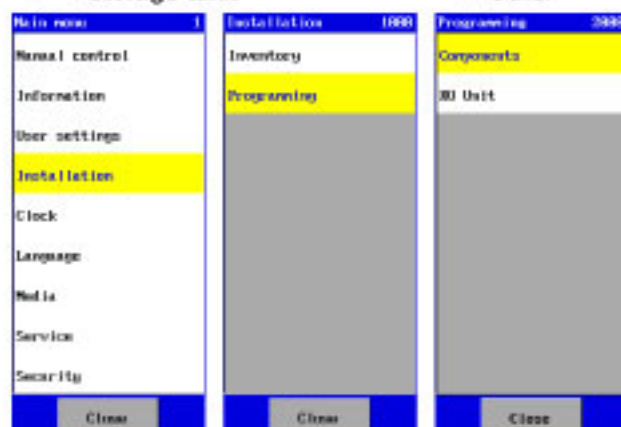
More information about the programming of the process phases is featured in § 7 "RO Unit" on page 47.

6. Components

An examination is made in this chapter of the inventory and programming options for the various components that have to be connected.

This component may divided into:

- Valves
- Pumps
- Alarm
- Switches
- Storage tank
- Conductivity meter (including temperature sensor)
- Flow meter
- Pressure meter
- pH meter
- Other



Where a reference is made in this chapter to inventory, this means the window located via the "Installation – Inventory" options. See § 5.1 "Inventory" on page 12 for more information.

Where a reference is made in this chapter to the programming of a component this means the window located via the "Installation – Programming – Components" options.

6.1. Valves

The valves may be connected only to the relay output functions (OUTx). Furthermore, a safety switch can be activated for the respective valve (see § 5.1 "Inventory" on page 12).

Whether a valve is open or closed can also be determined for each process stage.

The "Permeate valves" are alone in having other settings on top of the inventory settings.

6.1.1. Inlet valve



In the case of the "Inlet valve" all that has to be entered, in the inventory, is the relay output it is connected to.

A security switch can be activated. This can be linked to one if the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

For more information, see § 5.1 "Inventory" on page 12.

6.1.2. Concentrate valve



In the case of the "Concentrate valve" all that has to be entered, in the inventory, is the relay output it is connected to.

A security switch can be activated. This can be linked to one if the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

For more information, see § 5.1 "Inventory" on page 12.

6.1.3. Permeate rinse valve

In the case of the "Permeate rinse valve" all that has to be entered, in the inventory, is the relay output it is connected to.



A security switch can be activated. This can be linked to one of the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

For more information, see § 5.1 "Inventory" on page 12.

If the permeate rinse valve is connected to a conductivity meter, the valve will be opened or closed during the "Production" phase (if the valve is activated during this phase) depending on the measured conductivity and the settings.



A limit (0-9999) for conductivity can be set in the valve programming, as well as the delays for opening ("Delay on": 0-9999s) or closing ("Delay off": 0-9999s) the valve in the event the set limit is overshoot/undershot.

During all the other phases (other than "Production") the valve will be directly opened or closed at the start of the phase, depending on the setting for the corresponding phase.



If the selected conductivity meter is no longer connected to hardware in the inventory, then the text will be crossed out. Since the conductivity meter is no longer valid, the permeate flush shut-off valve will no longer depend on the selected conductivity meter. The settings are no longer relevant then and will therefore not be displayed.

Attention!

During the production start-up phases (Production 1, 2 and 3) the permeate rinse valve will also invariably be opened or closed independently of the conductivity.

During the "Standby" phase the rinse valve will be open by default.

6.1.4. Permeate block valve

The inventory and programming screens are identical to the screens which can be seen at the permeate rinse valve (see § 6.1.3 "Permeate rinse valve" on page 18). In the inventory the screen number needs to be increased by 10, and in the programming by 5.

During the "Production" phase and "Standby" phase, the permeate block valve will function differently from the permeate rinse valve. During "Production" the valve will be opened if the measured conductivity is below the set limit value. During "Standby" the valve will be closed.

6.1.5. Permeate 3-way valve

The inventory and programming screens are identical to the screens which can be seen at the permeate rinse valve (see § 6.1.3 "Permeate rinse valve" on page 18). In the inventory the screen number needs to be increased by 20, and in the programming by 10.

During the "Production" phase the valve will be closed in the rinsing direction if the measured conductivity is below the set limit value.

During "Standby" the valve will be opened in the rinsing direction.

6.2. Pumps

The pumps may be connected only to the relay outputs (OUTx). Furthermore, a circuit breaker can be activated for the particular pump and in the case of the feed pump and the backwash pump, an analogue output can also be activated to, for example, regulate the control of the pump, by means of a frequency regulator § 5.1 "Inventory" on page 12) per process step, if a pump is switched on or off. If an analogue output has been activated, then in the settings of the processes (see § 5.1 "Inventory" on page 12) it can be set to what percentage of the current range (0-20mA or 4-20mA) the output current must be set to. If a percentage of 0% is entered, then the relevant relay output will be switched off; at a different value the relay output is also activated.

This output in a frequency converter can, for instance, be used as a "target value". The flow or pressure that must be regulated can, via the "recorder function", also be directed to the frequency regulator.

The dosing pump is alone in having other settings on top of the inventory settings.

6.2.1. High pressure pump



In the case of the "High pressure pump" all that has to be entered, in the inventory, is the relay output it is connected to.

A security switch can be activated. This can be linked to one of the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

An analogue output can furthermore be selected with which, for example, a frequency regulator can be set.

For more information, see § 5.1 "Inventory" on page 12.

6.2.2. Booster pump



In the case of the "Booster pump" all that has to be entered, in the inventory, is the relay output it is connected to.

A security switch can be activated. This can be linked to one of the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

An analogue output can furthermore be selected with which, for example, a frequency regulator can be set.

For more information, see § 5.1 "Inventory" on page 12.

6.2.3. Dosing pump



In the case of the "Dosing pump" all that has to be entered, in the inventory, is the relay output it is connected to.

A security switch can be activated. This can be linked to one of the available inputs, and it can be set if the switch is "normally closed" or "normally opened".

For more information, see § 5.1 "Inventory" on page 12.

The subsequent programming of the dosing pump allows a dosing time to be set between 0 and 9999 (seconds or minutes). When a dosing time of 0 is entered the dosing pump is switched on until the end of the phase.



The controls of the dosing pump ("Output") can be adjusted and connected to a dosing tank in the programming of the dosing pump.

The dosing pump can be switched on with a delay, after the start of the phase. A delay of 0 to 9999 seconds can be entered.

Attention!

If the dosing pump is activated in successive phases (such as phase 1 to phase 2 or from the "Production" phase to the "Rinse" phase), the switch-on delay and dosing time will not be reset during the start of next phase.

See § 7 "RO Unit" on page 47 for the activation of the dosing pump during the phases.

For example: § 7.1 RO Unit – Production – Phase 1 – Dosing pump.

A pulse function can also be defined.

During the set dosing time pulses are provided as set ("Pulse on": 0.5 – 999.9 seconds / "Pulse off": 0.5 – 999.9 seconds).



You can connect the proportioning pump to a dosing tank.

You can indicate the connection in this menu and also whether the proportioning pump needs to be turned off when the dosing tank detects a low level.



If no level switch is connected to an input (IN1 to IN8) for the selected dosing tank in the inventory, then the text will be crossed out. Since the dosing tank is no longer valid, the dosing pump will no longer depend on the selected dosing tank. The settings will no longer be relevant and will therefore not be displayed.

A second dosing pump can be programmed. In the inventory the screen number needs to be increased by 10, and in the programming by 20.

6.3. Alarm



An alarm output may be connected only to a relay output function (OUTx). Activation of the relay is completely independent of the phase the unit is in.

In the case of the "Alarm output" all that has to be entered, in the inventory, is the relay output it is connected to.



The situation in which the output is activated can be set in the alarm output-related programming.

If a component is not connected or a monitoring is not activated (such as minimum conductivity monitoring) the monitoring will not appear in this alarm overview list either.

If the monitoring is activated, a check mark ✓ will be shown in front of the corresponding monitoring in the list.



If a monitoring is activated ("Alarm on"), you may choose to switch the alarm output off again automatically ("Automatic reset"), if the alarm situation is removed.

In some cases there is no point in automatically switching off the alarm output nor is there any need to do so. Examples of this are a power failure or maintenance, when the option for an automatic cut-out is not displayed.

The alarm output may also be switched off manually. See § 8 "Alarms" on page 54 or via an external switch where appropriate. See § 6.4.10 "Alarm reset" on page 25.

Attention!

Alarm messages "ROM settings" and "Default settings".

An alarm is always given when there is a fault in the configuration file. This cannot be set.

In that case the controller has to be reset or a back-up has to be loaded via the boot software.

See § 19 "Hard disk" on page 80 and § 26 "Boot software" on page 101.

6.4. Switches

Switches (e.g. level switches) may be connected only to the digital inputs (IN1 to IN8). Whether the input is monitored or not monitored can also be determined for each process stage.



In the case of the switches, the input this is connected to also has to be entered in the inventory.

Whether the switch "is "normally closed (NC)" or "normally open (NO)" also has to be entered.

Example for a "Low pressure" switch.

All switches have other settings on top of the inventory settings, such as a delay on the monitoring. An examination is made in following sections of what the function of the switches is, how the controller will react and what settings are available.

If a monitoring on a switch is switched on during a process the process will be controlled during this time and if the switch is still active after a delay (that can be set) the unit is switched off. The exception to this is the "Alarm reset" switch. This does not affect the process but only the alarms.

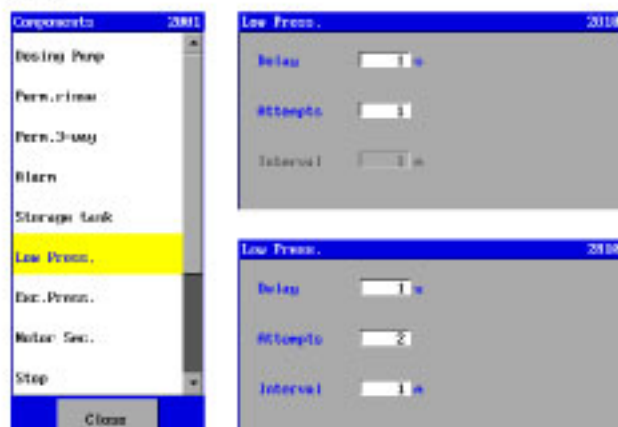
Attention!

The switches in the storage tank (high and low level) are not covered here. These correspond to the "Storage tank" component.

6.4.1. Low pressure

The "Low pressure" switch is used to check if there is enough water on the input side. This function can be used to make a number of programming attempts for recovery. In this case the unit will automatically be switched on again after a programmable interval time. The number of attempts is always kept. If the number of programmed attempts is executed during a process, the unit will be switched off and can then only be switched on manually.

If the number of attempts is set at 1 the unit will not be switch on automatically. At the end of a phase ("Production", "Rinse", etc...) the number of attempts is reset at the programmed value.

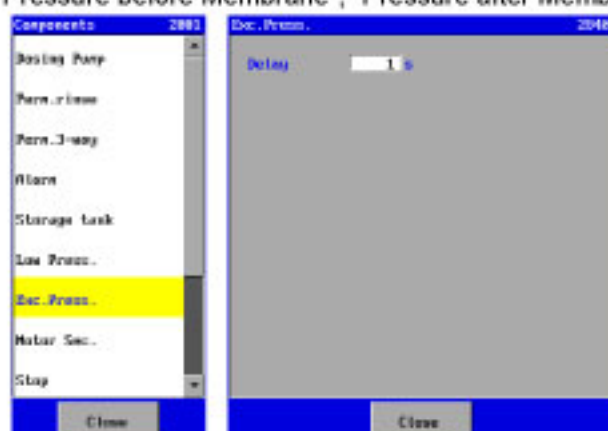


For information about the inventory see § 6.4 "Switches" on page 22.

A delay (0-9999 seconds) and the number of attempts (1-9) can be entered in the window. If the number of attempts is set at 2 or more the interval time between the attempts can entered (1-99 minutes).

6.4.2. Exceeded pressure

The "Exceeded pressure" switch may be placed at a position where an overpressure has to be controlled. This switch is generally placed between the high pressure pump and the membrane. The "Pressure before Membrane", "Pressure after Membrane" and "Pressure permeate" switches may be used in the event an overpressure control has to be made at several positions in the



If the unit is switched off after an overpressure situation these can only be switched on again manually.

For information about the inventory see § 6.4 "Switches" on page 22.

A further delay may be entered (0-9999 seconds) for the monitoring.

6.4.3. Pressure before membrane

The "Pressure before Membrane" switch is placed between the high pressure pump and the membrane. The inventory and programming is the same as for the "Exceeded pressure" switch. See also § 6.4.2 "Exceeded pressure" on page 23.

6.4.4. Pressure after membrane

The "Pressure after Membrane" switch is placed in the concentrate line after the membrane. The inventory and programming is the same as for the "Exceeded pressure" switch. See also § 6.4.2 "Exceeded pressure" on page 23.

6.4.5. Pressure permeate

The "Pressure permeate" switch is placed in the permeate line after the membrane. The inventory and programming is the same as for the "Exceeded pressure" switch. See also § 6.4.2 "Exceeded pressure" on page 23.

6.4.6. Motor security

The "Motor security" switch function is used to connect a thermal protection or motor security switch.



In the programming, it can be set whether the installation must be switched on automatically or manually when the malfunction has been remedied.

For information about the inventory see § 6.4 "Switches" on page 22.

A further delay can be entered (0-9999 seconds) for the monitoring. You may also indicate if the unit is automatically switched on ("Auto switch on"), when the malfunction has been remedied, or the unit has to be switched on manually.



6.4.7. Stop

The "Stop" switch function may be used for various purposes.



The programming can be set to show if the unit has to be switched on automatically or manually, when the malfunction has been remedied.

For information about the inventory see § 6.4 "Switches" on page 22.

A further delay can be entered (0-9999 seconds) for monitoring. It can also be specified if the unit is automatically switched on, when the malfunction has been remedied, or the unit has to be switched on manually.

6.4.8. Concentrate

The "Concentrate" switch is used to connect a flow control switch in the concentrate line, which monitors the concentrate flow.

This function can be used to program a number of attempts for recovery. In this case, the unit will be switched on again automatically after a programmable interval time. The number of attempts is always kept. Should the number of programmed attempts be executed during a process, the unit will be switched off and can be switched on only manually.

If the number of attempts is set at 1 the unit will not switch on automatically.

At the end of a phase ("Production", "Rinse", etc...) the number of attempts is reset to the programmed value.

For information about the inventory see § 6.4 "Switches" on page 22.



A delay (0-9999 seconds) and the number of attempts (1-9) can be entered in the window. If the number of attempts is set at more than 2 the interval time between the attempts can be entered (1-99 minutes).



6.4.9. Regeneration

The "Regeneration" switch can be used to show that a (simplex) water softening system is regenerating. The RO unit will be stopped and switched into the "Regeneration" phase. See § 7.7 "Regeneration" 52 for more information about this phase.

If the switch is no longer activated, the unit will automatically return from the "Regeneration" phase to the interrupted phase.

For information about the inventory see § 6.4 "Switches" on page 22.



A further delay can be entered (0-9999 seconds) for monitoring.

6.4.10. Alarm reset

The "Alarm reset" switch can be used for an alarm output to be switched off remotely.

The switch does not affect the unit's process run.

For information about the inventory see § 6.4 "Switches" on page 22.



A further delay can be entered (0-9999 seconds) for monitoring.

6.5. Tanks

6.5.1. Storage tank

There are two available types of level measuring, namely measurements with level switches (1 or 2) or level measurements with a 0(4)-20mA output that can be connected to a 0-20mA control input (if available).

Level switches



If the level switches are being used, the "Interface Input" will have to be specified.

Two level switches may be placed in a storage tank. A high-level switch (HL) and a low-level switch (LL). For the inventory the level switch that is connected can be indicated.

If both level switches are not connected the unit may only be switched manually in the "Production" phase.

If both switches are connected the unit will be switched in the "Production" phase as soon as the low-level switch is active. The unit will quit the "Production" phase again as soon the high-level switch is active.

If both switches are active (owing to a faulty connection, cable cut or defect in one of the switches) the high-level switch has the highest priority and the unit will switch off.

If only a high-level switch is programmed, the storage tank programming can be used to set a delay before the unit is switched on in the "Production" phase. If the high-level switch is active the unit will move directly out of the "Production" phase. In all other cases no delay has to be set while the storage tank does not appear in the list of components with programmable settings.

Level measurements 0(4)-20mA output



If level measuring with power output is active, the "0-20mA Interface" will be selected.

It will subsequently be possible to select a 0-20mA input. And after that, it will be possible to select the range of the measurement cell (0-20mA or 4-20mA).

If no hardware connection is made, it will only be possible to switch the installation on and off manually.



As far as level measuring is concerned, the power with empty tank and the power with full tank can be specified.

The installation will enter the "Production" phase as soon as the power goes below the level of the one specified for an empty tank. It will leave the "Production" phase as soon as the power level reaches higher than the level specified for a full tank.

6.5.1. Raw water tank

There are two available types of level measuring, namely measurements with level switches (1 or 2) or level measurements with a 0(4)-20mA output that can be connected to a 0-20mA control input (if available).

Attention:

If there is no water in the raw water tank during production or rinsing, an alarm will sound and the installation will be switched off.

No alarm will sound during maintenance or in the standby mode and the installation will not be switched off.

Level switches



If the level switches are being used, the "Interface Input" will have to be specified.

Two level switches may be placed in a raw water tank. A high-level switch (HL) and a low-level switch (LL). For the inventory the level switch that is connected can be indicated.

If one level switch has been programmed, then a delay to disable the installation can be set in the programming of the raw water tank. It can, furthermore, be set if the system automatically turns on when the level is correct again.



Level measurements 0(4)-20mA output

The first screenshot shows the 'Inventory' window with 'Dosing tank' selected. The 'Interface' is set to '0-20mA' and the 'Current range' is '0-20mA'. The second screenshot shows the 'Components' window with 'Dosing tank' selected. The third screenshot shows the 'Dosing tank' configuration window with 'Empty' level set to 5.0m and 'Full' level set to 15.0m.

If level measuring with power output is active, the "0-20mA Interface" will be selected.

It will subsequently be possible to select a 0-20mA input. And after that, it will be possible to select the range of the measurement cell (0-20mA or 4-20mA).

As far as level measuring is concerned, the power with empty tank and the power with full tank can be specified.

6.5.2. Dosing tank

There are two available types of level measuring, namely measurements with a level switch or level measurements with a 0(4)-20mA output that can be connected to a 0-20mA control input (if available).

Level switch

It is possible to have one level switch in a dosing tank (low level).

Please indicate at which exit the level switch should be connected during the inventory.

The first screenshot shows the 'Inventory' window with 'Dosing tank 1' selected. The 'Hardware' is set to 'N2-NC' and the 'NC' is set to 'N'. The second screenshot shows the 'Components' window with 'Dosing tank 1' selected. The third screenshot shows the 'Dosing tank 1' configuration window with 'Delay' set to 4 s, 'Switch off' checked, and 'Auto switch on' unchecked.

You can secure the low-level switch by entering a delay of 0-9999 seconds. Also, it is possible to indicate whether the unit must be switched off when the level in the dosing tank is too low. When the unit is turned off, you can have the unit turn on automatically when the dosing tank is filled up to a sufficient level.



Level measurements 0(4)-20mA output

If level measuring with power output is active, the "0-20mA Interface" will be selected.

It will subsequently be possible to select a 0-20mA input. And after that, it will be possible to select the range of the measurement cell (0-20mA or 4-20mA).

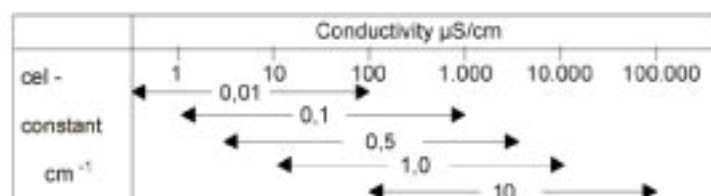
As far as level measuring is concerned, the power with empty dosage tank and the power with full dosage tank can be specified.

Also, it is possible to indicate whether the unit must be switched off when the level in the dosing tank is too low. When the unit is turned off, you can have the unit turn on automatically when the dosing tank is filled up to a sufficient level.

A second dosing tank can be programmed. In the inventory the screen number needs to be increased by 20, and in the programming by 10.

6.6. Conductivity meter / Temperature meter

A conductivity measurement cell may be connected to the controller. The controller has a facility for automatic switching between two measurement ranges. The measurement ranges are dependent on the sensors used and can be set from very pure water under $1 \mu\text{S}/\text{cm}$ to very saline water up to $100 \text{ mS}/\text{cm}$.



Calculating the measurement range:

$$\text{range}_{\min} = \text{cell constant} * 10 \mu\text{S} / \text{cm}$$

$$\text{range}_{\max} = \text{cell constant} * 10\,000 \mu\text{S} / \text{cm}$$

A lower limit can be set for the function control of the conductivity measurement and an upper limit can be programmed for the water quality control. The delay time for any alarm can be programmed. There is also a setting for indicating whether the unit has to be switched off in these cases and automatically switched on again as soon as the conductivity is restored.

