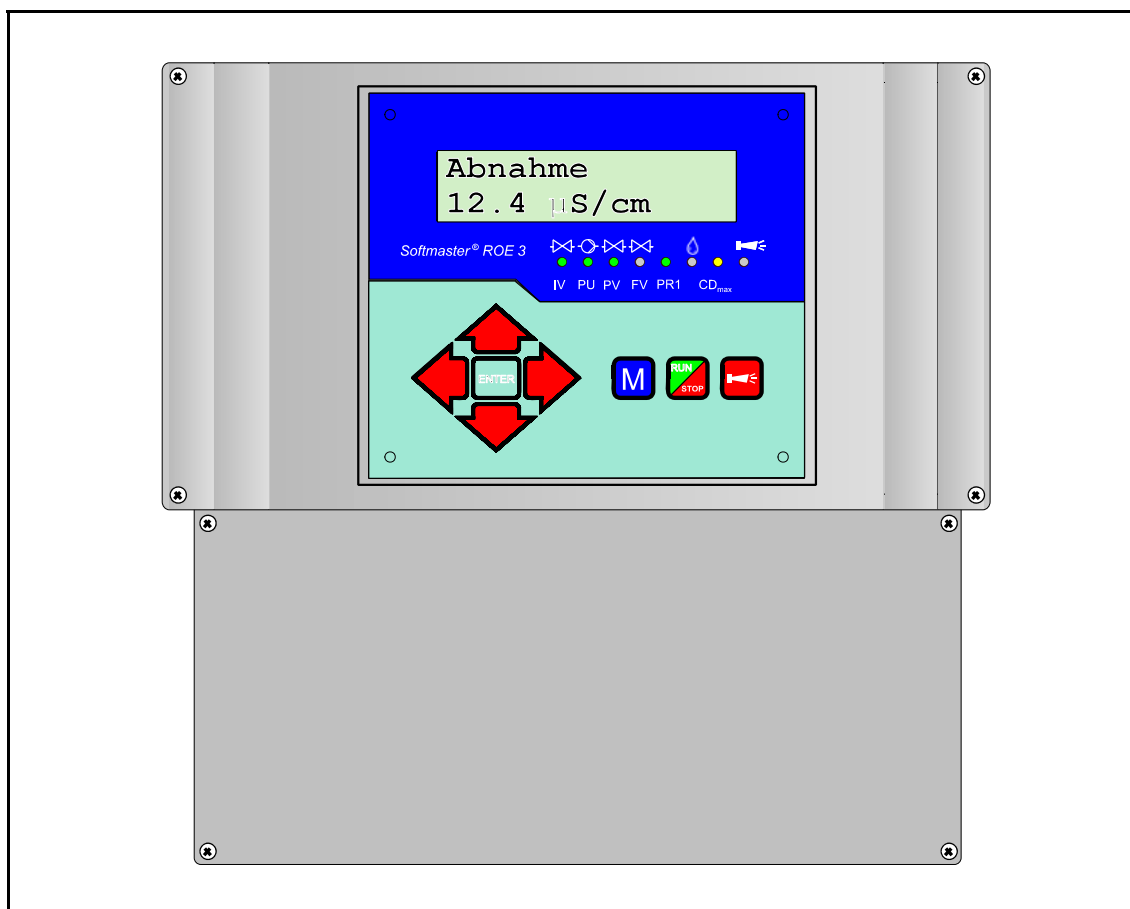


Softmaster[®] ROE 3

Microprocessor controllers for reverse osmosis plants



Operating instructions

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General notes

Introduction

These operating instructions describe the installation, operation and programming of the reverse osmosis controller Softmaster ROE 3.

We recommend that, whilst familiarising yourself with the operation of the unit aided by this manual, you have immediate access to the operable controller in order to perform the functions and combinations as described. As certain functions are interrelated, it is advisable to follow the instructions in the given order.

Should problems or questions arise which are not described in this manual and/or cannot be solved, our customer service is always at your disposal.