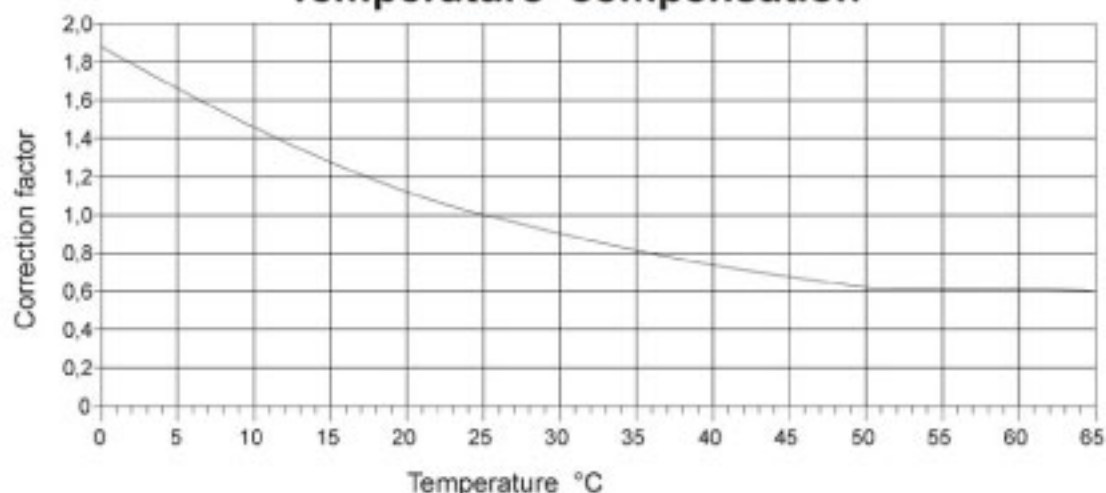
A temperature sensor can be used for the automatic temperature compensation of the conductivity measurement. If no temperature sensor is connected, the manually set temperature is kept.

If a temperature of 25°C is entered the correction factor is equal to 1 and there is no subsequent correction of the conductivity value.

A PT1000 temperature sensor has to be used.

If a temperature sensor is used the measured conductivity value can be automatically corrected. The temperature-dependent correction factor used for automatic or manual compensation can be obtained from the graph below.

Temperature compensation



Example:

Set/measured water temperature:

$$T = 12^\circ\text{C}$$

Measured conductivity values:

$$C_{12} = 100 \mu\text{S}/\text{cm}$$

Correction factor used:

$$K = 1.4$$

Displayed conductivity value:

$$C_{25} = 140 \mu\text{S}/\text{cm}$$

6.6.1. Conductivity permeate

The permeate water conductivity measuring cell is connected to the standard conductivity meter input. If there are multiple conductivity meters (in the case of optional print), then the permeate conductivity measuring cell can be connected to another conductivity meter input (at the inventory), if needed. How to set the conductivity meter is described from § 6.6.5 "Conductivity settings" on page 31.

6.6.2. Conductivity feed

The feed water conductivity measuring cell is normally connected to the optional print with the 2nd conductivity meter. At the inventory, the "Feed Conductivity" function must be connected to this conductivity meter input. How to set the conductivity meter is described from § 6.6.5 "Conductivity settings" on page 31.

With the inventory, the screen number needs to be increased by 10 each time.

With programming the screen number needs to be increase by 40 each time.

6.6.3. Conductivity 3

At the inventory, the "Conductivity 3" function must be connected to this conductivity meter input. How to set the conductivity meter is described from § 6.6.5 "Conductivity settings" on page 31.

With the inventory, the screen number needs to be increased by 20 each time.

With programming the screen number needs to be increase by 100 each time.

6.6.4. Conductivity 4

At the inventory, the "Conductivity 4" function must be connected to this conductivity meter input. How to set the conductivity meter is described from § 6.6.5 "Conductivity settings" on page 31.

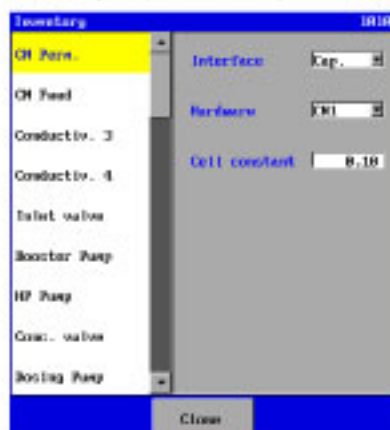
With the inventory, the screen number needs to be increased by 30 each time.

With programming the screen number needs to be increase by 140 each time.

6.6.5. Conductivity settings

In this description, setting a permeate conductivity meter is used as an example. Similar settings apply to other conductivity meters.

It is possible to chose from two types of conductivity measurement cells, namely a passive, capacity measurement cell, or a measurement cell with a 0(4)-20mA output can be connected to a 0-20mA control input (if available).



Capacity (passive) measurement cell

If a capacity measurement cell is used for the conductivity, "Cap" will have to be selected under "Interface".

A conductivity measurement cell may be connected only to a conductivity meter input. In the inventory you can indicate if the conductivity measurement cell is connected and what the sensor cell constant is.



Measurement cell 0(4)-20mA output

If a measurement cell is used with a current supply, "0-20mA" will have to be selected under "Interface". It will subsequently be possible to select a 0-20mA input. After that, it will be possible to select the range of the measurement cell (0-20mA or 4-20mA).



The conductivity meter has extensive programming options.

In addition to the conductivity measurement and monitoring-related settings, the temperature-related settings will also appear, if you use a passive, capacity measuring cell. The temperature measurement is connected to the conductivity measurement and the settings are relevant only if the conductivity measurement cell is also connected.

The window for the conductivity measurement-related settings is again divided into:

- Properties (conductivity measurement properties)
- Temperature (temperature compensation)
- Monitor Min. (monitoring of the minimum conductivity)
- Monitor Max. (monitoring of the maximum conductivity)

6.6.6. Properties conductivity measurement

Capacity (passive) measurement cell

In this window you can set if the measurement value needs to be displayed in $\mu\text{S}/\text{cm}$ or in TDS (ppm). If the unit is set at TDS a factor can be entered (0.50-1.00). A correction to the measured value can also be set (0.01-5.00).

A link can be made to a temperature measurement in the screen above whereby the measured conductivity value is compensated for in terms of temperature. If there is no link to a temperature measurement, then the temperature can be compensated for by means of a hand-operated value.

Measurement cell 0(4)-20mA output

In this window you can set if the measurement value needs to be displayed in $\mu\text{S}/\text{cm}$ or in TDS (ppm).

Furthermore, the measuring range of the measuring cell can be specified. Measured conductivity with minimal current ("Range Min.") and measured conductivity with maximal current ("Range Max.").

We consider that there is a linear characteristic between the current and the measured conductivity for these measurements.



6.6.7. Monitoring minimum conductivity

An electrical interruption of the sensor, electrical faults in the system or air in the sensor can erroneously result in very low conductivity. For monitoring purposes a minimum limit of 0.1 to 1000.0 $\mu\text{S}/\text{cm}$ can be entered.

The image shows two side-by-side screenshots of the 'OH Param.' dialog box. The left window has the 'Monitor' checkbox unchecked, while the right window has it checked. Both windows show the following settings: 'Limit' is 1.0 μS , 'Delay' is 100 s, and 'Switch off' is unchecked. The 'Monitor Min.' field is highlighted in yellow in both. A 'Close' button is at the bottom of each window.

A delay can also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit actually is switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.6.8. Monitoring maximum conductivity

A change to the quality of the supply water or a defective membrane can lead to a change in the water conductivity. For monitoring purposes the maximum limit of 0.2 to 10.000,0 $\mu\text{S}/\text{cm}$ can be entered.

The image shows two side-by-side screenshots of the 'OH Param.' dialog box. The left window has the 'Monitor' checkbox unchecked, while the right window has it checked. Both windows show the following settings: 'Limit' is 10.0 μS , 'Delay' is 100 s, and 'Switch off' is unchecked. The 'Monitor Max.' field is highlighted in yellow in both. A 'Close' button is at the bottom of each window.

A delay may also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.7. Temperature

A temperature sensor can be connected to the controls. This can be linked to a "conductivity cell" for a temperature compensation of the measured conductivity value (see § 6.6.6 "Properties conductivity measurement" on page 32).

Attention:

The temperature sensor must be of the PT1000 type.

6.7.1. Temperature permeate

The permeate water temperature measuring cell is connected to the standard temperature meter input. If there are multiple temperature meters (in the case of optional print), then the permeate temperature measuring cell can be connected to another temperature meter input (at the inventory), if needed. How to set the temperature meter is described from § 6.7.5 "Temperature settings" on page 34.

6.7.2. Temperature feed

The feed water temperature measuring cell is normally connected to the optional print with the 2nd temperature meter. At the inventory, the "Feed Temperature" function must be connected to this temperature meter input. How to set the temperature meter is described from § 6.7.5 "Temperature settings" on page 34.

With the inventory, the screen number needs to be increased by 10 each time.

With programming the screen number needs to be increase by 40 each time.

6.7.3. Temperature 3

At the inventory, the "Temperature 3" function must be connected to this temperature meter input.

How to set the temperature meter is described from § 6.7.5 "Temperature settings" on page 34.

With the inventory, the screen number needs to be increased by 20 each time.

With programming the screen number needs to be increase by 100 each time.

6.7.4. Temperature 4

At the inventory, the "Temperature 4" function must be connected to this temperature meter input.

How to set the temperature meter is described from § 6.7.5 "Temperature settings" on page 34.

With the inventory, the screen number needs to be increased by 30 each time.

With programming the screen number needs to be increase by 140 each time.

6.7.5. Temperature settings

In this description, setting a permeate temperature meter is used as an example. Similar settings apply to other temperature meters.



A temperature sensor can be linked to a temperature input (TMX).

The temperature measurement should be specified in the inventory, that is, at which temperature input it has been connected.

The temperature sensor must be of the PT1000 type..



6.7.6. Temperature measurement properties



This window can be used to indicate how the unit of temperature can be specified (°C or °F).

6.7.7. Monitoring minimum temperature

For minimum temperature monitoring purposes a minimum limit of 1 to 99 °C can be entered.



A delay can also be entered (1-9999 sec). During this delay, the measured value has to be below the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off"). If this is the case you may set if the unit should be automatically switched on again ("Auto. switch on") should the measured value rise above the limit once more.

If the monitoring is not switched ("Monitor") the monitoring will not appear in the programming list of phases.

6.7.8. Monitoring maximum temperatures

For monitoring maximum temperature purposes a maximum limit of 1 to 99 °C can be entered.



A delay can also be entered (1-9999 sec). During this delay, the measured value has to be below the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off"). If this is the case you may set if the unit should be automatically switched on again ("Auto. switch on") should the measured value rise above the limit once more.

If the monitoring is not switched ("Monitor") the monitoring will not appear in the programming list of phases.



6.8. Relative conductivity



The relative conductivity is the ratio between the conductivity of the incoming water (feed) and the conductivity of the permeate water. The relative conductivity is calculated according to the formula: $(\text{Permeate Conductivity} / \text{Feed Conductivity}) * 100\%$

There are extensive programming options for the relative conductivity. The relative conductivity settings will only be visible if the print with the 2nd conductivity meter is present and both the feed and permeate conductivity functions are connected to a conductivity meter.

6.8.1. Properties relative conductivity



In this window, can be set whether or not the relative conductivity value must be displayed in the display.

6.8.2. Monitoring minimum relative conductivity

For monitoring purposes a minimum limit of 1,0 to 100,0 % can be entered.



A delay can also entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit actually is switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.8.3. Monitoring maximum relative conductivity

For monitoring purposes the maximum limit of 1,0 to 100,0 % can be entered.



A delay may also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.9. Recorder outputs

Through optional prints (ca-3rec), three or six recorder outputs (0-20mA) can be added. If the print is connected, then the recorder functions will be displayed in the inventory list. (Recorder 1,2,3,4,5 and 6)



Each output can be set separately within a range of 0-20mA or 4-20mA. Which signals are to be transmitted at the output concerned can be specified next.

All the measured values (conductivity, temperature, relative conductivity, flow and pressure) can be transmitted to the 0-20mA output.



"Activate" must be checked in order to transmit a signal. Next, a range can be specified by entering a minimum and a maximum value. If the measured value of the measurement concerned is lower than (or equal to) the set minimum value, then a current of 0 mA (if the output is set at a current range of 0-20mA) or of 4 mA (if the output is set at a current range of 4-20mA) will be transmitted. If the measured value is higher than (or equal to) the set maximum value, then the output current is 20 mA. If the measured value is within the set measuring range, then the output current will be calculated. The characteristic has a linear coherence.

If a signal is transmitted, then the signal concerned will be checked in the list of the recorder output concerned.



6.10. Flow meter

The flow meters equipped with a 0(4)-20mA output or paddle wheel potentialfree output can be connected to the control panel.

It is possible to specify thresholds for the upper and lower limits, both with a programmable time delay. It is also possible to specify whether the installation should be shut down in case of either positive or negative crossing of the specified values.

If the thresholds are activated, it is possible to send an alarm message when, for instance, the upper threshold is exceeded (this can be either through a relay or with an e-mail (only possible with RGS8x1x-xxx)).

The properties of the flow meters are only visible if the control panel is equipped with prints with 0-20mA inputs (ca-fi-pr-3an) or pulse inputs (ca-pulse).

6.10.1. Flow Feed

This meter indicates the flow for the incoming water.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

6.10.2. Flow Concentrate

This meter indicates the flow for the concentrate water.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

With the inventory, the screen number needs to be increased by 5 each time.

With programming the screen number needs to be increase by 20 each time.

6.10.3. Flow Permeate

This meter indicates the flow for the permeate water.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

With the inventory, the screen number needs to be increased by 10 each time.

With programming the screen number needs to be increase by 40 each time.

6.10.4. Flow 4

This flow measurement is for general use.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

With the inventory, the screen number needs to be increased by 15 each time.

With programming the screen number needs to be increase by 60 each time.

6.10.5. Flow 5

This flow measurement is for general use.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

With the inventory, the screen number needs to be increased by 20 each time.

With programming the screen number needs to be increase by 80 each time.

6.10.6. Flow 6

This flow measurement is for general use.

The way of editing flow measurements is described in § 6.10.7 "Flow meter settings" on page 39.

With the inventory, the screen number needs to be increased by 25 each time.

With programming the screen number needs to be increase by 100 each time.



6.10.7. Flow meter settings

This description cites the properties of flow measurement in the feed water as an example. Similar properties apply for other flow measurements.

It is possible to choose from two types of flow measurement, namely a measurement cell with a 0(4)-20mA output, or a measurement cell with a paddle wheel (potential free) output can be connected (if the optional inputs are available).



Measurement cell 0(4)-20mA output

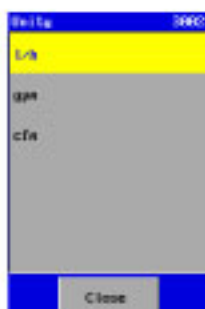
If a measurement cell is used with a current supply, "0-20mA" will have to be selected under "Interface". It will subsequently be possible to select a 0-20mA input. After that, it will be possible to select the range of the measurement cell (0-20mA or 4-20mA).



Measurement cell pulse output

If a measurement cell is used with a pulse output will have to be selected under "Interface" ("p/s"). It will subsequently be possible to select a pulse input. After that, it will be possible to enter the maximum range of the measurement

6.10.8. Properties flow meter



In this window you can set in which unity the measurement value should be displayed. Furthermore, the measuring range of the measuring cell can be specified. Measured flow with minimal current ("Range Min." between 0,0 and 10.000,0) and measured flow with maximal current ("Range Max." between 0,0 and 10.000,0). We consider that there is a linear characteristic between the current and the measured flow for these measurements.



6.10.9. Monitoring minimum flow

For monitoring purposes the minimum limit of 0,1 to 10.000,0 can be entered.

The image shows two side-by-side screenshots of the 'Flow Feed' dialog box for minimum flow monitoring. Both windows have a title bar 'Flow Feed' and a version number '3010'. The left window has the 'Monitor' checkbox unchecked, while the right window has it checked. Both windows show a 'Limit' of 1,0 l/h and a 'Delay' of 10 s. The 'Switch off' checkbox is unchecked in both. The 'Monitor Min.' and 'Monitor Max.' labels are highlighted in yellow in both windows. A 'Close' button is at the bottom of each window.

A delay can also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit actually is switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.10.10. Monitoring maximum flow

For monitoring purposes the maximum limit of 0,1 to 10.000,0 can be entered.

The image shows two side-by-side screenshots of the 'Flow Feed' dialog box for maximum flow monitoring. Both windows have a title bar 'Flow Feed' and a version number '3010'. The left window has the 'Monitor' checkbox unchecked, while the right window has it checked. Both windows show a 'Limit' of 10,0 l/h and a 'Delay' of 1 s. The 'Switch off' checkbox is checked in both. The 'Monitor Min.' and 'Monitor Max.' labels are highlighted in yellow in both windows. A 'Close' button is at the bottom of each window.

A delay may also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.



6.11. Pressure meter

The pressure meters equipped with a 0(4)-20mA output can be connected to the control panel. It is possible to specify thresholds for the upper and lower limits, both with a programmable time delay. It is also possible to specify whether the installation should be shut down in case of either positive or negative crossing of the specified values. If the thresholds are activated, it is possible to send an alarm message when, for instance, the upper threshold is exceeded (this can be either through a relay or with an e-mail (only possible with RGS8x1x-xxxx)).

The properties of the pressure meters are only visible if the control panel is equipped with prints with 0-20mA inputs (ca-fl-pr-3an).

6.11.1. Pressure Feed

This meter indicates the pressure in the feed pipe.
The way of editing flow measurements is described in § 6.11.6 "Pressure meter settings" on page 42.

6.11.2. Pressure BP

This meter indicates the pressure after the booster pump.
The way of editing flow measurements is described in § 6.11.6 "Pressure meter settings" on page 42.
With the inventory, the screen number needs to be increased by 5 each time.
With programming the screen number needs to be increase by 20 each time.

6.11.3. Pressure PU

This meter indicates the pressure after the high pressure pump.
The way of editing flow measurements is described in § 6.11.6 "Pressure meter settings" on page 42.
With the inventory, the screen number needs to be increased by 10 each time.
With programming the screen number needs to be increase by 40 each time.

6.11.4. Pressure Concentrate

This meter indicates the pressure in the concentrate pipe.
The way of editing flow measurements is described in § 6.11.6 "Pressure meter settings" on page 42.
With the inventory, the screen number needs to be increased by 15 each time.
With programming the screen number needs to be increase by 60 each time.

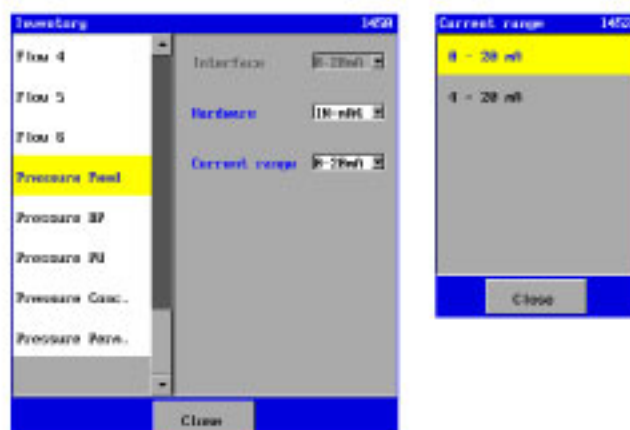
6.11.5. Pressure Permeate

This meter indicates the pressure in the permeate pipe.
The way of editing flow measurements is described in § 6.11.6 "Pressure meter settings" on page 42.
With the inventory, the screen number needs to be increased by 20 each time.
With programming the screen number needs to be increase by 80 each time.

6.11.6. Pressure meter settings

This description cites the properties of pressure measurement in the feed water as an example. Similar properties apply for other pressure measurements.

The 0-20mA input that is connected to the concerned pressure meter can be selected for the inventarisation.



The current range of the pressure meter also has to be specified (0-20mA or 4-20mA).

6.11.7. Properties pressure meter



In this window you can set in which unity the measurement value should be displayed. Furthermore, the measuring range of the measuring cell can be specified. Measured pressure with minimal current ("Range Min." between 0,0 and 10.000,0) and measured pressure with maximal current ("Range Max." between 0,0 and 10.000,0). We consider that there is a linear characteristic between the current and the measured pressure for these measurements.



6.11.8. Monitoring minimum pressure

For monitoring purposes the minimum limit of 0.1 to 10.000,0 can be entered.

A delay can also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit actually is switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.11.9. Monitoring minimum pressure

For monitoring purposes the maximum limit of 0.1 to 10.000,0 can be entered.

A delay may also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.12. pH meter

The pH meters equipped with a 0(4)-20mA output can be connected to the control panel.

It is possible to specify thresholds for the upper and lower limits, both with a programmable time delay. It is also possible to specify whether the installation should be shut down in case of either positive or negative crossing of the specified values.

If the thresholds are activated, it is possible to send an alarm message when, for instance, the upper threshold is exceeded (this can be either through a relay or with an e-mail (only possible with RGS8x1x-xxxx)).

The properties of the flow meters are only visible if the control panel is equipped with prints with 0-20mA inputs (ca-fi-pr-3an).

6.12.1. pH meter settings

The 0-20mA input that is connected to the concerned pH meter can be selected for the inventarisation.

The screenshot shows a software window titled 'Inventory' with a list of components on the left. 'pH 1' is highlighted. The main area shows settings for 'pH 1': Name (None), Interface (0-20mA), Hardware (19-mA), and Current range (0-20mA). A 'Close' button is at the bottom.

The current range of the pH meter also has to be specified (0-20mA or 4-20mA).

6.12.2. Properties pH meter

The screenshot shows a software window titled 'pH 1' with a 'Properties' tab. It contains fields for 'Unit', 'Range Min.' (0.0), and 'Range Max.' (20.0). A 'Close' button is at the bottom.

The measuring range of the measuring cell can be specified. Measured pH with minimal current ("Range Min." between 0,0 en 14,0) and measured pH with maximal current ("Range Max." between 0,0 and 14,0). We consider that there is a linear characteristic between the current and the measured pH for these measurements.



6.12.3. Monitoring minimum pH

For monitoring purposes the minimum limit of 0,1 to 14,0 can be entered.

The image shows two side-by-side screenshots of a software window titled 'pH 3' with a status bar showing '33.00'. The window is divided into two panes. The left pane has a 'Properties' section with 'Monitor Min.' highlighted in yellow. The right pane contains configuration options: a 'Monitor' checkbox (unchecked in the left screenshot, checked in the right), a 'Limit' input field (value 6.8), a 'Delay' input field (value 10 s), and a 'Switch off' checkbox (unchecked in both). A 'Close' button is at the bottom of each pane.

A delay can also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit actually is switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.12.4. Monitoring maximum pH

For monitoring purposes the maximum limit of 0,1 to 14,0 can be entered.

The image shows two side-by-side screenshots of a software window titled 'pH 3' with a status bar showing '33.00'. The window is divided into two panes. The left pane has a 'Properties' section with 'Monitor Max.' highlighted in yellow. The right pane contains configuration options: a 'Monitor' checkbox (unchecked in the left screenshot, checked in the right), a 'Limit' input field (value 6.8), a 'Delay' input field (value 10 s), and a 'Switch off' checkbox (checked in both). A 'Close' button is at the bottom of each pane.

A delay may also be entered (1-9999 sec). During the delay the measured value has to be under the limit so an alarm is given if the unit is switched off.

You can set if the unit is actually switched off ("Switch off").

If the monitoring is not switched on ("Monitor") the monitoring will not appear in the programming list of phases.

6.13. Additional

6.13.1. Additional program

In the case of the "Additional program" the inventory has to specify the relay output this is connected to.



During the subsequent programming of the additional program a time duration can be set between 0 and 9999 (seconds or minutes). If a time of 0 is entered the additional program will be switched on until the end of the phase.



The additional program can be switched on with a delay, after the start of the phase. A delay of 0 to 9999 seconds can be entered.

Attention!

If the additional program is activated in successive phases (such as phase 1 to phase 2 or from the "Production" phase to the "Rinse" phase), the switch-on delay and dosing time will not be reset during the start of the next phase.

See § 7 "RO Unit" on page 47 for activating the additional program during the phases.

For example: § 7.1 RO Unit – Production – Phase 1 – Add.Program.

6.13.2 Additional program 2

See also § 6.13.6.13.1 "Additional program" on page Additional46.

With the inventory, the screen number needs to be increased by 5 each time.

With programming the screen number needs to be increased by 5 each time.

6.13.3 Additional program 3

See also § 6.13.6.13.1 "Additional program" on page Additional46.

With the inventory, the screen number needs to be increased by 15 each time.

With programming the screen number needs to be increased by 10 each time.

7. RO Unit

This chapter will examine the various phases of the RO unit.



The manual control opportunities are explained in § 9 "Manual operation of the unit" on page 57.

7.1. Properties

The general characteristics with regards to the installation can be set in this window.



It can be set in which phase the controls must start after a power failure.

7.2. Production

During the "Production" phase the unit provides treated water: the untreated water generally flows via the inlet valve to the high-pressure pump and then to the osmosis module. A stream of water (concentrate) concentrated with salt flows via the concentrate regulating valve into the sewer. The stream of water, the desalinated water (permeate), flows into a storage tank / consumption points. Possible installation options include multistage installations, concentrate return or permeate discharge valve, which are activated depending on the conductivity.

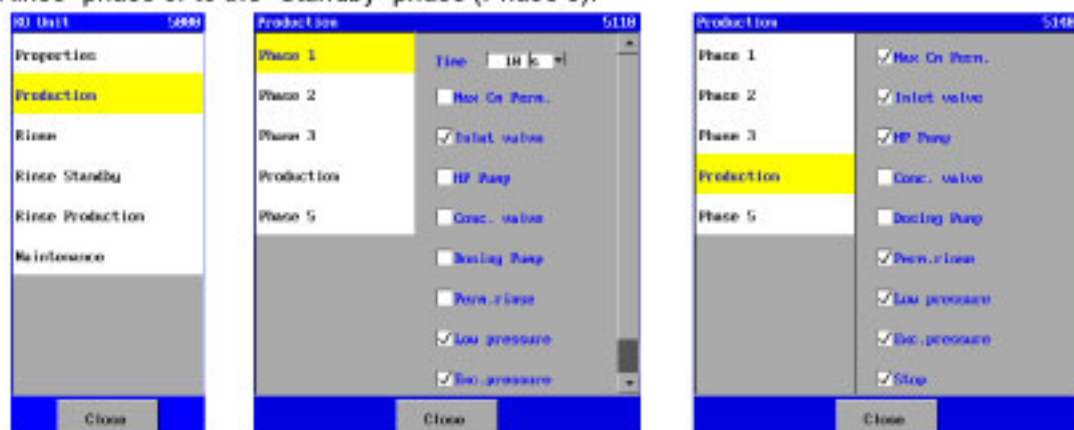
The production of desalinated water can be launched depending on the level switch (s) (HL and LL) or manually. During production a service hour counter will be kept which can be read off under the menu option "Information" (see § 10.5 "Counters" on page 60). A counter will also be kept in connection with maintenance, if this is programmed (see § 22.2 "Maintenance" on page 91). This can be read off in the same window as the service hour counter.

During the "Production" phase the unit may be switched off manually, irrespective of the status of the level switches in the storage tank. The unit will go into the "Rinse" phase (if programmed) or the "Standby" phase. The lower bar in the main window will then show if the unit has been switched off manually. The unit will then no longer be switched on automatically until the unit has been switched on manually again (see also § 9 "Manual operation of the unit" on page 57).



If the "Rinse during Production" phase (see § 7.5 "Rinse during production" on page 50) is activated, the lower bar will show the time remaining until the next rinse. The time is counted in minutes. If the remaining time is under one minute, the time will be counted in seconds.

Prior to the "Production" phase a max. of 3 stages (with a time duration) can be entered (Phase 1, 2 and 3). Subsequent to the "Production" phase 1 stage can be entered to switch over to the "Rinse" phase or to the "Standby" phase (Phase 5).



For each stage you can enter what inputs or limits have to be monitored and what outputs have to be activated. A time has to be entered (0-9999 seconds / minutes) in phases 1, 2, 3 and 5. If a time of 0 is entered the corresponding phase will be omitted.

Attention!

If a permeate valve is connected to a conductivity meter, the valve will be opened or closed during the "Production" phase, depending on the measured conductivity and the settings, if the valve is activated during this phase (see also § 6.1.3 "Permeate rinse valve" on page 18).

7.3. Rinse (after production)

The "Rinse" phase is used, for example, for the displacement of the concentrate after the end of the production cycle. This phase may comprise a max. of 3 stages, each with a time duration of 0-9999 seconds / minutes.



If no rinsing is required after the "Production" phase the phase may be omitted by turning the phase switch off (no check mark in "Activate"). If the phase is activated the various stages can be programmed

For each stage you can enter what inputs or limits have to be monitored and what outputs have to be activated and the time duration of the phase (0-9999 seconds / minutes).

If a time of 0 is entered the corresponding phase will be omitted.

Warning!

Rinsing can only be stopped manually and cannot be controlled by adjusting the level switches.

7.4. Rinse during Standby

The "Rinse during Standby" phase is used, for example, to prevent the modules being affected by bacterial growth during a long "Standby" phase.

The rinse may comprise a max. of 3 stages each with a time duration of 0-9999 seconds / minutes.



If no interval rinse is required during the "Standby" phase this phase may be omitted by switching the phase off (no check mark in "Activate"). If the phase is activated the various stages may be programmed and an interval time may be entered (1-9999 minutes / hours).

For each step you can enter which inputs or limits are monitored, which outputs have to be activated and the time duration of the phase (0-9999 seconds / minutes).

If a time of 0 is entered the corresponding phase will be omitted.

Warning!

Rinsing can only be stopped manually and cannot be controlled by adjusting the level switches.

7.5. Rinse during production

The "Rinse during production" phase is used, for example, to apply a further rinse during a lengthy production cycle if the water is heavily contaminated.

The rinse may comprise a max. of 3 stages each with a time duration of 0-9999 seconds / minutes.



If no interval rinse is required during the "Production" phase this phase may be omitted by switching the phase off (no check mark in "Activate"). If the phase is activated the various stages may be programmed and an interval time may be entered (1-9999 minutes / hours).

For each stage you can enter which inputs or limits are monitored, which outputs have to be activated and the time duration of the phase (0-9999 seconds / minutes).

If a time of 0 is entered the corresponding phase will be omitted.

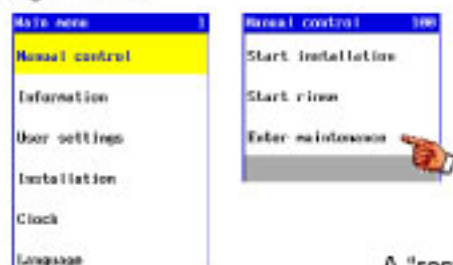
Warning!

Rinsing can only be stopped manually and cannot be controlled by adjusting the level switches.

7.6. Maintenance

The "Maintenance" phase can only be switched on and off manually, in order to clean the membrane with special solutions, for example.

§ 22.2 "Maintenance" on page 91 describes how the "Maintenance" phase can be activated. If this is not activated the phase will not appear in the RO Unit list with phases and cannot therefore be programmed.



If the phase is activated this can be switched on manually ("Enter maintenance") from the "Standby" phase.

A "rest" stage will first of all be switched on.



The actual maintenance can then be started and stopped manually ("Start maintenance" / "Stop maintenance").



You may quit the "Maintenance" phase manually from the "rest" stage ("Exit maintenance").



The maintenance may comprise a max. of 3 stages each with a time duration of 0-9999 seconds / minutes.

For each stage you can enter which inputs or limits are monitored, which outputs have to be activated and the time duration of the phase (0-9999 seconds / minutes).

If a time of 0 is entered the corresponding phase will be omitted.

7.7. Regeneration

The "Regeneration" phase can be used to show that a water softening system is in regeneration. This phase can be activated only if a switch "Regeneration" is configured (see § 6.4.9 "Regeneration" on page 25).

No settings can be programmed for the "Regeneration" phase, while all RO process-related functions are switched off, except "Regeneration" switch monitoring. The level switches monitoring is also switched off.

The unit is automatically switched on again as soon as the "Regeneration" switch is no longer active

7.8. Standby

No settings can be programmed for the "Standby" phase while all RO process-related functions are switched off, except level switches monitoring. If the unit is not automatically switched on at the level switches the unit may be manually switched off and has to be switched on manually again. (see also § 9 "Manual operation of the unit" on page 57).



If the unit is manually switched off this is shown in the lower bar of the main screen ("Manual Stop").

If the "Rinse during Standby" phase (see § 7.4 "Rinse during Standby" on page 49) is activated the lower bar will show the time remaining until the next rinse.

The time is counted in minutes. If the remaining time is less than one minute the time is counted in seconds. If the unit is manually switched off rinsing will not take place.

7.9. Standby Stop

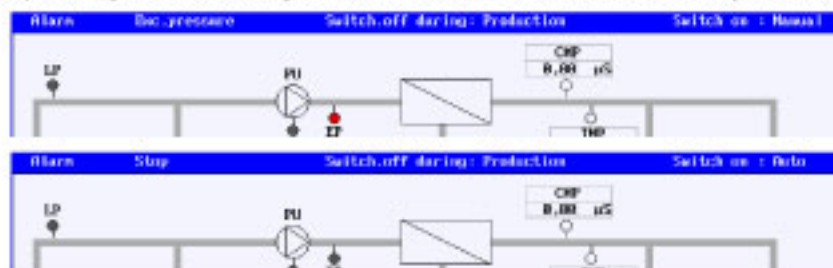
The controller is routinely delivered in the "Standby Stop" phase. The unit will not start up automatically until this is manually switched on (see § 9.1 "Standby stop" on page 57). Once it is switched on, subsequent to a power failure the controller will no longer start up in this phase., unless this is activated via the programming prior to the power failure (see § 7.1 "Properties" on page 47).

Even after new software is installed, the "Standby stop" phase will be activated until the unit is switched on manually.

7.10. Alarm

No settings can be programmed for the "Alarm" phase while all RO process-related functions are switched off, except the monitoring on which the RO process is interrupted. The level switches monitoring is also switched off.

Depending on the settings the unit will switch on automatically or it has to be switched on manually.



The top bar in the main window shows that the "Alarm" phase is activated. Also shown is the cause of the alarm, the way the unit switched on again and the phase, which is interrupted by the alarm situation.



In the case of low pressure or concentrate flow alarm the unit can be automatically switched on after an adjustable interval time (depending on the settings, see § 6.4.1 "Low pressure" on page 22 and § 6.4.8 "Concentrate" on page 24). The window shows the remaining number of attempts and the remaining interval time until the next attempt. When the set number of attempts is reached, this will be shown "Switch on : 0*". In that case the unit has to be switched on manually.

The remaining interval time is displayed in minutes until the remaining time is less than 1 minute, when there is a changeover to a display in seconds.



An alarm, in the alarm window takes the following form:



The window provides the following information:

- line 1 : x/y x = number of the warning, y = number of warnings
- line 2 : brief description of the alarm situation given.
- line 3 : date and time when the alarm occurs
if "uu-uu-uuuu" and/or "uu:uu" is displayed here, then the clock did not get a valid value at the moment.
- line 4 : date and time when the alarm is removed
If the alarm has not yet been removed this is shown by "****".



For example, it is possible to read off in the window the date and time the controller is switched off (line 3) and when it is switched on again (line 4).



8.3. Overview alarms

Shortened display	Description
Backup settings	The last programming changes are not stored. The previous programming is loaded. Check the parameters or load an back-up through a SD Card.
Concentrate	The concentrate flow control switch is active after the set delay.
Default settings	The configuration files on the hard disk are disabled or unavailable The controller has to be configured again or a back-up loaded.
Language file	The language file cannot be read. The English language will be loaded. You can load a backup through a SD Card.
Font file	The font file cannot be read. The standard font will be loaded. You can load a backup through a SD Card.
Multiple files	Multiple files can not be read. You can load a backup through a SD Card.
Press. after Mem.	The pressure switch after the membrane is active after the set delay.
Press. Permeate	The pressure switch in the permeate line is active after the set delay.
Press for Mem.	The pressure switch for the membrane is active after the set delay.
Email	A fault occurred when sending an e-mail.
Low pressure	The low pressure switch is active after the set delay.
Max. CM Perm.	Maximum conductivity limit permeate exceeded.
Max. Temp. Perm.	Maximum temperature limit permeate exceeded.
Min. CM Perm.	Minimum conductivity limit permeate undershot.
Min. Temp. Perm.	Minimum temperature limit permeate undershot.
Max. CM Feed.	Maximum conductivity limit feed exceeded.
Max. Temp. Feed.	Maximum temperature limit feed exceeded.
Min. CM Feed.	Minimum conductivity limit feed undershot.
Min. Temp. Feed.	Minimum temperature limit feed undershot.
Max. CM Rel.	Maximum relative conductivity limit exceeded.
Min. CM Rel.	Minimum relative conductivity limit undershot.
Motor security	The motor security switch is active after the set delay.
Maintenance	Maintenance has to be undertaken on the unit.
Exc. pressure	The overpressure switch is active after the set delay.
ROM settings	The configuration files on the hard disk are disabled or unavailable. The controller has to be configured again or a back-up loaded.
SD: Software Card	The SD card is not appropriate for the data logging or a back-up. The SD card contains original software or "OEM" software.
SD: Card full	Not enough disk space on the SD card
SD: Not present	No SD card available or this does not comply with the specifications.
Stop	The stop switch is active after the set delay.
Power failure	The controller has been switched off.
Set clock	The clock must be set at a valid date/time.
Booster pump	Security switch of booster pump is activated.
High pressure pump	Security switch of high pressure pump is activated.

9. Manual operation of the unit



The unit can be controlled manually.

The main menu's "Manual control" features an overview of the manual operations possible at that time.

The options for each phase are shown below.

9.1. Standby stop



During the "Standby Stop" phase the unit is at a standstill and is not activated until the unit is manually switched on. This window can be used to switch on the unit.

9.2. Maintenance



The "Maintenance" phase can be divided into "non-active" status and "active" status. During "non-active" status the following actions can be applied:

- Start actual maintenance (active status) via "Start maintenance"
- Quit maintenance via "maintenance"

You return to the Standby phase.



During "active" status only this status can be stopped ("Stop maintenance").

9.3. Standby



Various actions can be applied during the "Standby" phase.

- Start production via "Start installation"
This option is not shown if there are level switches and the storage tank is full.
- Start "Rinse during Standby" phase via "Start rinse"
This option is not shown if the "Rinse Standby" phase is not activated or if the unit is manually stopped during production.
See § 7.4 "Rinse during Standby" on page 49.
- Start maintenance via "Enter maintenance"
This option is not shown if the maintenance is not activated or is secured.
See § 7.6 "Maintenance" on page 51 and § 23.1.3 "Process" on page 98.



9.4. Production



Various actions can be applied during the "Production" phase.

- Stop production via "Stop installation"
If there are level switches and the storage tank is empty a warning will appear in the main window to show the unit is manually stopped ("Manual stop").
The unit has to be switched on again manually.
- Start "Rinse during Production" phase via "Start rinse"
This option is not shown if the "Rinse during Production" phase is not activated. See § 7.5 "Rinse during production" on page 50.

9.5. Rinse



Various actions can be applied during the "Rinse" phase.

- Start production via "Start installation"
This option is not shown if level switches are available and the storage tank is full.
- Stop rinse via "Stop rinse"
The rinse is interrupted and the Standby phase is directly activated.

9.6. Rinse during Standby



Various actions can be applied during the "Rinse during Standby" phase.

- Start production via "Start installation"
This option is not shown if level switches are available and the storage tank is full.
- Stop rinse via "Stop rinse"
The rinse is interrupted and the Standby phase is directly activated.

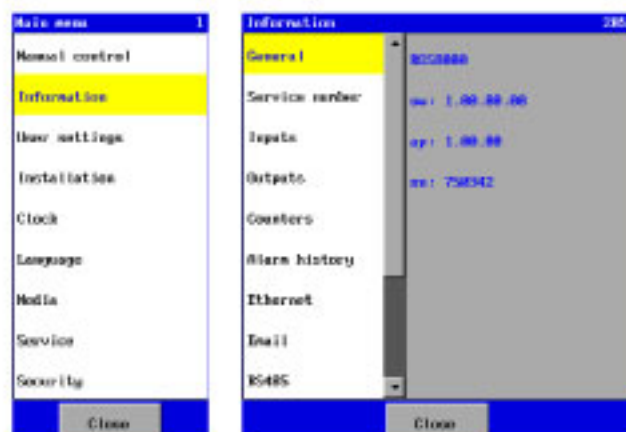
9.7. Rinse during production



Various actions can be applied during the "Rinse during Production" phase.

- Stop rinse via "Stop rinse"
The rinse is interrupted and the Production phase is directly activated.

10. Retrieve information



Various types of data can be retrieved from the information menu, such as: the Software version, the service telephone number, the number of service hours, the status of the inputs and outputs, the alarm history, the maintenance interval (if programmed).

The information menu is located in the main menu.

The various information windows are discussed in the following sections.

10.1. General



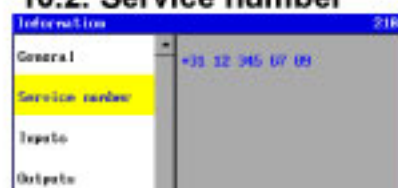
This window shows the Software version and the serial number.

The software is a combined package of various files (including language files) and the application software

- sw: software version of the complete software package
- ap: software version of the application software
- sn: serial number of the controller

The serial number is important for making a back-up on the SD card and for identification during communication (RS232, RS485, Ethernet).

10.2. Service number



The window provides information about the service telephone number, which is programmable as described in § 22.1 "Service number" on page 91.

10.3. Inputs



The window shows the status of the inputs.

A line is established as follows:

<number> <description> <status>

- <number> : indication of input on the print (1="IN 1")
- <description> : brief description of the function
- <status> : input status ("-" input is non-active, "|" input is active)

10.4. Outputs



The window shows the status of the relay outputs.

A line is established as follows:

<number> <description> <status>

<number> : indication of relay output on the print
(1="OUT 1")

<description> : brief description of the function

<status> : output status ("-" relay not activated, "1" relay activated)

10.5. Counters



The window provides information about the number of counters.

The counters that will be shown are:

Service

This is a service hour counter showing the total number of production hours.

The number comprises hhh:mm where "hhh" stands for the number of hours and "mm" for the number of minutes.
No further settings are required for this counter.