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

Handling notes

Quick, repeated switching on/off of the controller should be avoided. Wait at least 5 seconds before switching the unit either 'on' or 'off' at the main switch.

Only operate the controller in compliance with the ambient conditions (e.g. temperature, moisture) stated in the chapter entitled technical data. Especially protect the controller against moisture.

The controller should not come into contact with splash or condensation water.

The original seals attached during manufacture (EPROM labels) must not be broken; otherwise all warranty claims will be withdrawn.

Before dismantling a defect controller, always write down the description of the error (failure effect). Repair work (independent of the guarantee period) is only possible after the unit has been dismantled and returned to us with a description of the error.

The allowed maximum electrical load capacity of the relay outputs and the total power rating of the plant must not be exceeded.

The controller should only be used for the stated intended purpose.

Safety notes

Always pay attention to the following safety notes:

The controller must be installed and operated in compliance with the relevant standards (e.g. DIN, VDE, UVV), or in accordance with the regulations laid down by the individual country.

Some functions (e.g. manual production) allow direct manipulation of the plant (valves, pumps, etc.), without locking or monitoring. These functions are thus protected by a password and are only to be used by trained personnel.

If you observe malfunctioning of the controller, switch it off immediately and inform the service personnel.

Do not attempt to repair the controller yourself (loss of warranty rights); instead always get in touch with authorized service personnel. This is the only way a reliable and safe operation of the plant can be ensured.

After protective equipment (safety fuse, motor protection circuit breaker) has been triggered, attempt, at first, to eliminate the cause of the malfunctioning (e.g. clean the pump) before reactivating the protective equipment. Frequent triggering is always due to an error which, in certain circumstances, may also cause damage to the controller.

Ignoring these notes can result in damage to the controller as well as the plant and may result in a loss of warranty rights.

Installation and commissioning

Installation as well as commissioning must only be undertaken by authorized technicians!

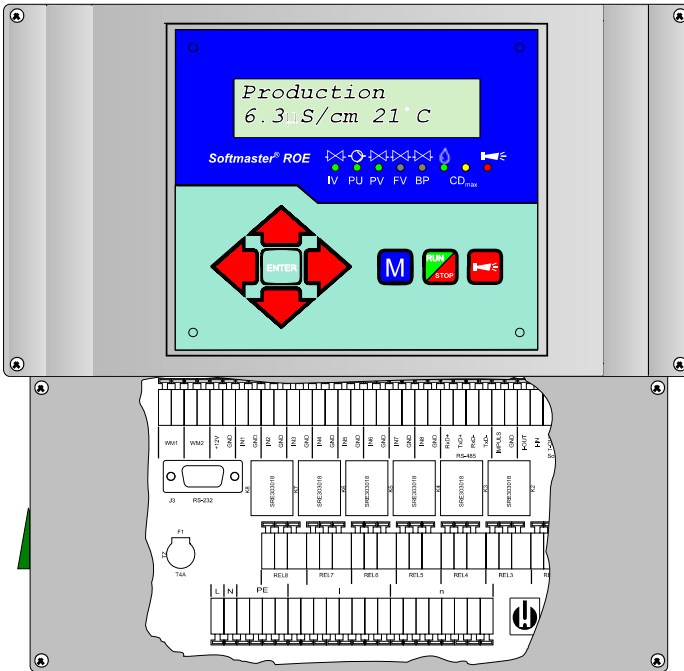
The connecting cables to the sensors should be kept as short as possible and **clear** of power cables. Close proximity to strong electromagnetic radiators can lead to deviations of the display; in this case, separate interference suppression measures should be carried out.

After installation, program the unit with the plant-specific features and data (e.g. switch functions, conductivity limit values, etc.). The data is permanently stored (also during power failure).