Maintenance

This counter indicates how long the unit has been in the "production" phase since the last maintenance. If the counter is not activated it will not be visible.

See also § 22.2 "Maintenance" on page 91.

The number comprises hhh:mm where "hhh" stands for the number of hours and "mm" for the number of minutes.

10.6. Alarm history



The window gives an overview of the last 20 changes in alarm situations. This means a warning will be provided about the occurrence and the removal of the alarm situation.

A warning is established as follows:

<number>	<description>	: number	number of the alarm without any further meaning
		: description	brief description of the alarm situation
<status>		: status	indicates whether the alarm that occurred at that time ("On") or was removed ("Off").
<date>	<time>	: date	date when the change occurred
		: time	time when the change occurred

10.10. RS232



The control type RGS8x1x-xxx has a RS232 port by default. Using this port, information can be sent to a PC, for example. This window displays the settings for the RS232 connection. The serial number is also displayed to identify messages across the RS232 line.

The settings regarding the RS232 port cannot be programmed freely in this control unit.

10.11. Recorder outputs



The currently transmitted current can be read on a recorder in this window. This option is only available if the corresponding optional print ca-3rec is present. If no window function is connected, then no text will be displayed and no current will be transmitted.

10.12. Inputs 0-20mA



This window allows reading the current incoming power supply on a 0-20mA input.

This option is only available when the accompanying optional print ca-fl-pr-3an is present. If there is no function connected to an input, no accompanying text will appear.

10.13. Inputs pulses



This window allows reading the pulses per second on a pulse input.

This option is only available when the accompanying optional print ca-pulse is present. If there is no function connected to an input, no accompanying text will appear.

10.14. Print composition in the controller



The controller comprises multiple PCBs (Printed circuit board).

The window shows what PCBs the controller consists of. This allows you to check if the PCBs are also actually being detected by the software.

The following PCBs may be displayed:

- cb-tft-7 : front circuit board for LCD display and touch panel
- cb-power : power supply circuit board
- cb-cpu-y/1 : cpu circuit board (SD kaart en 8 digitale ingangen)
- cb-cpu-y/2 : cpu circuit board (RS232, RS485, Ethernet, SD kaart en 8 digitale ingangen)
- cb-4relp-3relf(1) : relay circuit board no.1 (4x relay output, 3x relay output)
- cb-1cm-1tm (1) : basic measuring circuit board no.1 (1x conductivity meter and 1x temperature meter) grey : software version of circuit board.
- ca-1cm-1tm (1) : optional circuit board with 2nd conductivity meter and 2nd temperature meter
- ca-fl-pr-3an(1) : optional circuit board with 3 additional inputs (0-20mA)
- ca-fl-pr-3an(2) : 2nd optional circuit board with 3 additional inputs (0-20mA)
- ca-pulse(1) : optional circuit board with 3 additional inputs (pulse, paddle wheel)
- ca-pulse(2) : 2nd optional circuit board with 3 additional inputs (pulse, paddle wheel)
- ca-3rec (1) : optional print with 3 outputs 0-20mA.
- cb-4relp-3relf(2) : relay circuit board no.2 (4x relay output, 3x relay output)
- cb-1cm-1tm (2) : basic measuring circuit board no.2 (3rd conductivity meter and 3rd temperature meter) grey : software version of circuit board
- ca-1cm-1tm (2) : optional circuit board on 2nd basic measuring board with 4th conductivity meter and 4th temperature meter
- ca-fl-pr-3an(3) : optional circuit board on 2nd basic measuring board with 3 additional inputs (0-20mA)
- ca-fl-pr-3an(4) : 2nd optional circuit board on 2nd basic measuring board with 3 additional inputs (0-20mA)
- ca-pulse (3) : optional circuit board on 2nd basic measuring board with 3 additional inputs (pulse, paddle wheel)
- ca-pulse (4) : 2nd optional circuit board on 2nd basic measuring board with 3 additional inputs (pulse, paddle wheel)
- ca-3rec (2) : optional circuit board on 2nd basic measuring board with 3 additional outputs 0-20mA.

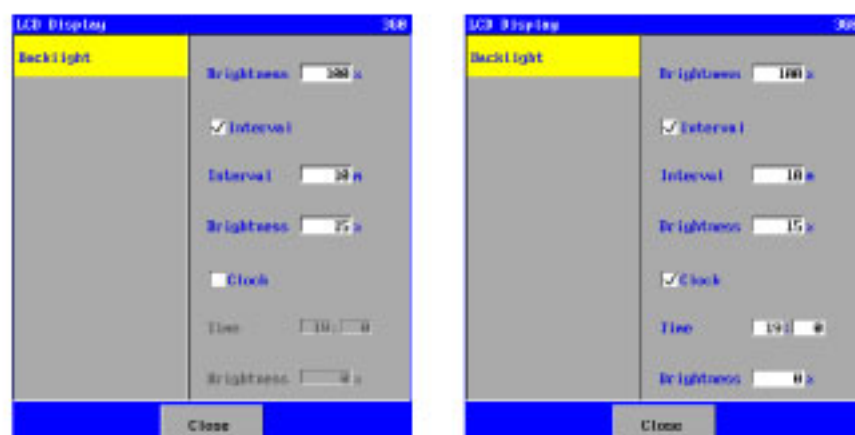
11. User settings

11.1. LCD Display

The control unit has lighting in the LCD Display.



In this window you can specify the brightness of the lightning.



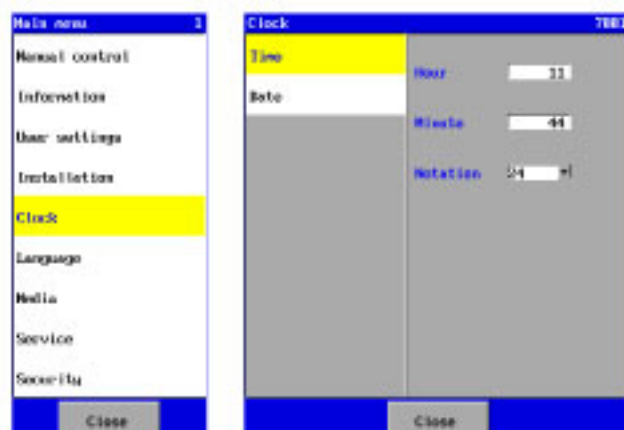
Furthermore you can specify in this window whether the lighting should be dimmed or switched off (=0%) when the touch panel is not used for longer than a certain period of time.

Also you can specify whether the lighting should be dimmed or switched off (=0%) after a programmed time.

When the touch panel is used after this time, the lightning will be switched on for the selected interval time (when interval time activated). After this time, the dim level as programmed for the interval time will be activated.

12. Clock

12.1. General

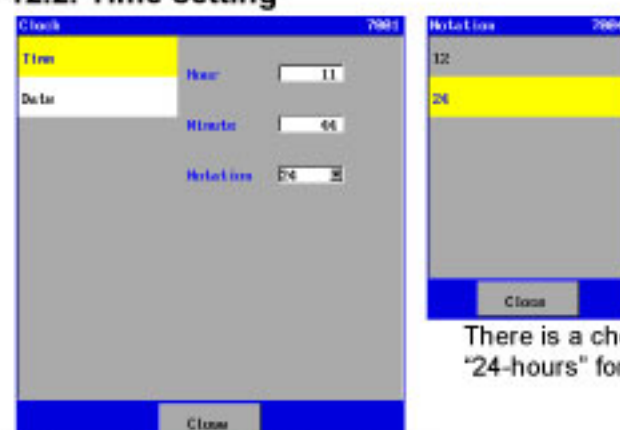


The time and date can be set in the controller.
The time and date are used in various functions, such as data "logging".

The clock setting option is located in the main menu.

The controller has a battery so the time and date can be kept. If the controller is switched on again the time and date have to be reset. In the case of summer time and winter time, the time and date have to be adjusted manually.

12.2. Time setting



The time setting window can be used to change the hours, minutes and time format. The general operation for entering a value (see § 4.3.1 "Set value or text" on page 9) is used to change the hours and minutes.

The general operation for making a choice from a list (see § 4.3.3 "Set dropdown list" on page 9) is used to change the time format.

There is a choice between a "12-hours" ("03:34 AM") and a "24-hours" format ("16: 54").

The changed time is directly up-to-date.
The time format will also apply directly. However, this is not stored when you quit the main menu.

12.3. Date setting



The date setting window can be used to change the years, months, days and the date format.

The general operation for entering a value (see § 4.3.1 "Set value or text" on page 9) is used to change the years, months and days.

The general operation for making a choice from a list (see § 4.3.3 "Set dropdown list" on page 9) is used to change the date format.

There are three formats to choose from.

The changed date is directly up-to-date. The data format will also apply directly. However, this is not stored when you quit the main menu.



The control unit also checks whether the date is correct (year > 2009).

If this is not the case, then a message will be displayed in the alarm window that the clock must be set.

Attention!

To change the current time and/or date via internet, you should use the "terminal" mode. The time and date format can be changed via the internet with both the "terminal" mode and "configurator" mode. See § 21.6.2 "Terminal" on page 88 and § 21.6.3 "Configurator" on page 88.

13. Language setting



The controller offers you the opportunity to choose from different languages.

The language setting option is located in the main menu.

13.1. Change language setting



Select the required language.



You will then be asked to confirm your choice.

The texts in the menu are immediately changed in the changed language. The language setting is not, however, stored after you quit the main menu.

Attention!

The "terminal" mode has to be used to change the language. See § 21.6.2 "Terminal" on page 88.

14. Ethernet

Attention ! This chapter only applies to control unit type RGS8x1x-xxxx.

The controller is suitable for communicating via Ethernet. The web server on the controller allows information to be exchanged with the controller via a web browser (such as Internet Explorer) (see also § 21 "Internet" on page 85).

In order to adapt the controller the Ethernet connection has to be set correctly.



This chapter will explain how the Ethernet connection can be set.

The Ethernet menu is located in the main menu.

14.1. Configuration

14.1.1. DHCP function



The controller has a "DHCP" function. This function is enabled when option "Autom. IP (DHCP)" has been activated.

When the controller starts up, a check is made for roughly 5 seconds to see if a DHCP server is

available on the network and if an IP address is automatically assigned. If there is no DHCP server the set IP address is used (see § 14.1.2 "IP address" on page 67). In that case the "Autom. IP (DHCP)" option should be turned off.

If the IP address is automatically assigned via an DHCP server, the IP address is read off via the information menu (see § 10.7 "Ethernet" on page 61).

14.1.2. IP address

The IP address is the controller's address within the network to which the controller is connected.

The first 3 numbers are normally the same for all connected components on the network.

The final number has to be unique within the network.



In the window the IP address is entered after "IP".

The controller also has a DHCP function (see § 14.1.1 "DHCP function" on page 67) to check if the controller is automatically assigned an IP address from a DHCP-server (in a router, for example).

If this is the case, the IP address set here is not used. The automatically assigned number can be read off in the information menu (see § 10.7 "Ethernet" on page 61).



14.1.3. Subnetmask

The screenshot shows a configuration window titled 'Ethernet' with a status bar '0100'. Below the title is a checkbox labeled 'Auton. IP (DHCP)'. The main area contains four rows of input fields: 'IP' (192, 168, 1, 5), 'NM' (255, 255, 255, 0), 'GW' (192, 168, 1, 254), and 'Port' (80). The 'NM' row is highlighted in blue.

In the window the subnetmasker is entered after "NM".

This generally has to be set as 255.255.255.0, showing that the first 3 numbers of an IP address, within the network, have to be the same and the final number has to be unique.

14.1.4. Default gate-way

The screenshot shows the same configuration window as in 14.1.3. The 'GW' row is highlighted in blue, showing the default gateway address 192.168.1.254.

In the window the address of the standard gateway is entered after "GW".

The address has to be set in the IP address of the appliance (router or modem, for example) connecting the network with another network (such as the internet).

14.1.5. HTTP port number

The screenshot shows the same configuration window. The 'Port' row is highlighted in blue, showing the port number 80.

The port number 80 is routinely used for the internet (World Wide Web).

The port numbers 1 to 1023 are officially reserved but may be set, if necessary.

The port number may have to be changed if, for example, 2 controllers are placed behind a modem or router that both have to be accessible via the internet. In the router or modem another port has to be earmarked for both controllers.

A corresponding port number then has to be entered in the window.

If a port number other than port 80 is used then a colon and port number have to be entered in the browser's URL bar, after the IP address or domain name. For example: 198.162.0.10:1024 for the use of port number 1024.

Attention!

The changed port number becomes active only if the controller is switched off and switched on.

14.2. Access via internet (WAN)

Here it is indicated how the modem can be set to be granted access to the controls via the internet (WAN). It further describes how the IP address of the modem can be traced on the internet.

The modem is connected to two networks, namely the internet (WAN = Wide Area Network) and the local network (LAN = Local Area Network). The modem has an IP address in both networks. To gain access via the internet to the control, a so-called "NAPT entry" (Network Address Translation) must be created in the modem.

Thus the modem will know to which IP address in the local network the incoming messages are to be transmitted.

If the DHCP (DHCP = Dynamic Host Configuration Protocol) server is activated in the modem, the IP address of the controller (which is accessible via the internet) must be reserved ("DHCP lease"). The controls are then always assigned the same IP address. This is necessary because only a fixed IP address can be specified in the "NAPT entry" to control the internet access.

Below is a schematic example of a configuration. Here the "PC-1" and "modem-1", for example, are placed in the office of the supplier of the installation.

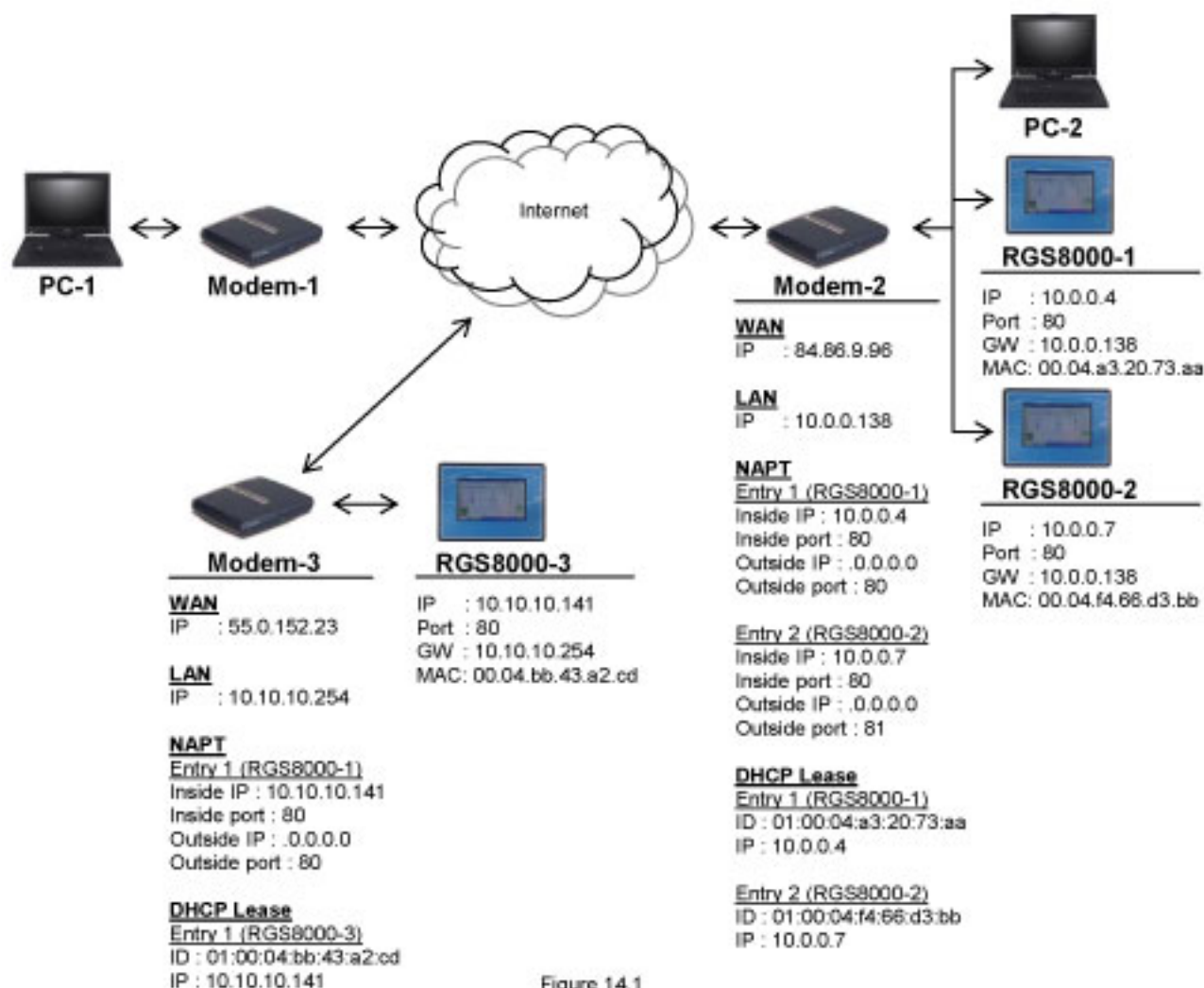


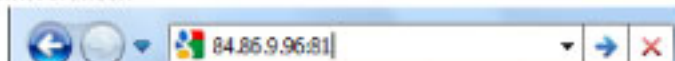
Figure 14.1

Examples:

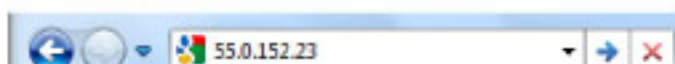
1) If you want to connect from your PC (PC-1) with control RGS8000-1 then you must enter the following in the URL bar of the internet browser:



2) If you want to connect from your PC (PC-1) with control RGS8000-2 then you must enter the following in the URL bar of the internet browser:



3) If you want to connect from your PC (PC-1) with control RGS8000-3 then you must enter the following in the URL bar of the internet browser:



14.2.1. IP address of the modem (WAN)

The IP address of the particular modem on the internet can be obtained by inserting <http://www.whatismyip.com> in the URL bar of the browser on a computer that is connected to the local network "behind" the particular modem. A web page will appear with the IP address of the modem. This address must be used to access the control via the internet. If this is done on, for example, PC-2 (see Figure 14.1), then the IP address "84.86.9.96" will be displayed. This IP address is not adjustable.

14.2.2. IP address of the modem (LAN)

The modem is equipped with a specific IP address in the local network. This IP address can eventually be modified, but this is not really common. This IP address can be found in the instruction manual of the modem. The modem can subsequently be connected to a PC.

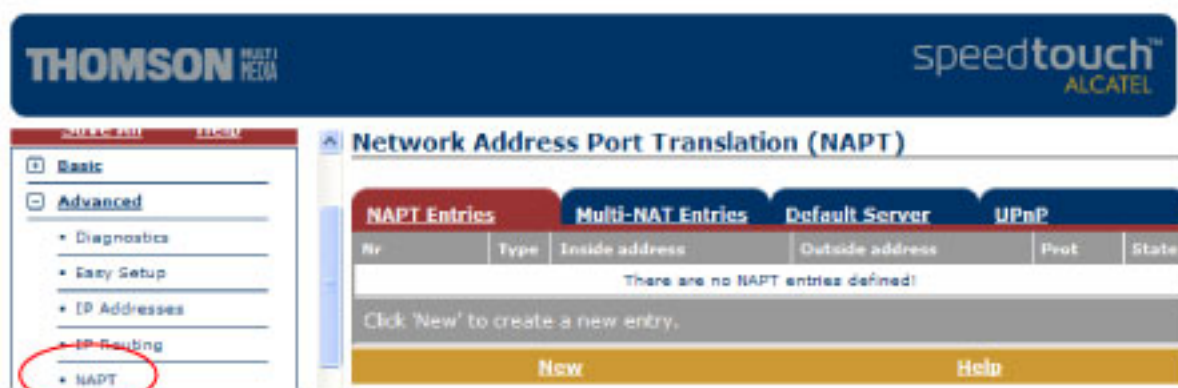
The IP address of the PC should be set so that it can communicate with the modem. To connect to the modem, the IP address of the modem must be entered in the URL bar of the browser (for example, Internet Explorer).

14.2.3. NAPT

A "NAPT Entry" ("Network address port translation") is to be set in the modem. This will give access to the control of the internet. The IP and port number of the control are specified in the "NAPT entry". See § 14.2.2 "IP address of the modem (LAN)" on page 70, how to make a connection between a PC and the modem.

If you have two controls in the local network that should be accessible via the internet, they must communicate via the internet through different ports. Standard communication is via port 80. The modem will transmit the incoming messages (from the internet) directly to the control with a specific IP address and port number in the local network.

Example with a Speedtouch 520i modem:



Open "Advanced" in the menu and click subsequently on "NAPT". Make a "NAPT Entry" by clicking on "New".

NAPT Entries		Multi-NAT Entries		Default Server		UPnP	
Nr	Type	Inside address	Outside address	Prot	State		
1							

Specify following properties and click 'Apply' to commit.

NAPT properties:

Protocol:	tcp		
Inside IP:	10.0.0.4	Inside Port:	80
Outside IP:	0.0.0.0	Outside Port:	80

Buttons: Apply, Clear, Help

Enter the IP address (in this example: 10.0.0.4) and port number (in this example: 80) of the control that should be accessible via the internet.

If several controls should be accessible via the internet, then one should make use of the ports. The setting "Outside Port" should be set differently for each control. This port number should then be used in the URL bar of the browser of the PC (also see the examples given in Figure 14.1).

Save the settings by clicking on "Save All".

Buttons: Save All, Help

Menu: Basic

14.2.4. DHCP Lease

If the DHCP server in the modem is activated (see also § 14.1.1 "DHCP function" on page 67), a so-called "DHCP Lease" must be created. This establishes that the modem always assigns a fixed IP address to a particular device (in this case the control) in the local network. The IP address should be equal to the IP address (Inside IP) that is set in the "NAPT entry". See § 14.2.2 "IP address of the modem (LAN)" on page 70, how to connect a PC to the modem.

Example with a Speedtouch 520i modem:

Open "Advanced" in the menu and then click on DHCP. It is subsequently indicated in the "Server Config" window whether the DHCP server is enabled. If so, then the following steps must be performed.

Click on "Server Leases" and an overview of the set "Leases" will be displayed. Click on "New" to create a new "Lease".

Enter "01" in "Client ID" then and thereafter the MAC address (see § 10.7 "Ethernet" on page 35) of the control and enter the IP address of the control in the "Client IP Address". Then on "Apply".

The adjacent represented overview will now be displayed.

Save the settings by clicking on "Save All".



15. SD card

The SD card function can be used for various purposes such as changing application software, making "OEM" software, storing alarms, measurement data and process data.

This chapter will explain how this can be set and how the cards are organised in relation to the directory structure.

For the specifications of the SD cards see § 36 "Technical specifications" on page 113.

15.1. Arrangement of the cards

A separate card has to be created for each SD card application.

The following types of cards may be distinguished:

- cards with original software
- cards with "OEM" software
- cards with software back-ups and log files

One card type may display data about different types of controllers.

For example, one card with original software may feature the original software of both type RGS3000 and type RGS8000 controllers, etc....

The distinction is made to keep the cards of the installer (OEM) and end user separate. A SD card can also be kept in which only original software is placed.

15.2. Directories

Below is a description of where the files are stored on a SD card.

The files are invariably stored in pre-defined directories.

The directory structure is as follows:

Original software	: X:\ <controller type> \ software \ original \ Vxxxxxx_xx
OEM software	: X:\ <controller type> \ software \ oem \ Vxxxxxx_xx
Back-up software	: X:\ <controller type> \ software \ back-up \ Vxxxxxx_xx_jjmmdd
Alarm log files	: X:\ <controller type> \ log \ <sssss> \ alarm
Data log files	: X:\ <controller type> \ log \ <sssss> \ data
Process log files	: X:\ <controller type> \ log \ <sssss> \ process

Explanation:

X:\	= Main directory of the SD card
Vxxxxxx_xx	= Software version number
Vxxxxxx_xx_jjmmdd	= Software version number with date of the back-up
<controller type>	= for example RGS3000, RGS8000, etc...
<sssss>	= The controller's serial number. Each serial number consists of 6 digits

Attention!

Any departure from this directory structure could result in the software failing to identify the card so the card's data cannot be read.



15.3. Software files

The controller is routinely delivered with the latest Software version (at that time).

If further changes are subsequently made in the software the software may be adapted by copying the original software to a SD card and loading via the Boot program in the controller (see § 26 "Boot software" on page 101). Get in touch with your supplier to obtain the latest version.

Once the original software is loaded, the controller will be reset to the factory settings.
You need to reset the controller with the settings you require.

After the settings have been changed, these settings may be stored together with the software as a back-up. The back-up may be used, for example, to secure the settings of a, normally, properly functioning unit, prior to making settings or software-related changes.

To make a back-up see § 19.2 "Back-up by the end user " on page 80.

If the back-up made has to be replaced you may use the boot program again (see § 26 "Boot software" on page 101).

15.4. Log functions

There are three types of log functions: alarm logging, data logging (status / measurements) and process information logging. As for how these can be set, first of all the SD card function has to be switched on to access the log functions. See the windows below.



Attention!

The SD card function has to be switched off before the SD card can be removed from the controller.

This is to prevent the files from becoming unreadable.
Files in XML format are therefore correctly closed.

15.4.1. Alarm log function

If an (alarm) warning has occurred in the system, the warning may be stored in the SD card. The "Alarm Log" option then has to be chosen in the "Log" menu.



The alarm log function can be activated via this window and the "format" of the information sent can be specified. The information can be stored in CSV format and in XML format.

The size of the file may vary somewhat. About 100 bytes can be counted for each alarm.

For more information about the log function, see § 20.1 "Alarm" on page 81.

15.4.2. Data log function

In order to check the quality of the water at a later time, for example, the measurement value can be logged.

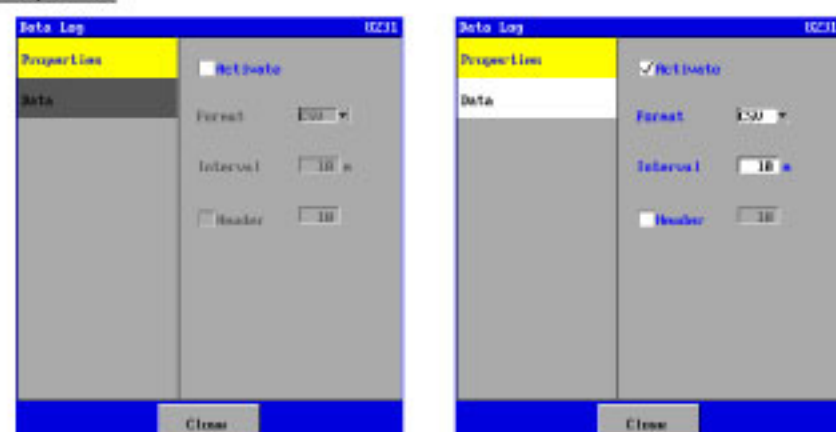


Towards this end, the data log function has to be activated (in "Properties" option).

CSV: For all data logging roughly 100 kB a day.

XML: For all data logging roughly 200 kB a day.

Properties



The "Properties" option is used to activate the data log function and to specify the "format" of the stored information. The information can be stored in CSV format and in XML format.

An interval time of between 1 and 9999 minutes may be specified for logging.



The "Header" field (appears only if the CSV format is set) can be used to indicate if an information line has to be added after a specific number of lines with status / measurement information (in the above example after 10 lines). An interval of between 1 and 999 lines may be specified. The data is separated by a comma. For more details about the log functions and the format type see § 20.2 "Data information" on page 82.

Data



The "Data" option is for setting which data is logged.

For this the field of the corresponding function has to be "checked". The status of the measurement value of the corresponding function will then be featured in the information line.

15.4.3. Process log function



This window can be used to activate the process log function. The data is stored in ASCII format and cannot be set. The format appears as follows:
date time unit (sub) process

If the controller has been voltage free this is also indicated in the file, with the date and time the controller was switched on and off.

The size of the file may vary somewhat. Roughly 50 bytes can be counted on for each process change or power failure.

For more information about the log function see § 20.3 "Process data" on page 84.

16. E-mail

Attention ! This chapter only applies to control unit type RGS8x1x-xxxx.



The controller can be used to send e-mails with (alarm) warning. The options will be explained in this chapter as well as how the controller has to be set.

The e-mail menu is located in the main menu.

The configuration can be set via the "Properties" option. The situation in which an e-mail is sent can be set via the "Log" option.

16.1. Configuration

To send e-mails a number of parameters have to be set in the controller.



In this window the following items have to be set:

- Switch on / off e-mail function
- E-mail address of the recipient
- IP address of SMTP-server

16.1.1. Switch on / off e-mail function



The e-mail function can be switched on and off in the window via the "Activate" option.

If the option is "checked" the function is switched on and the various programmable settings are accessible.

16.1.2. IP address of SMTP server

To send an e-mail the IP address of the internet provider's SMTP-server is required for the local internet connection.



Generally speaking, only the domain name of the SMTP-server is known. This can be found in your "e-mail account", for example (such as "Outlook"), the address specified in the SMTP-server.

<http://www.whatsmyip.org/whois/>, for example, allows you to search for the related IP address of the SMTP server by entering the domain name.

16.1.3. E-mail sender

The controller will send an e-mail with a specific sender name. In this case the sender is therefore the controller.

The controller will compose the name from the name of the controller (for example, RGS8000) and the controller's serial number. "@wxs.nl" is routinely added to this.

The name of the sender cannot be set by the user.

Example: RGS8000_752032@wxs.nl.

E-mail sent by a RGS8000 type controller with serial number 752032.

16.1.4. E-mail address of the recipient



There is an option to enter the e-mail address of the recipient (where the controller has to send the-mails).

An e-mail address with up to 55 characters may be entered.

16.2. Log functions

If an (alarm) warning has occurred in the system a warning can be given via e-mail. The "Log" option then has to be chosen in the "Email" menu.



16.2.1. Alarm log function

If an (alarm) warning has occurred in the system a warning can be given via e-mail. The "Alarm Log" option then has to be chosen in the "Log" menu.



If the alarm log function is activated (in "Properties") option the "Alarms" option will be automatically displayed.

Properties

The "Properties" option allows the alarm log function to be activated and the "format" of the information sent to be specified (only the CSV format is available at the present time).



The message in the e-mail is established as follows:

date, time, status of the warning (on/off), description of the warning,
phase where the warning occurred (where relevant).

For more information about the log function see § 20.1.1 "CSV format" on page 81.

Warnings



The "Alarms" option can be used to set which (alarm) warnings will require an e-mail to be sent.

For this, the field for the corresponding warning has to be "checked".

An e-mail will then be sent at the time the situation occurs and when the situation is removed.

17. RS485

Attention ! This chapter only applies to control unit type RGS8x1x-xxxx.



The controller has an RS485 connection.

The RS485 connection can be used for data logging (status / measurement), alarms and process data. This chapter will explain how this can be set.

The RS485 menu is located in the main menu.

17.1. Configuration

17.1.1. Configuration in the controller

The configuration of the RS485 connection is fixed and cannot be programmed.
The connection is configured as follows:

- Baudrate 9600 Baud
- Data bits 8
- Parity No
- Stop bits 1

17.1.2. Configuration of the "Hyperterminal"

The controller can be connected with a PC by means of an RS232 / RS485 converter, which is not included in the delivery. For example, a "Hyperterminal" can be used to consult and possibly store the data sent by the controller. "Hyperterminal" is routinely available in "Windows" under "Desktop accessories – Communications".

17.2. Log functions

There are three types of log functions: alarm logging, data logging (status / measurements) and process information logging.

Below is an explanation of how these can be set.

17.2.1. Alarm log function



If an (alarm) warning has occurred in the system a warning may be given via the RS485 connection on a PC, by means of an RS232 / RS485 converter, which is not included in the delivery.

The "Alarm Log" option then has to be chosen in the "Log" menu.

The alarm log function is activated in this window and the "format" of the information sent can be specified (only the CSV format is possible at the present time).

date, time, status of warning (on/off), description of the warning,
phase where the warning occurred (where relevant).

For more information about the log function see § 20.1.1 "CSV format" on page 81.



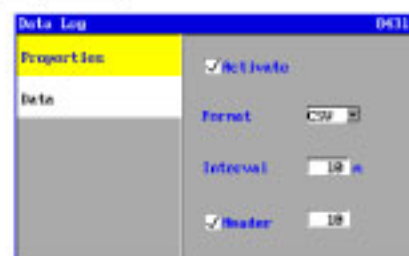
17.2.2. Data log function



In order to check the quality of the water at a later time, for example, the measurement value can be logged.

Towards this end, the data log function has to be activated (in "Properties" option).

Properties



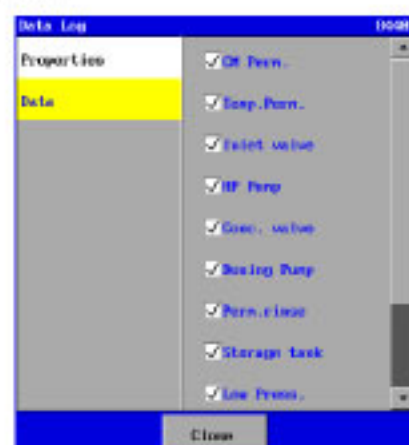
The "Properties" option is used to activate the data log function and specify the "format" of the information sent (only the CSV format is possible at the present time).

An interval time of between 1 and 9999 minutes may be specified for logging.

The "Header" field (appears only if the CSV format is set) can be used to indicate if an information line has to be added after a specific number of lines with status / measurement information (in the above example after 10 lines). An interval of between 1 and 999 lines may be specified. The data is separated by a comma.

For more details about the log functions and the format type see § 20.2.1 "CSV format" on page 83.

Data



The "Data" option is for setting which data is logged.

For this the field of the corresponding function has to be "checked". The status of the measurement value of the corresponding function will then be featured in the information line.

17.2.3. Process log function



This window can be used to activate the process log function.

The data is sent in ASCII format and cannot be set. The format appears as follows:
date time unit (sub) process

If the controller has been voltage free this is also indicated in the file, with the date and time the controller was switched on and off.

For more information about the log function see § 20.3 "Process data" on page 84.

18. RS232

Attentie ! Dit hoofdstuk is alleen van toepassing voor de besturing type RGS8x1x.



The control unit has a RS232 connection. This RS232 connection can be used for logging data (status/measurements), alarms and process data.

The settings and options for the RS232 connection are equal to the options for the RS485 connection. How everything can be set can be seen in chapter § 17 "RS485" on page 78.

In that case the screen number needs to be increased by 200 each time.

19. Hard disk

The controller features a memory used as a hard disk.

When software files are being installed items such as languages and web pages are written to the disk. The settings are also stored here as well as the last 20 alarms.

The hard disk data may be copied to a SD card.

There are two copying functions:

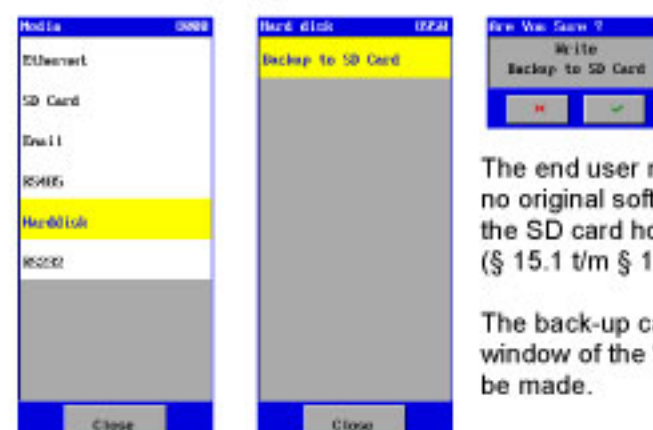
- Copying function for the fitting contractor
- Copying function for the end user

19.1. Back-up via the fitting contractor

This can be done by the fitter for standard units, which nearly always have to be set the same, so the settings have to be made only once after the new software is installed. These can then be stored on a separate SD card with OEM software, see also "SD card" on page 72 (§ 15.1 t/m § 15.3). The SD card can then be used to copy the data to corresponding units.

§ 22.5 "Hard disk" on page 92 describes how "OEM back-up" can be achieved.

19.2. Back-up by the end user



The end user may also make a back-up. A SD card on which no original software or "OEM software" is stored is placed in the SD card holder, see "SD card" on page 72 (§ 15.1 t/m § 15.3).

The back-up can be made via the "Media" menu. If the window of the "Harddisk" option is opened, the back-up can be made.

20. Logging

The controller allows various data to be logged

The data may be written to a file on the SD card or sent via e-mail, RS232 or RS485.

The following data may be singled out:

- Alarm data
- Data information (measurement and status data)
- Process data

Depending on the medium used, alarm and data information may be generated in the following formats:

- CSV format can be imported into Excel
- XML format can be directly read off in Excel (e.g. Excel 2007).

The process data is recorded in a fixed text format.

The following table shows what data can be recorded for each medium and what recording format is available.

	CSV	XML
RS485 / RS232		
Alarm	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Measurem. / states	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SD Card		
Alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Measurem. / states	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E-mail		
Alarm	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Measurem. / states	<input type="checkbox"/>	<input type="checkbox"/>

20.1. Alarm data

Alarms that are given can be recorded via various media (SD card, e-mail or a serial port (such as RS232 or RS485)). Alarms are routinely recorded.

Alarms are recorded including the date and time the alarm occurred.
The moment when the alarm situation was removed is also recorded.

20.1.1. CSV format

If the alarms are recorded in CSV format the structure will be as follows:

<Day -Month-Year>, <Hour: Minute>, <On/off >, <Warning >, <Process>

Example:

09-01-2009,13:15, On, Power failure
09-01-2009,13:30, Off, Power failure
09-01-2009,15:30, On, Exceeded pressure (RO Unit: Production)

It can be seen from the above data that controller failed on 9 January 2009 at 13:15 and switched on again at 13:30. At 15:30 there was an exceeded pressure alarm during the production process.

Example of a file name:

AL100204.CSV : This file contains alarm log data from 04-02-2010 in CSV format.



20.1.2. XML format

If the alarms are recorded in XML format the structure will be as follows:

```
<standard XML header>(< ?xml version="1.0" encoding="UTF-8"?>)
<data>
  <object <date > <time > <status> <warning > <process> />
</data>
```