General description

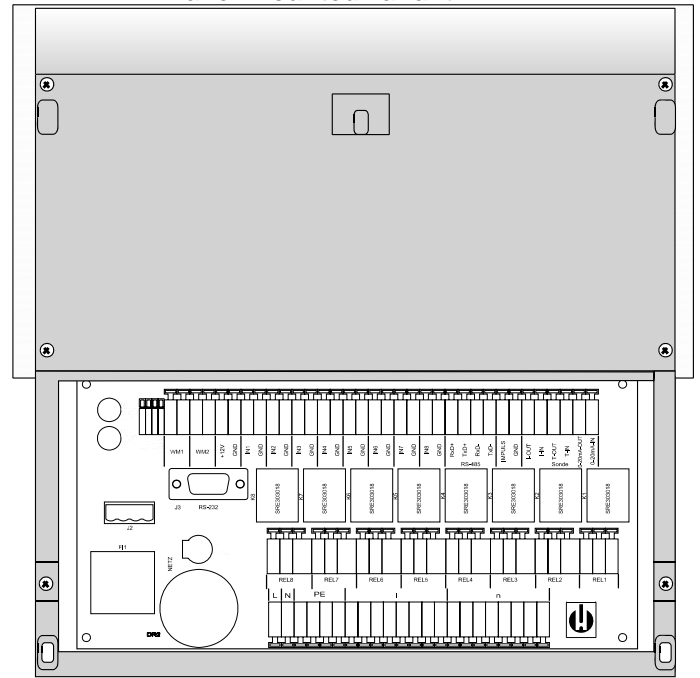
Views of unit

Wall-mounted variant



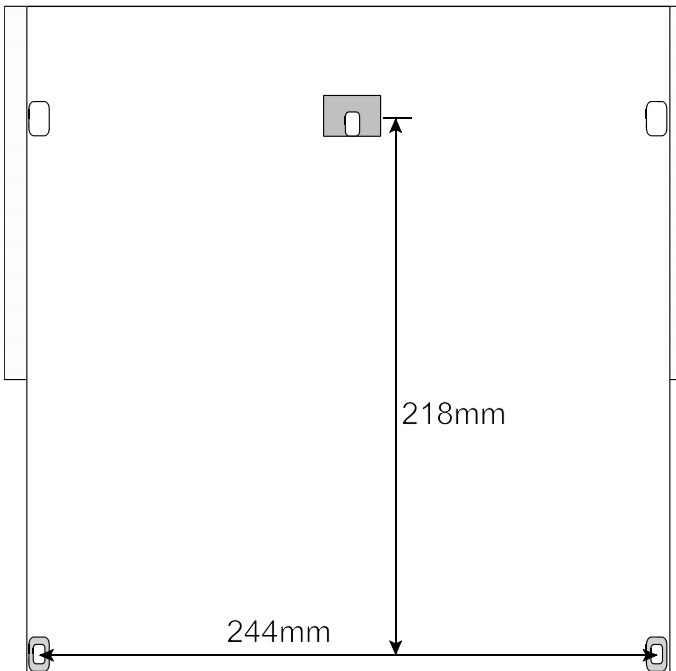
Terminal box

Panel-mounted variant

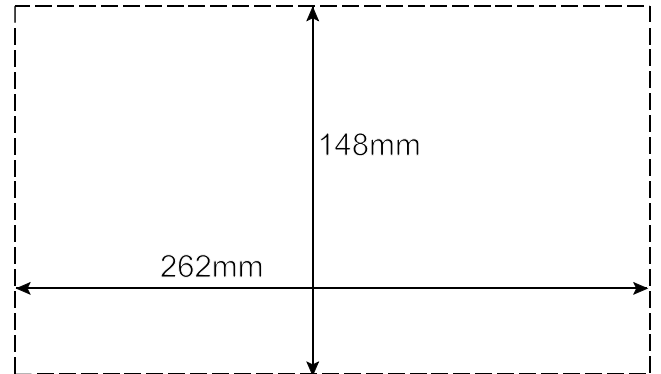


Terminal box

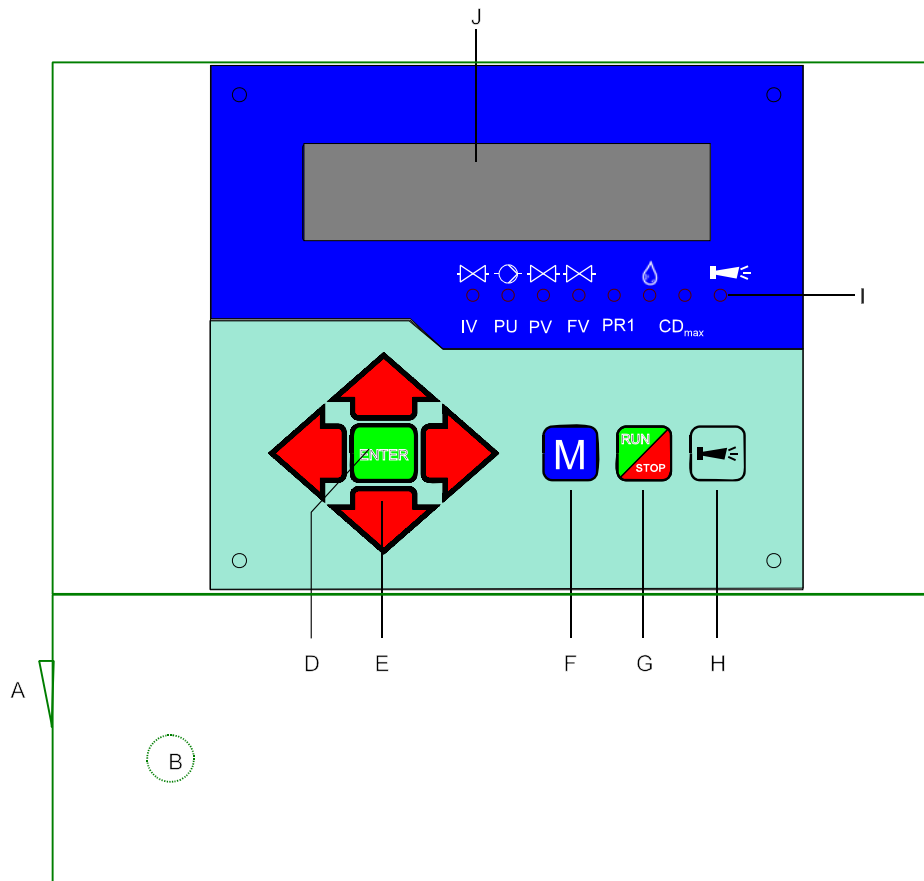
Drilling scheme for wall-mounted variant



Panel cut-out for panel-mounted variant



Description of display and operating features



A On/Off switch

Only the wall-mounted variant is equipped with a On/Off switch. Use this switch to switch the unit on or off.

B Safety fuse, max, T6.3A

The safety fuse protects the outputs against overload or a short circuit. (Inside the unit)

C Thermal fuse (optional)

Thermal fuse protection for the pump motor, max. 6.3 A.