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<data>
  <object Date="09-10-2009" Time="13:30" Alarm="Off" Warning ="Power failure " />
  <object Date="09-10-2009" Time="13:30" Alarm="Off" Warning ="Exceeded pressure, RO Unit; Production 1 " />
</data>
```

It can be seen from the above data that controller was activated on 9 January 2009 at 13:30. In the case of an exceeded pressure alarm, for example, the warning also shows the phase (such as Production 1) when the alarm occurred.

Example of a file name:

AL100204.XML : This file contains alarm log data from 04-02-2010 in XML format.

Attention!

If XML format is used for storage on an SD card, the file can no longer be used if the alarms logger is switched off or the SD card is deactivated. See § 15.4 "Log functions" on page 73 for more information about the switching on and off of the SD card.

20.2. Data information

The data information (measurement and status data) can be recorded via various media (SD card or serial port (bv.RS485)). The type of data and the type of format (only for SD) can be set separately for each medium. The data is recorded including the date and time.

The data is indicated as follows:

- Valves, pumps, alarm and extra program
 - 0 = turned off,
 - 1 = turned on
- Switches
 - 1 = not active,
 - 2 = active but has not passed delay time
 - 3 = still active after delay time
- Tanks (supply tank and dosing tank)
 - 0 = empty
 - 2 = half full
 - 3 = full
- Measurements (level of conduction, temperature)
 - Measured value is indicated.



20.2.1. CSV format

If the data is recorded in CSV format the structure will be as follows:

<Day-Month-Year>, <Hour: Minute>, <Data 1><Data n>

When the controller is started up or the record is activated a "header" is first of all produced to indicate what the corresponding data means. You can set whether the header should be repeated after a number of data lines. See § 15.4.2 "Data log function" on page 74 (SD Card) and § 17.2.2 "Data log function " on page 79 (RS485).

The header shows what component the recorded data refers to.

The header line is established as follows:

Date, Time, xx, yy, zz,.....

xx, yy, zz, are abbreviations of the selected logging functions.

For information about the abbreviations used see § 28 "Terminology" on page 104.

The information line is established as follows:

Date, Time, aa, bb, cc,

aa, bb, cc, are the status or measurement data.

Example:

Header : dd-mm-yyyy,hh:mm,CMP, TM, IV, PU,, ROU

data : 27-01-2010,08:55,1,2,3,25, 1, 1,, Production

On 27-01-2010 at 08:55 the measured conductivity was 2.3 (µS/cm), the measured temperature 25 °C, the input valve opened, the high-pressure pump switched on and the unit was in the "Production" phase.

Example of a file name:

VL100204.CSV : This file contains data log data from 04-02-2010 in CSV format.

20.2.2. XML format

If the alarms in XML format are recorded the structure will be as follows:

<standard XML header> (= <?xml version="1.0" encoding="UTF-8"?>)

<data>

<object <date > <time > <data1> <data2> <process> />

</data>

Example:

<?xml version="1.0" encoding="UTF-8"?>

<data>

<object Date="27-01-2010" Time="08:55" CMP="2.30" TM="25" IV="1" PU="1" ROU="Production" />

</data>

On 27-01-2010 at 08:55 the measured conductivity was 2.30 (µS/cm), the measured temperature 25 °C, the input valve opened, the high-pressure pump switched off and the unit was in the "Production" phase.

Example of a file name:

VL100204.XML : This file contains data log data from 04-02-2010 in XML format.

Attention!

If the XML format is used for storage on an SD card, the file can no longer be used if the data logger is switched off or the SD card is deactivated.

See § 15.4 "Log functions" on page 73 for more information about the switching on and off of the SD card.



20.3. Process data

Process data can be recorded via various media (SD card or serial port (bv.RS485)). All process changes are routinely recorded.
The data is recorded in fixed text format.

The structure is as follows:

<Day -Month-Year> <Hour: Minute> <Unit:> <Process> <Status of relay outputs>

Example:

17-02-2010 13:06 RO Unit: Standby
17-02-2010 13:06 RO Unit: Production 1: IV CV
17-02-2010 13:06 RO Unit: Production 2: IV PU CV
17-02-2010 13:06 RO Unit: Production: IV PU

Any power failure is also recorded with the date and time when the controller failed and with the date and time when the controller switched on again.

Example:

=====

Power failure: 17-02-2010 12:00 - 17-02-2010 13:20

=====

Example of a file name:

PL100204.TXT : This file contains process log data from 04-02-2010.

21. Internet

Attention ! This chapter only applies to control unit type RGS8x1x-xxxx.

The controller is provided with a web server and is to be used with Internet Explorer.
There is a "head page", and a page with a display of the system by which the scheme is "fixed"
plus a page where the controller itself is displayed.
The texts on the web pages are in English.

21.1. Access via the local network (LAN)

The controller can be connected to the LAN (locale network).
If the network uses a DHCP-server the controller is automatically assigned a correct IP address (when the controller starts up). Otherwise the controller will retain the IP address as specified in the Ethernet configuration data (see § 14.1.2 "IP address" on page 67).

If the PC seeks the controller web pages in the local network, both the controller's IP address and the controller's "local host name" can be entered in the browser's URL bar. The controller's "local host name" consists of the type of controller and the controller's serial number.

Example:

A type RGS8000 controller with the serial number 000002 has a local host name: "RGS8000_000002"

URL bar:

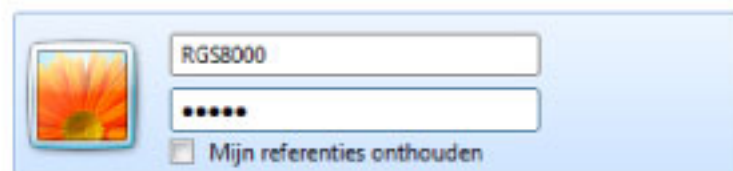


21.2. Access via internet (WAN)

It is possible to gain access to the control via the "world wide web" (internet).
The IP address (WAN) of the modem to which the control is connected to, with eventually the port number, must be entered in the URL bar of the internet browser. See § 14.2 "Access via internet (WAN)" on page 68 for more information about setting up the modem and the IP number of the modem.

21.3. Security

The internet pages are secured with a user name and a password. If the controller is accessed via the HTTP connection (internet) the following window will appear
If the correct information is entered, access will be allowed to the internet pages.

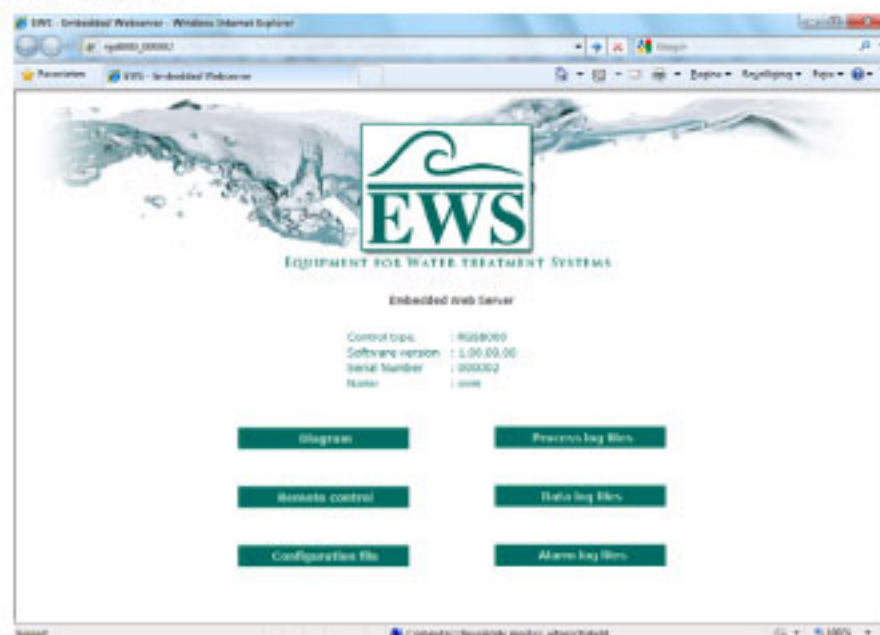


The standard settings for the user name and password are:

User name	: <type of controller >	= "RGS8000"
Password	: <empty>	= ""

There is a second security feature in the event the controllers' settings have to be changed via the internet ("terminal" mode and "configurator" mode). PC software with a USB dongle is required for this purpose (see § 21.8 "Internet key" on page 90). Get in touch with your supplier for more information about this product. The procedure for accessing both options is described in § 21.6.4 "Protection" on page 89.

21.4. Head page



After the IP address (or "local host name") is entered and confirmed in the URL bar and the correct user name and password are entered the above page will appear in the browser. This is the head page.

This page features information about the controller with which the connection is made.

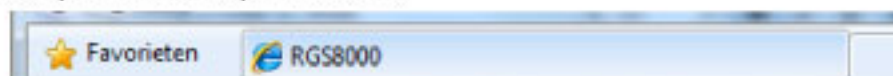
"Control type"	: The type of controller.
"Software version"	: The version of the software in the controller.
"Serial number"	: The controller's serial number
"Name"	: The controller's name

If no name is specified in the controller, a question mark will appear here.

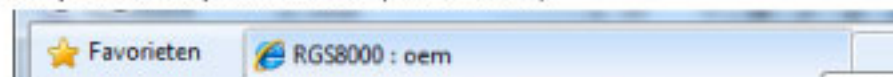
See § 22.3 "Names" on page 92 for entering a name.

The type of controller and the controller's name will also appear in the browser's "tab". If no name is specified in the controller nothing will be displayed.

Example: without a specified name



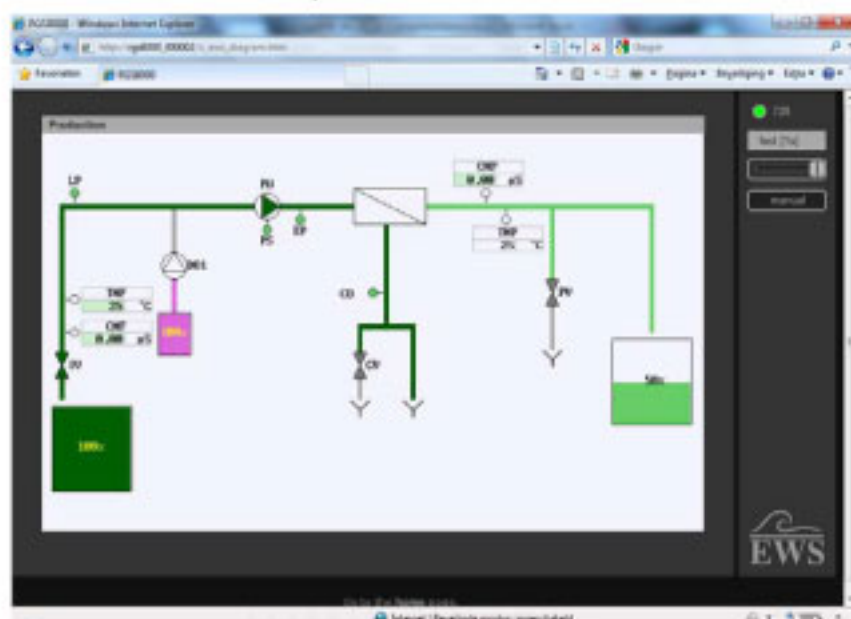
Example: with a specified name (name = oem)



Various "links" are also made to other web pages. These web pages relate to the display of the unit, the display and operation of the controller and web pages with a list of the corresponding log files (alarm, data and process). There is also a link ("Configuration file") to a file where the controller's programming is stored in an easy-reference list.

21.5. Unit display

The current status of the unit is schematically presented on this page. The data is refreshed every 2 seconds.



- LED communication indication
- Interval time updating front
- Immediate updating front

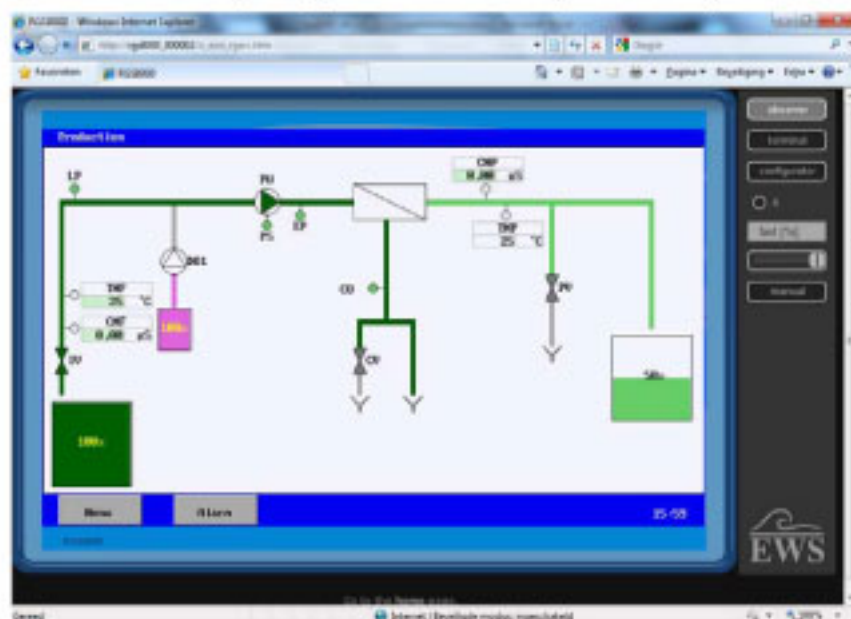
The above example shows only the components defined in the controller. The controller is in production and all the inputs are in order.

21.6. Controller display / operation

This page shows the current information on the LCD display. The "terminal" mode or "configurator" mode can also be used to change the settings in the controller.

After the initial start-up the LCD display is updated every 2 seconds.

When there is no updating of the front drawing it could be possible that the updating time is too short.



- to "Observer" mode
- to "Terminal" mode
- to "Configurator" mode
- LED communication indication
- Interval time updating front
- Immediate updating front



21.6.1. "Observer" mode

The "Observer" mode displays the current information in the browser, as shown on the controller. For example, a helpdesk can serve to focus together with staff onsite on examining operation-related issues. The touch panel is not activated

21.6.2. "Terminal" mode

The touch panel is activated in the "terminal" mode. The mode is secured hence it is accessible only to authorised persons. § 21.6.4 "Protection" on page 89 describes the stages for gaining access. The touch panel allows you to deal with the control on a remote basis. The display will be renewed as soon as the touch panel is used again. If the touch panel is not used, the values will be updated according to the set interval.

21.6.3. "Configurator" mode

Attention!

This mode is no longer available in software version 1.04 and higher.

The "configurator" mode can also be used to change settings but not all the settings can be altered in this mode. The mode is secured hence it is accessible only to authorised persons. § 21.6.4 "Protection" on page 89 describes what the stages are for gaining access.

The following menus are not available:

- | | | |
|--------------------|-------------|---|
| - Manual operation | - Language | - Current time and date |
| - Information | - Inventory | - Service menu: Resets, Back-up and hardware test |

All the settings are obtained in this mode (after pressing the key "Retrieve") and this can then be changed with a menu that is identical to the one in the controller. After the settings are changed you may quit the menu whereupon a "Transmit" key will appear under the "Retrieve" key. This key allows you to send the changed settings to the controller.

Attention!

When the settings have been received, the controller will be automatically started again. The controller will check if a SD card is in the holder along with valid software.

Attention!

"The "configurator" mode is only available in the English language".

21.6.4. Protection

Access to the "terminal" mode and the "configurator" mode is secured.

Access may be obtained with PC software ("Internet key", see also § 21.8 "Internet key" on page 90).

Attention!

The controller will invariably allow only one user access to one of the two options.

As soon as the "terminal" mode or "configurator" mode is activated you are first of all asked for an access code, whereupon the controller will open a "session" for the corresponding user. Access is barred to other users at this time.

The procedure has to be completed within roughly 2 minutes.

The following windows may appear:



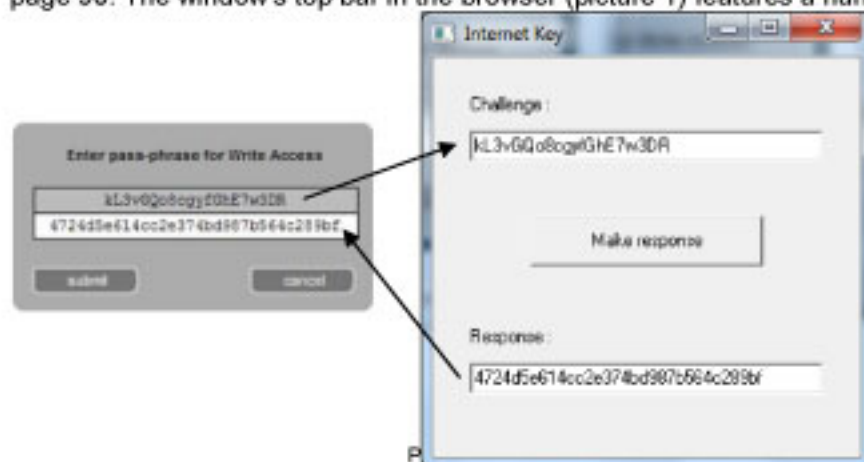
Still no user with access.



There is already a user with access.

In the event of there still being no user with access, access may be achieved via the following procedure.

Open the WINDOWS program "Internet Key" (picture 2) on your PC. See also § 21.8 "Internet key" on page 90. The window's top bar in the browser (picture 1) features a number of characters.



It is simple to move the character strings with the Copy" and "Paste " functions in Windows.

The characters have to be entered in the "Internet key" program in the data entry field "Challenge:". Pressing on the "Make response" key in the "Response:" field will call up a character string. The string is then entered in the window's "free field" (lower bar) in the browser.

The following windows may now appear:



Access accepted



Access denied.

If the access is accepted, both the "Terminal" mode and the Configurator" mode are used. Access is available for roughly 30 minutes. Quitting the "session" (as a result of activating the "Observer" mode, for example) will call up a window (picture 3) where the choice has to be confirmed. If the "session" is still active when the time has elapsed the window will automatically appear to show that the session has aborted (picture 4).