D "ENTER" key

Confirm inputs and trigger functions with the ENTER key.

E Arrow keys

Use these keys to operate the menu drive in the display and to enter values and programming data.

F "M" key

Call the menu and return from submenu levels.

G "Run/Stop" key ("Production/Standby")

Manual triggering of production: Plant is put into operation or manual triggering for STOP/ Standby: Plant goes into the Standby position.

H "Fault OFF" key

Deletes the alarm signal at output 'AL' (Alarm); a fault display can only be deleted if the fault has been eliminated.

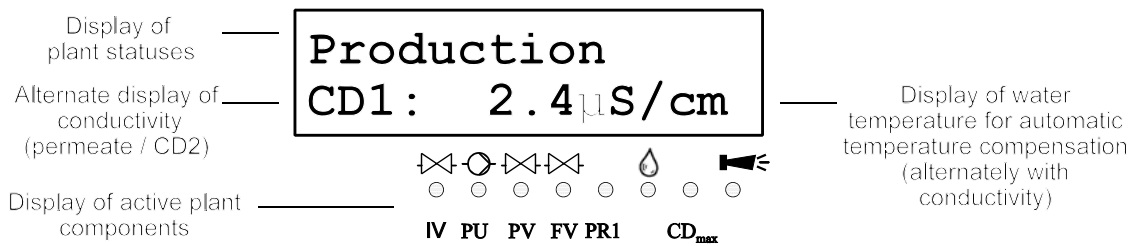
I LED functions

LED symbols always signal the status of the plant, independent of the level (menu) being worked on.

J LC display

Two lines with 16 characters, backlit.

Display functions



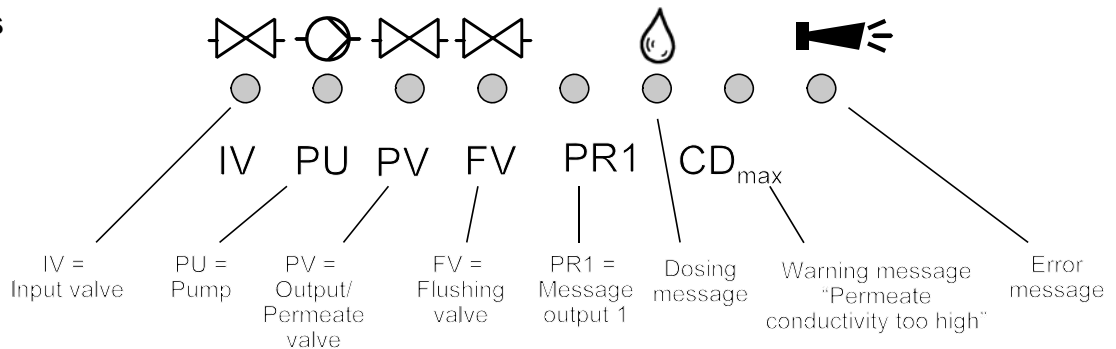
Display - top line

The top line displays plant statuses and values (described below).

Display - bottom line

Alternate display of the conductivity for permeate (CD1) and sensor CD2 (see technical data for measuring ranges) and the water temperature (2-digit, only with automatic temperature compensation).

LED displays



The LEDs display active plant components and occurring error messages.

IV (green)

LED lights up: Input valve is open.

PU (green)

LED lights up: Pump 1 and/or pump 2 is/are switched on.

PV (green)

LED lights up: Output/Permeate valve is open.

FV (green)

LED lights up: Flush valve is open.

PR1 (green)

LED lights up: Message output is switched (possible for statuses "Permeate max", "Tank empty" "Production" and/or "Stop/Standby").

Metering message (green)

LED lights up as long as the impulse output is activated.

Warning message "Conductivity too high" (yellow)

LED lights up: The limit value CD1 max and/or CD2 max have/has been exceeded.

Error message "Alarm" (red)

LED lights up: Alarm relay activated, error message not confirmed yet and error still occurring.

LED flashes: Alarm relay no longer active, error message has been confirmed but the error is still occurring.

As long as an error is still occurring, it is shown alternately with the operating display.

Operating displays

Production
CD1: 12.3 μ S/cm

Plant is in operation and produces permeate with 12.3 μ S/cm of conductivity.

Production
CD2: 1.6 μ S/cm

Plant is in operation and the following plant supplies water with 1.6 μ S/cm of conductivity.

Production
Temp: 21 °C

Plant is in operation. The water temperature is 21 °C (display only with automatic temperature compensation).

Production
Perm.: 1.6m³/h

Plant is in operation. The permeate flow at water meter WM1 is currently 1.6 cubic metres per hour.
Display is only for values > 10l/h and if programmed in the menu.

Production
Con.: 0.7m³/h

Plant is in operation. The concentrate flow at water meter WM2 is currently 0.7 cubic metres per hour.
Display is only for values > 10l/h and if programmed in the menu.

Production
Yield: 69.6%

Plant is in operation. The current yield in % (ratio of permeate and raw water).
Example: permeate 1.6 m³, concentrate 0.7 m³
Yield = 100% * permeate/(permeate + concentrate) = 69.6%

Standby
CD1: 23.8 μ S/cm

Plant is on standby with a permeate conductivity of 23.8 μ S/cm.

Flush
10m

Flush program is active (flush after production or interval flush), residual time 10 minutes.