Picture 3: Quit?

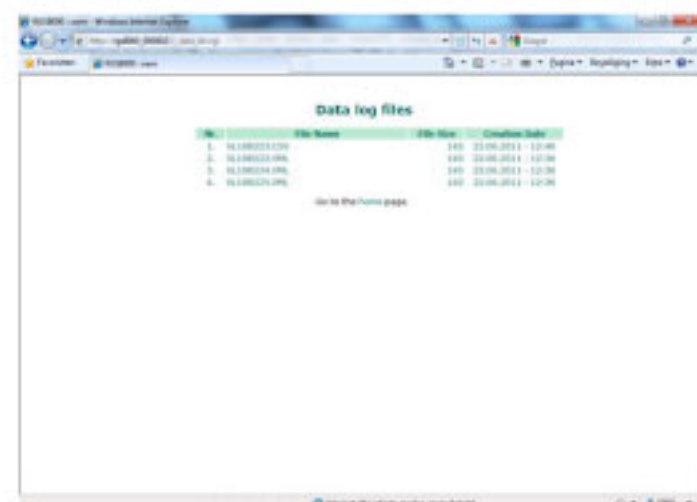


Picture 4: Session time elapsed.

21.7. Getting log files

The internet can be used to view log files stored on the SD card.

In the main menu, pressing on the link with the required list of log files will call up a page with the available files. When no SD card is available no files will be displayed but a warning will be given that the SD card is not available.



Example:

The "Data log" link is pressed.

List of data log files. CSV and XML files are available on the SD card.

Data in the CSV file logged on 22-06-2011.
Data in the XML files logged on 22-06-2011.

Pressing on file name (link) will open the browser. If the file has to be downloaded the browser options have to be used.

Attention!

An XML file for the current day may be obtained only if the process for logging the corresponding data to the SD card is deactivated or if the SD card is deactivated, because during the deactivation period the XML file is converted to a valid file.

The SD card can be deactivated by staff onsite or via the "terminal" mode in the browser.

See § 15.4 "Log functions" on page 73 for more information about switching the SD card on and off.

21.8. "Internet key"

To change data in the controller a security feature is available for which the "Internet Key" WINDOWS software is required. The program can be installed on a PC. The program can be opened only if the right USB dongle is connected. Get in touch with your supplier for further information. The way to operate the program is described in § 21.6.4 "Protection" on page 89.

22. Service



The controller's service menu allows settings to be applied for maintenance and settings, which are for authorised people only.

The service settings option is located in the main menu.

§ 4.3 "Window" on page 9 describes how a setting can be changed.



The service menu can be secured against unauthorised persons. A key then appears after "Service" to show that the option is secured (see also § 23.1.2 "Menu" on page 98).

22.1. Service number



A service telephone number can be programmed in the controller. The user can ring this number in the event of any questions.

The user can view the service telephone number in the information menu (see § 10.2 "Service number" on page 59).

The service number has a maximum of 19 characters.

22.2. Maintenance

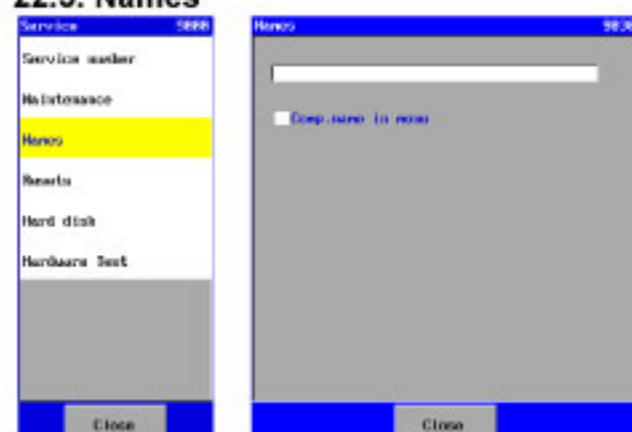


A maintenance phase can be activated here, so the system (unit) programming (see § 7.6 "Maintenance" on page 51) will be displayed during the maintenance phase.

During the "Standby" phase the manual operation menu will display the option to launch the "Maintenance" phase (see § 9.3 "Standby" on page 57).

If the phase "Maintenance" is activated a "Maintenance" warning may also be activated with a related interval time. This warning can be used to warn about a maintenance activity. An interval time of between 1 and 65,000 hours may be set.

22.3. Names



The "name" of the controller can be entered in this window. This name appears on the internet page (see § 21.4 "Head page" on page 86) to make a clear reference to a specific unit.

A name with a max. of 39 characters can be specified.

Also can be specified whether the default name will be used in the menu's (uncheck) or the name as specified in the inventory menu (check).

See also § 5.1 "Inventory" on page 12.

22.4. Resets



Specific records may be set in this window.

- "Service" Service hour counter set at zero.
- "Maint." Maintenance counter set at zero.
- "Alarm" Alarm history deleted.

The reset is completed by pushing the reset button.

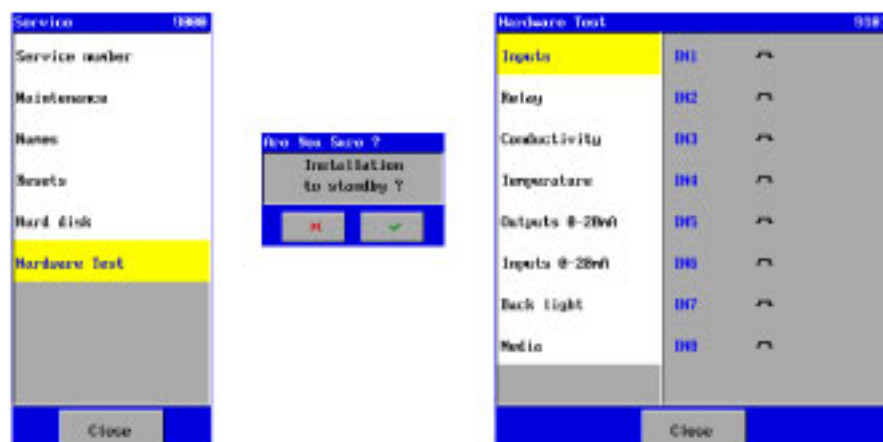
22.5. Hard disk



The controller's programming is stored on an internal "hard disk". This window can be used to copy the programming to an SD card with which, for example, a standard setting for a specific unit type can be stored.

22.6. Hardware test

This option allows you to test the hardware in the light of the unit display and control.



22.6.1. Inputs



The digital inputs can be tested in this window.

- Closed input contact.
- Opened input contact.

22.6.2. Relay outputs



The relay outputs can be tested. A relay can be activated or deactivated by pushing the text on the touch panel, whereupon the following windows will be called up for choice confirmation and alert.

Attention!

To prevent a pump, for example, being switched on while a valve is still closed, you are advised to remove the output connections.



22.6.3. Conductivity meter



The conductivity meter's measurement range adjustment and switching can be checked as part of a two-stage process: adjusting the maximum range and checking the measurement range switching (and also checking the characteristic).

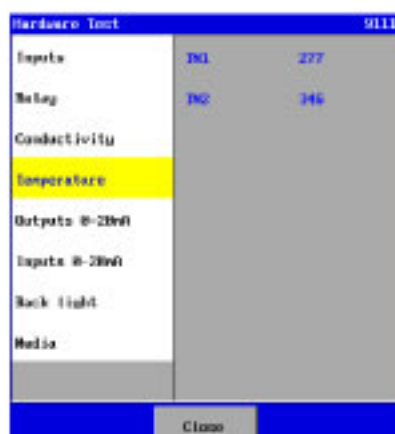
The maximum range can be adjusted by placing a short circuit on the conductivity meter input. A value of roughly 1000 then has to be specified in the window.

It is possible to switch between measurement ranges by pushing the text of the conductivity. The value in the window then has to be about 1000.

The switching (and characteristic) can be checked by placing a resistance of 1 k Ohm on the conductivity meter input. In the event of a "x1" measurement range the window has to display a value of roughly 500 and in the event of a "x10" measurement range a value of roughly 910.

If the optional print (ca-1cm-1tm) is present, then the 2nd conductivity meter will also be displayed in the window.

22.6.4. Temperature meter



The adjustment of the temperature meter can be checked.

The characteristic's "zero point" control can be checked by placing a 1 k Ohm resistance on the temperature meter input, whereupon a value of 0 or 1 has to be displayed in the window.

The characteristics maximum control can be checked by placing a 1,33 k Ohm resistance on the temperature meter input, whereupon a value of roughly 874 has to be displayed in the window.

If the optional print (ca-1cm-1tm) is present, then the 2nd temperature measurement will also be displayed in the window.

22.6.5. Outputs 0-20mA



The 0-20mA output management can be controlled. In first instance, all outputs will be set at 0mA. It is possible to increase the current of a certain output by 4mA at a time. If the text is pressed at a current of 20mA, then the current will be switched off again (0mA).

This option is only displayed if the optional circuit board with outputs 0-20mA (ca-3rec) is present.

22.6.6. Inputs 0-20mA



This window allows checking whether the 0-20mA inputs function appropriately.

A value of ca. 4000 should be displayed when power values reach 20mA. The current supply and the shown value have a linear course.

22.6.7. Inputs pulse



This window allows checking whether the pulse inputs function appropriately.

A value of pulses / second will be displayed.

22.6.8. Back light



The light supply can be controlled.

It is possible to check whether the back light supply works appropriately by pushing the text box ("100%").

The supply will always switch between 50% and 100%. The lighting should be dimmed notably at 50%.



22.6.9. Media

Attention ! This chapter only applies to control unit type RGS8x1x.



In this screen the RS232 port and the 485 port can be controlled.
The send and receive lines can be controlled independently.

The counter behind "Rx" (receive line) is increased by 1 each time a "comtest" message is sent by the control. This message can be sent, for example, via the PC "HyperTerminal" software (settings : baudrate=9600,databits=8,stopbits=1, parity=no).
In "HyperTerminal" the text "comtest" then needs to be entered, after which the "Enter" key needs to be pressed.

A message containing the type of control and the serial number will be sent by pushing the text box "Tx" of the targeted communication port. For example "RGS8000 750345" for a RGS8000 with serial number 750345. If the message has been sent, the counter behind "Tx" will be increased by 1.

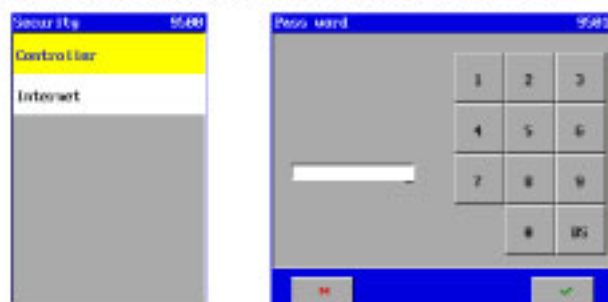
23. Security



The security menu in the controller is for making settings for securing certain settings and processes and securing internet access. The settings security option is located in the main menu.

23.1. Controller

Specific settings in the menu and processes can be secured against use by unauthorised persons. A password has to be entered towards this end.

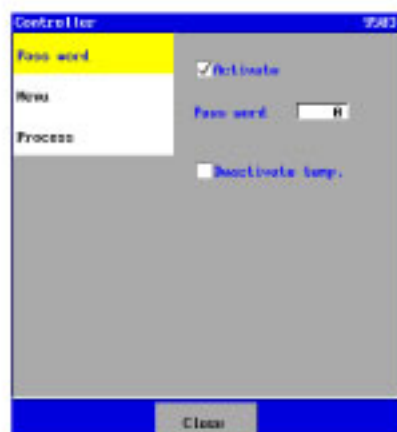


When the password is set the right password has to be entered to access this menu.



If the password is not set the menu and processes security features are not activated and nor are they shown in the menu.

23.1.1. Pass word



The password can be activated in this window. The password can be entered if this is activated. The password has to be a number between 0 and 9999.

The security feature may also be temporarily switched off as a result of which an authorised person can access all the settings if they remain in the menu. As soon as you quit the menu to return to the main screen the security will be automatically reactivated, thus guarding against cases where people forget to switch the security feature on again.



23.1.2. Menu



Various submenus can be secured in the menu simply by "checking the box".

Activating a security feature for a specific component calls up a key to show the component is secured.



23.1.3. Process

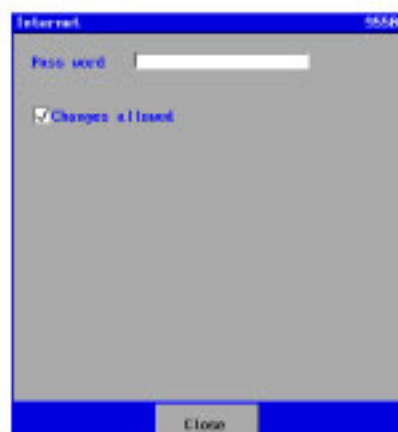


When the maintenance process is secured in the menu, no-one will be able to launch the maintenance. This security feature can be activated by "checking the box".

The security feature first has to be turned off before the maintenance process can get underway.

23.2. Internet

Attention ! This chapter only applies to control unit type RGS8x1x-xxxx.



The controller has a web server which can be connected over the internet. Various securities features are set with this option.

You will be asked for your user name and password before a connection is made to the web server (see also § 21.3 "Security" on page 85).

The password can be changed and can be a maximum of 16 characters long.

Settings can be changed via the internet. Special PC software with a dongle is required for this. When the "Changes allowed" option is switched off, the end user can disable any scope for changes via the internet.



24. Power failure

24.1. Clock

The data is stored in the event the controller's power supply fails.

The controller has a battery so the time and date can be kept. If the controller is switched on again the time and date have to be reset.

The control unit also checks whether the date is correct (year > 2009). If this is not the case, then a message will be displayed in the alarm window that the clock must be set.

In the case of summer time and winter time, the time and date have to be adjusted manually.

24.2. Alarms

Thanks to the various alarm options, a power failure is always notified when the controller is switched on again.

Exceptions to this are the alarms via an alarm relay. With the alarm relay you can choose to have the alarm relay activated or otherwise after a power failure.

See § 6.3 "Alarm" on page 21.

24.3. Programming

The controller programming is stored in a file.

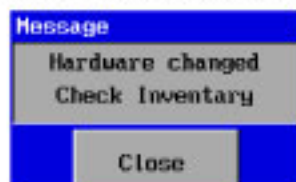
The file is read off when the controller starts.

If the programming is changed the altered data will be stored when you quit the main menu but if the controller cut outs when this is in the main menu any altered data there may be will not be stored and the "old" data will be read off again after the control starts.



25. Messages

25.1. Hardware changed



If a change has been made to the hardware configuration of the control (by changing the circuit board), the above notification will appear. In this case the inventory of the components needs to be checked because it is possible that a function is no longer linked to the hardware because of removal of said hardware.

26. Boot software

26.1. General

The controller features two software programs: the boot software and the application software (for example RGS8000). If the controller is launched the boot software will first of all be opened. Explanations will be given in this chapter of the boot software and how the application software can be changed.

26.2. Changing application software

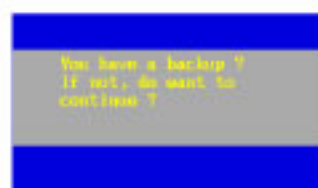
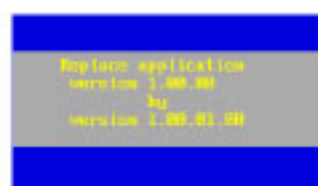
The controller will always start in the boot software whereupon the following window will appear. This shows the version of the boot software and whether a valid application is available and if so what application software is available.



Next a check is made to see if a SD card is available in the connector intended for this purpose. If not the application software will be automatically started, provided a valid application is available.

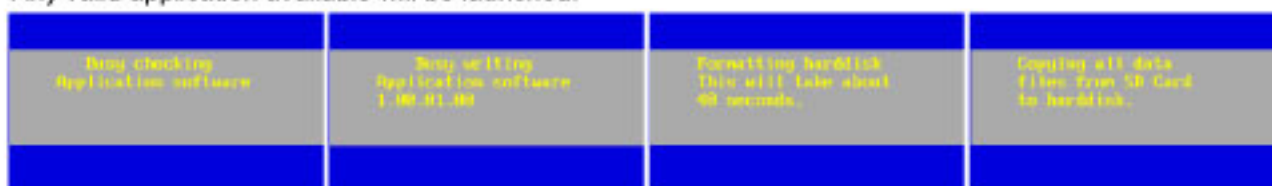
When no valid application is available a warning appears in the display so an SD card has to be inserted with the specified software.

If the SD card is detected, an overview is provided of the software versions available on the SD card.



It is possible to load certain software by pushing the text of the targeted software version. If a valid application is already available in the controller, confirmation will be requested to make an update and you will then be asked whether a back-up has been made of the current software and setting.

Any valid application available will be launched.



During the update a check is made first of all to see if the file on the SD card is valid. The new application is next placed in the controller whereupon the internal hard disk is formatted and any other files are placed on this hard disk.



27. Frequently asked questions

27.1. General

Question:

LCD display does not show anything.

Answer:

- Is the right power supply voltage connected?
- Is there a cable cut affecting the power supply?
- Is the power supply voltage connected to the right pins (1 + 2)?
- Are the fuses OK?
- Are the tape cables correctly connected?
- Is the contrast effectively set (P4)?

27.2. Relay outputs

Question:

Relay output does not turn on.

Answer:

- Check in the main screen to see if the output is activated.
If it is, check if the secondary fuse (F3) is OK.
If not, check the settings for the corresponding phase.

27.3. Digital inputs

Question:

Inputs not detected.

Answer:

- Is the input activated for the corresponding phase?
If it is, check if the secondary fuse (F3) is OK.
If not, change the setting for the corresponding phase.

27.4. E-mail

Question:

No e-mails sent.

Possible causes:

- Only control unit type RGS8x1x-xxxx is suitable for sending emails.
- Is the e-mail address provided correct? See § 16.1.4 "E-mail address of the recipient" on page 77.
- Is the IP address of the SMTP server correctly set? See § 16.1.2 "IP address of SMTP server" on page 76.
- Is the Default Gateway correctly set? See § 14.1.4 "Default gate-way" on page 68.
- RJ45 cable correctly connected (green LED for RJ 45 connector off?)
Does the RJ45 connector's orange LED flicker when an attempt is made to send an e-mail?



27.5. Internet

Question:

Web server page does not appear in the browser.

Possible causes:

- Only control unit type RGS8x1x-xxxx is accessible via internet.
- Is the correct IP address of the "local host name" entered? See § 14.1.2 "IP address" on page 67.
- In the event of a DHCP server: was the controller connected to network at start-up?
- RJ45 label correctly connected (green LED or RJ45 connector on?)
- Does the RJ45 connector's orange LED flicker when an attempt is made to send an e-mail?
- Is the port number correctly set? See § 14.1.5 "HTTP port number" on page 68.
- Is the Default Gateway correctly set (if contact is sought via the "World Wide Web")? See § 14.1.4 "Default gate-way" on page 68.
- Web browser possibly not compatible. Try Internet Explorer 8.

27.6. RS485

Question:

No information lines appear on the "Hyperterminal" screen.

Possible causes:

- Only control unit type RGS8x1x-xxxx is equipped with a RS485 port.
- Is the right COM port connected and set on the PC?
- Is a RS232/RS485 converter available?
- Is the connection on the controller correct (wires changed)?
- Are the baud rate, data bits, stop bits and parity appropriately set on the PC?

27.7. RS232

Question:

No information lines appear on the "Hyperterminal" screen.

Possible causes:

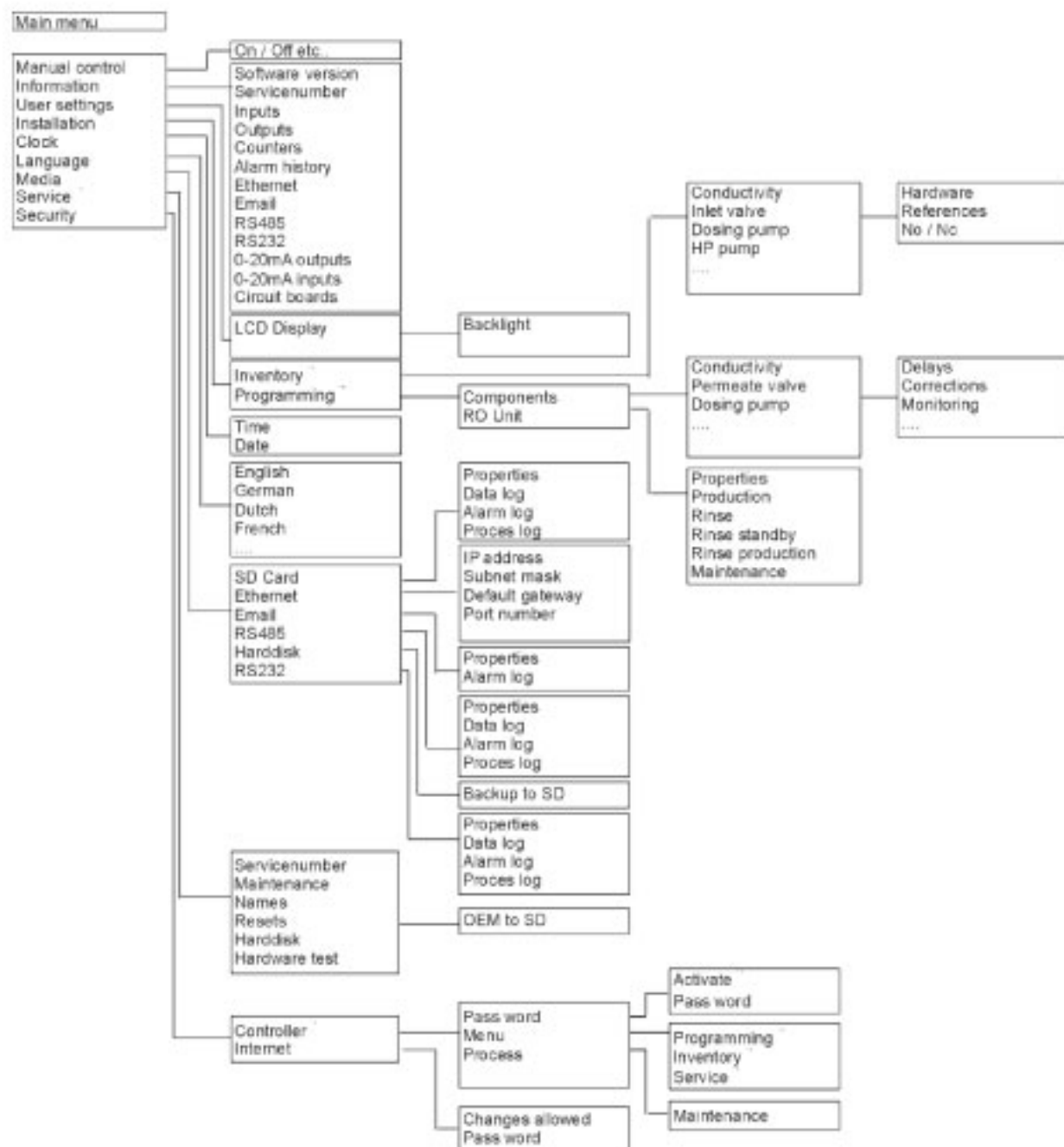
- Only control unit type RGS8x1x-xxxx is equipped with a RS232 port.
- Is the right COM port connected and set on the PC?
- Is the connection on the controller correct (wires changed)?
- Are the baud rate, data bits, stop bits and parity appropriately set on the PC?

28. Terminology

This chapter provides a brief explanation about the specific terms and abbreviations used in the operating manual.

Term / abbreviation	Description
SD card	"Secure Digital" card. This is a file storage medium.
XML format	"eXtensible Markup Language". This is a general file structure for use in various types of software (such as directly opening in Excel, Access).
CSV format	"Comma Separated Value". This is a file structure often used to record measurement data. This format can be imported into spread sheets (such as Excel)
RS232	Serial communication port which can be connected to the PC's serial COM port.
RS485	Serial communication port which (via converter) can be connected to the PC's serial COM port by means of an RS232 / RS485 converter, which is not included in the delivery.
SMTP server	Server for an e-mail message
IV	Inlet valve
PU	High-pressure pump
CV	Concentrate valve
PV	Permeate rinse valve
PVb	Permeate block valve
PVw	Permeate 3-way valve
DO	Dosing pump
BP	Booster pump
AL	Alarm signal
ST	Stop
HL	High-level switch
LL	Low-level switch
EP	Overpressure
PBM	Pressure before membrane
PAM	Pressure after membrane
PP	Permeate pressure
LP	Low pressure
CO	Concentrate flow control switch
PS	Motor protection switch
RS	Alarm reset
RE	Regeneration input
CM	Conductivity meter
TM	Temperature meter
RC	Recorder output (0-20 mA)
FL	Flow meter
PR	Pressure meter

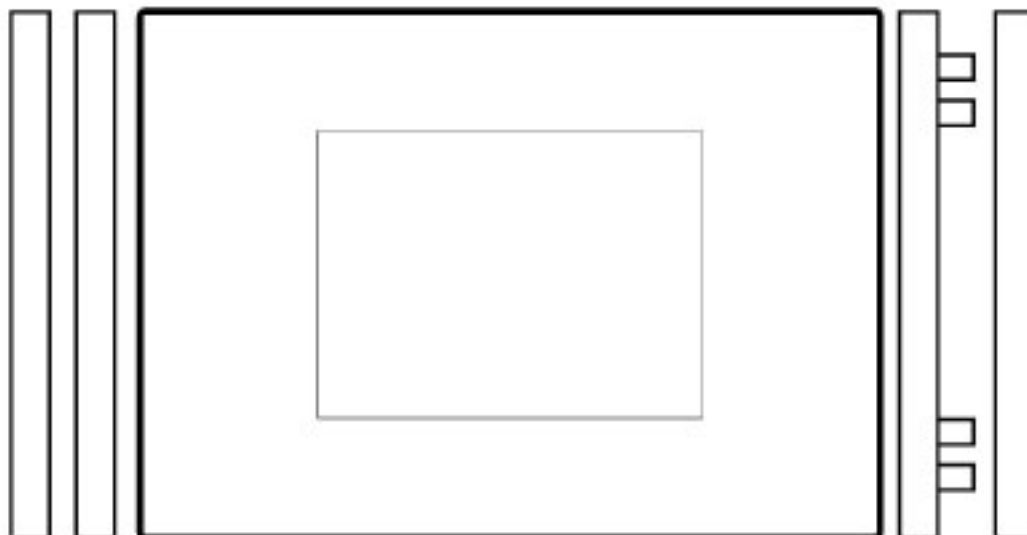
29. Overview menu





30. Opening casing

Remove the four side covers of the housing.



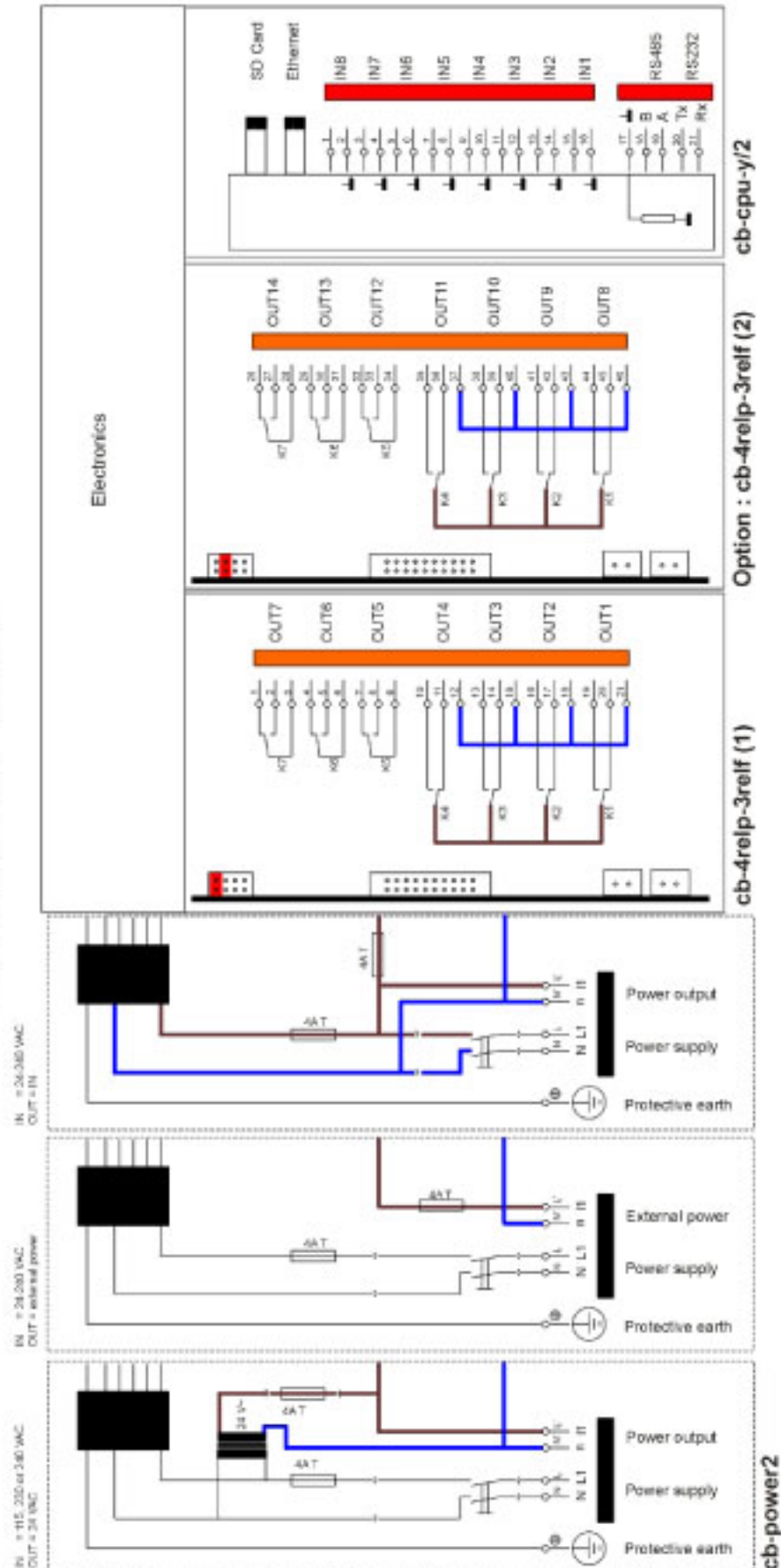
Open the housing on the left side by carefully placing the key cover between the hinge points and pushing until the front door springs open.



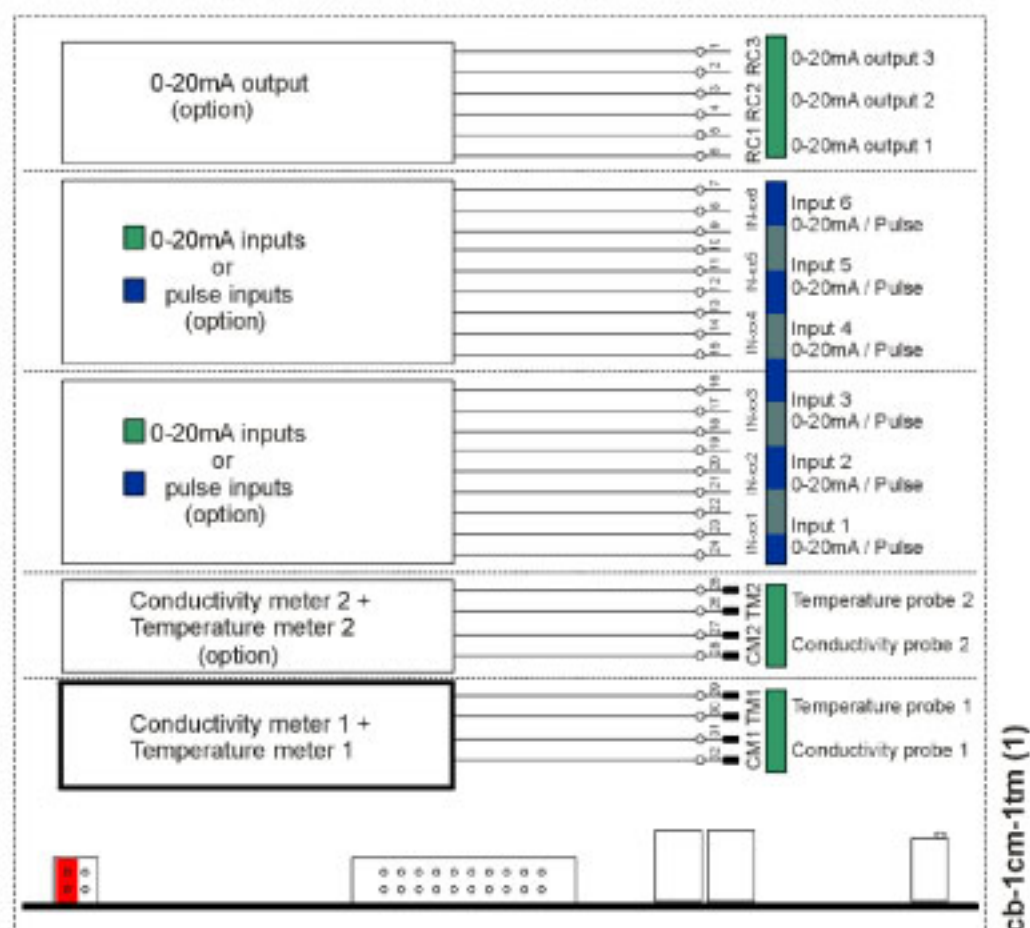
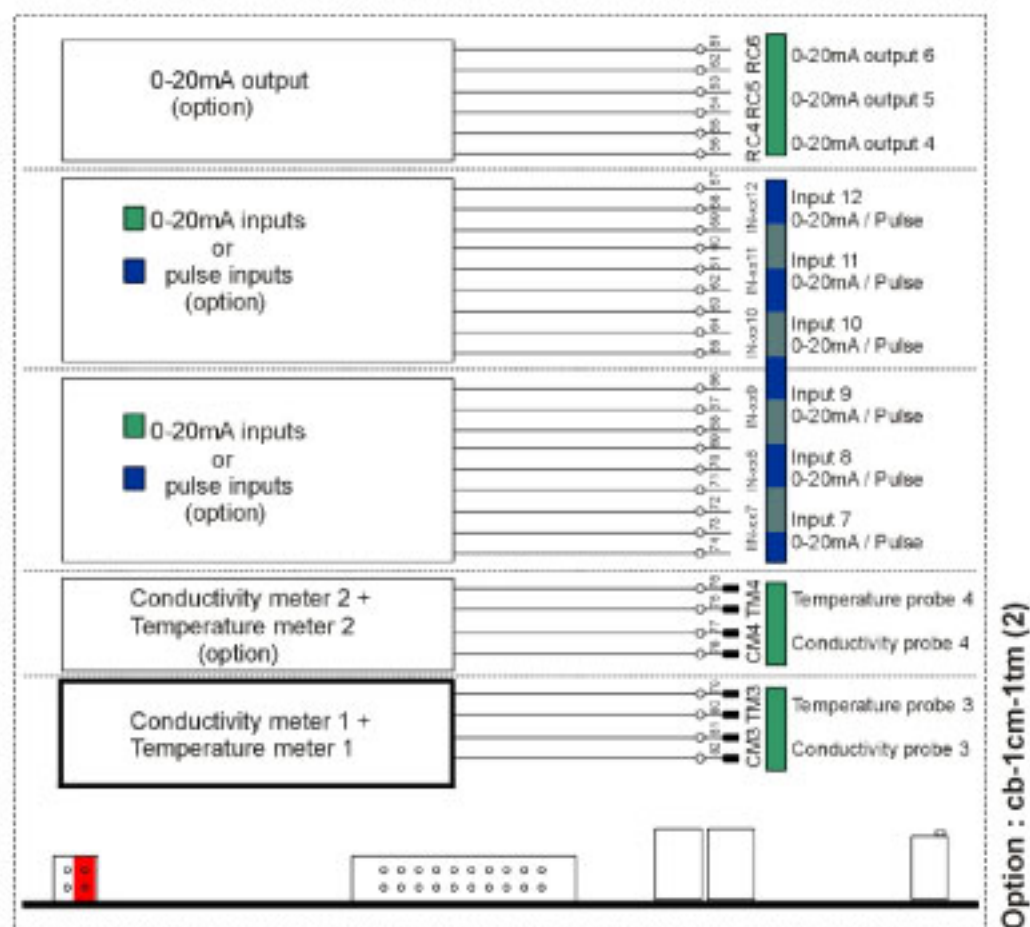
31. Terminal block connection

31.1. Schematics

Connection terminals RGS8xxx-xxxx



Connection terminals RGS8000 (Measure circuit boards)





31.2. Remarks



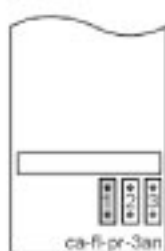
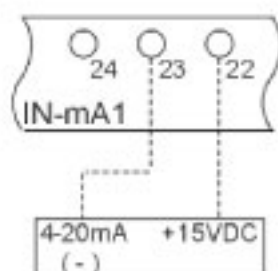
The 3th terminal of the 18 pole black connector will not be used (see picture above).

32. Electrical connection examples

Attention!

When connecting components, it is recommended to completely disconnect the power supply from the controller.

Connection of flow meter (2 wires)

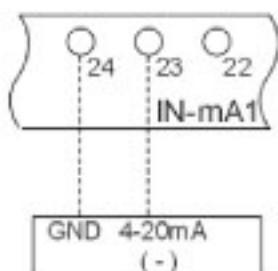


Connection of a 2-wire flow meter with a 4 – 20mA output to input IN-mA1.

A "jumper" should be placed on the "ca-fl-pr-3an" PCB as shown in the illustration.

Jumpers "2" and "3" should be installed for IN-mA2 and IN-mA3, respectively.

Connection of flow meter powered by external supply (2 wires)

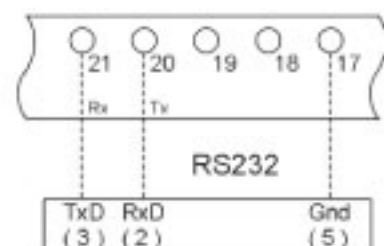


Connection of a 2-wire flow meter powered by external supply with a 4 – 20mA output to input IN-mA1.

A "jumper" should be placed on the "ca-fl-pr-3an" PCB as shown in the illustration.

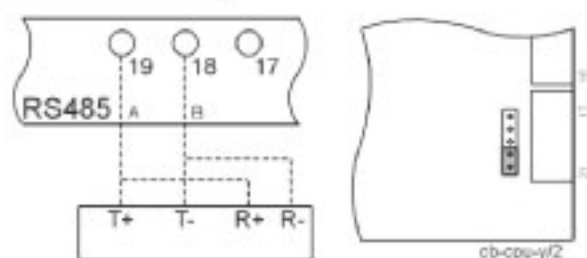
Jumpers "2" and "3" should be installed for IN-mA2 and IN-mA3, respectively.

RS232 Connection



To set the communication port of the controller to "RS232", the jumpers should be installed (cpu PCB cb-cpu-y/2) according to the illustration shown on the left.

Connector type DB9

**RS485 Connection**

To set the communication port of the controller to "RS485" with termination resistor (120 Ohm), the jumper should be installed (cpu PCB cb-cpu-y/2) according to the illustration shown on the left.

No jumpers should be installed if no shut down threshold is wanted.

33. Installation and Start up

33.1. General

- Install the controller at eye level in a place that is convenient for the user.
- Do not install under damp wiring.
- Implement electrical connections. Take into account the instructions of the local electricity company as well as any manufacturer's specifications.
- Ensure that the connection to earth is flawless.
- Separate all wiring carrying low voltage (inputs and measurements) from supply cables (not tied together).
- Switch on the device and perform basic programming using this manual and the technical information from the supplier.
- Set the current time and date.
- Start up the unit according to the manufacturer's specifications.

ATTENTION:

Some external relays, magnetic switches, magnetic valves, etc., may produce undesired disturbance pulses when the system is switched on/off.

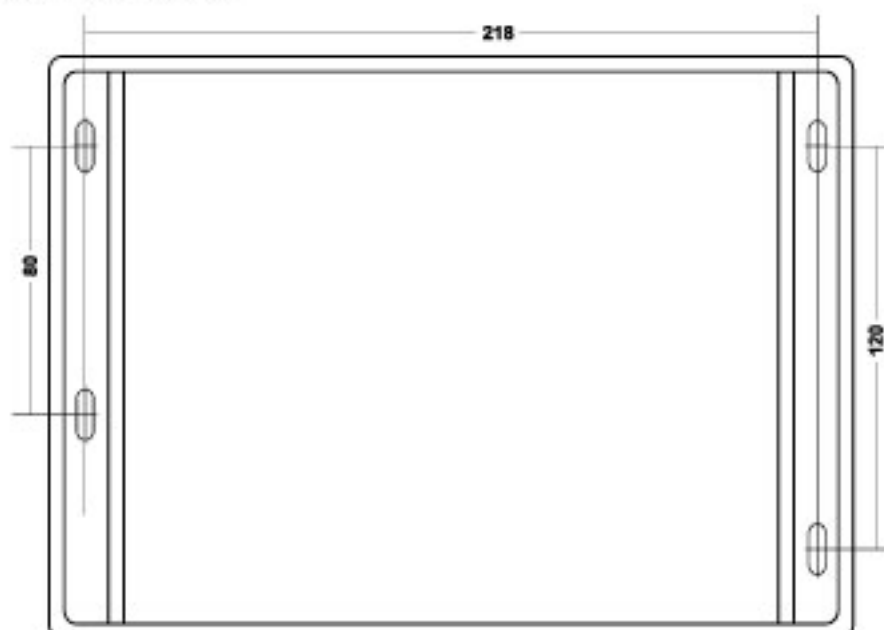
Therefore, it is recommended to equip these components with an RC network in advance.

Get in touch with the supplier of these components for the proper type of RC network.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

33.2. Installation



33.3. Ethernet connector

The controller can be connected to an Ethernet connection. Towards this end a RJ45 connector is placed in the controller. The RJ45 plug cannot be placed through the swivel so a ready-made cable cannot be used and one has to be assembled by the user.

34. Maintenance

The controller does not require any special maintenance.

LCD display

If the "touch panel" is operated with dirty fingers, it may happen that the LCD becomes difficult to read. Should this occur the LCD display can be cleaned with a moist cloth.

Caution: Do not use chemical cleaning products for this, only water!

35. Spare parts

35.1. Order codes

Item code	Description
EH-A	Panel assembly set (4x screw, 4x insert)
EH-C-N	Side cover
EH-C-K	Key cover
EH-U-S	Transparent door

35.2. Pictures

EH-A



EH-C-N



EH-C-K



EH-U-S



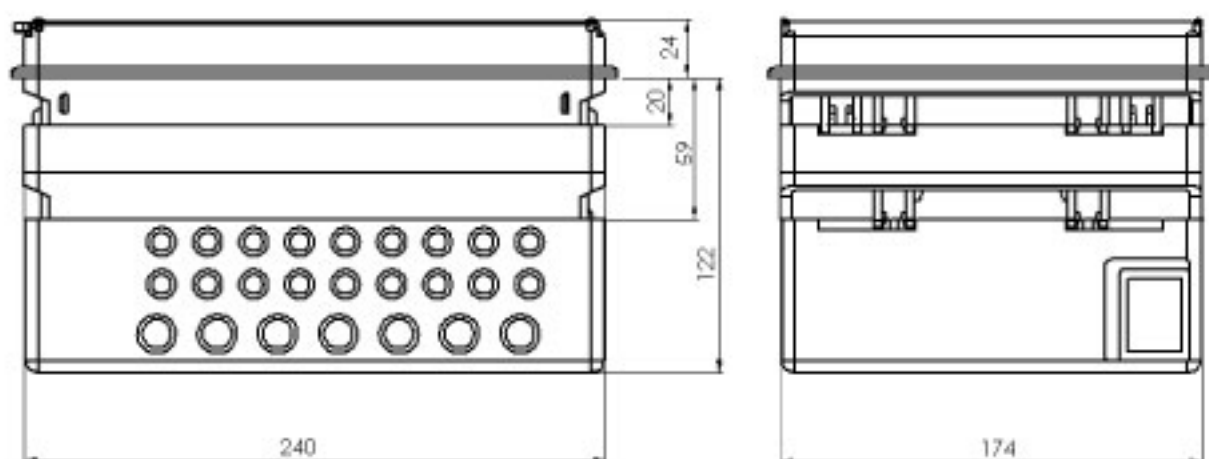


36. Technical specifications

Power supply	Features: Tolerance:	24-240 VAC, 115/24 VAC, 230/24 VAC, 240/24 VAC 10%
Power input		12 VA
Relay outputs	Powered: Potential free:	Total 4A (all powered outputs together) 250 V, 4A per relay
Inputs		Contacts loaded 15V, 10 mA
Conductivity cell	Type: Constant:	Capacitive 0,01 – 10,00 cm ⁻¹
Temperature sensor	Type: Range:	PT1000 1 - 99°C
RS232	Speed:	9600 Baud
RS485	Speed:	9600 Baud
Ethernet	Speed: Functions:	10/100 MB DHCP
Web browser		Internet Explorer 8
SD Card	Type: Capacity: Format:	Standard SD Up to 2 GB FAT12, FAT16, FAT32
CPU	Processor: Hard disk: RAM:	48 MHz 4 MB 1 MB
Protection		IP65
Ambient temperature		0 - 50 °C
Weight	IN = OUT: IN <> OUT:	ca. 2,8 kg ca. 4,0 kg
Casing	Dimensions: Built-in depth: Panel opening: Material:	240 x 174 x 107 mm 122 mm 240 x 174 mm ABS
Fuses	Relay (F2) : Primary (F1) :	4A slow 4A slow
Current outputs	Max resistance:	500 Ohm
Current inputs	Supply : Supply load :	15 V max. 40 mA
Pulse inputs	Pulses / sec.	Max. 15.000 Contacts loaded max. 15V, 10 mA
CE	Immunity: Emission: Low voltage:	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4 2006/95/EG



36.1. Casing dimensions



Subject to technical changes without notice

37. Index

Additional program	46
Alarm	1, 2, 10, 17, 21, 22, 25, 53, 54, 60, 72, 74, 77, 78, 81, 82, 92, 104
Alarm log function	74, 77
Back light	95
Booster pump	1, 19, 104
Boot software	100, 101
Clock	65, 99
Concentrate	1, 17, 24, 56, 104
Concentrate valve	1, 17, 104
Conductivity feed	31
Conductivity meter	17, 30, 94, 104
Conductivity permeate	30
Counters	60
CSV	74, 75, 77, 78, 79, 81, 83, 90, 104
Data log function	74, 79, 83
DHCP	67, 68, 71, 85, 103, 113
Dosing tank	28
E-mail	1, 54, 61, 76, 77, 102
Ethernet	59, 61, 67, 71, 85, 111, 113
Exceeded pressure	23, 81, 82
Flow meter	38, 39, 104
frequency regulator	1, 6, 14, 19
Hard disk	80, 92, 107, 113
Hardware test	93
High pressure pump	19
Informatie	64
information ... 1, 3, 5, 7, 13, 14, 15, 16, 17, 22, 23, 24, 25, 54, 55, 59, 60, 67, 73, 74, 75, 77, 78, 79, 81, 82, 83, 85, 86, 87, 88, 90, 91, 103, 111	
Inlet valve	1, 12, 17, 104
inputs	1, 3, 48, 49, 50, 51, 59, 87, 93, 102, 111
Inputs	59, 93, 102, 113
Inputs 0-20mA	62, 95
Installation	17, 111
Internet	67, 70, 85, 89, 90, 98, 103
Inventory	11, 12, 17, 88
IP address	61, 67, 68, 69, 70, 71, 76, 85, 86, 102, 103
language	59, 66
LCD	1, 4, 5, 64, 87, 102
LED	87, 102, 103
Logging	81
Low pressure	1, 22, 56, 104
Maintenance	2, 3, 51, 56, 57, 60, 91, 92, 112
Manual	1, 47, 48, 52, 57, 58, 88
modem	68, 69, 70, 71, 85
Motor security	23, 56
NAPT	68, 70, 71
outputs	1, 3, 19, 48, 49, 50, 51, 59, 60, 84, 93, 102, 113
Outputs	60
Overpressure	1, 104
Pass word	97
permeaatsperafsluiter	18
Permeate 3-way valve	1, 19, 104
Permeate block valve	1, 18, 104
Permeate rinse valve	1, 18, 104
pH meter	17, 44
port number	68, 70, 85, 103



Power failure	56, 81, 82, 84, 99
Pressure after membrane	1, 23, 104
Pressure before membrane	1, 23, 104
Pressure meter	41, 42, 104
Pressure permeate	23
Printed circuit board	63
Process log function	75, 79
Production	2, 3, 18, 20, 22, 24, 26, 46, 47, 48, 49, 50, 58, 81, 82, 83, 84
Protection	89, 113
Pumps	17, 19
Raw water tank	7, 27
Recorder	37, 62, 104
Regeneration	1, 3, 25, 52, 104
Resets	88, 92
Rinse	2, 3, 20, 22, 24, 46, 48, 49, 50, 52, 57, 58
RS232	1, 54, 59, 61, 62, 63, 78, 80, 81, 96, 103, 104, 109
RS485	1, 54, 59, 61, 62, 63, 78, 80, 81, 82, 83, 84, 103, 104, 110, 113
SD card	1, 54, 56, 59, 72, 73, 74, 80, 81, 82, 83, 84, 88, 90, 92, 101, 104
Security	85, 97
Security switch	14, 56
Service	59, 60, 88, 91, 92
Service number	59, 91
SMTP server	76, 102, 104
Standby	2, 3, 11, 48, 49, 51, 52, 57, 58, 84, 91
Standby Stop	2, 3, 52, 57
Stop	24, 51, 52, 56, 57, 58, 78, 104
Storage tank	17, 22, 26
Subnetmask	68
Switches	17, 22, 82
Tanks	26, 82
Temperature	30, 34, 35, 94, 104, 113
Temperature meter	30, 94, 104
Valves	17, 82
XML	73, 74, 81, 82, 83, 90, 104