Quality Flush
CD1: 17.3 μ S/cm

Quality flush during production is active with a permeate conductivity of 17.3 μ S/cm.

The LED "CDmax" lights up additionally.

Program the duration of the quality flush in the BASIC PROGRAM menu.

Stop

Plant has been stopped via the STOP input and is locked. It is only possible to restart production with the "Run/Stop" key after the stop input has been released.

Error messages

In addition to the displayed error messages, the red LED “Alarm” lights up or flashes.
Alternate display of all error messages and operating displays.
Each occurred error is stored in the error history.

Error message “Power failure”

Power failure	or	Power failure set clock !
---------------	----	------------------------------

Message after each switching on, unit was without voltage. Check the time and, if necessary, set the time if “set clock !” is displayed. After this, the unit is without a real-time clock (plug-in card RTC/RS232).

After switching on or after voltage recovery, the controller starts with “STANDBY”.

Check the plant for possible negative results due to the power failure.
All stored values remain stored even during power failure. The real-time clock on the plug-in card is battery buffered and thus keeps on running.

Confirm the fault display with the “Alarm” key.

Error message “CD Permeate Max”

CD Permeate Max 64.4 $\mu\text{S}/\text{cm}$	Permeate conductivity is greater than the set limit value “LV Permeate Max”
---	---

The maximum permeate conductivity has been exceeded for a longer period than the programmed test time (Delay Max) during production. The error message is displayed and, according to the programming, the plant has been switched off.

In addition to the error message, the yellow warning light “CDmax” lights up.

Confirm the fault display with the “Alarm” key.
Check the plant settings and raw water quality or check the units for possible defects.
The error display is only deleted after the fault has been eliminated.

Error message “CD Permeate Min”

CD Permeate Min 1.2 $\mu\text{S}/\text{cm}$	Permeate conductivity is smaller than the set limit value “LV Permeate Min”.
--	--

The minimum permeate conductivity has fallen below the limit value for a longer period than the programmed test time (Delay Min) during production. The error message is displayed and, according to the programming, the plant has been switched off.

Confirm the fault display with the “Alarm” key.
Check the conductivity sensor and its supply lines for interruption. There might be air in the permeate line and the sensor is not washed by water.
The error display is only deleted after the fault has been eliminated.

Error Message “CD2 Max”

CD2 Max
CD2: 32.1 μ S/cm

Conductivity CD2 is greater than the set limit value “CD2 Max”

The maximum conductivity at sensor CD2 has been exceeded for a longer period than the programmed test time (Delay Max) during production. The error message is displayed and, according to the programming, the plant has been switched off.

In addition to the error message, the yellow warning light “**CDmax**” lights up.

Confirm the fault display with the “Alarm” key.

Check the plant settings and raw water quality or check the units for possible defects.

The error display is only deleted after the fault has been eliminated.

Error Message “CD2 Min”

CD2 Min
CD2: 0.4 μ S/cm

Conductivity at the sensor CD2 is smaller than the set limit value “CD2 Min”

The minimum conductivity CD2 has fallen below the limit value for a longer period than the set test time of ten seconds during production. The error message is displayed.

Confirm the fault display with the “Alarm” key.

Check the conductivity sensor and its supply lines for interruption. There might be air in the permeate line and the sensor is not washed by water.

The error display is only deleted after the fault has been eliminated.

Error message “Temperature Max”

Temperature Max
Temp: 46 °C

The water temperature is greater than the set limit value “LV Temperature”

The maximum water temperature has been exceeded for a longer period than the programmed test time (Delay) during production.

Confirm the fault display with the “Alarm” key.

The error display is only deleted after the fault has been eliminated.

Error message “Low water pressure“

Low water press.
CD1: 16.8 μ S/cm

The pressure switch in front of the pressure pump for the dry-running protection has triggered.

The plant has been switched off after the programmed delay time (Delay LP). Restart the plant with the "RUN/STOP" key. If water is still low, the plant is switched off again after the delay time.

When automatically controlling the re-filling of the storage tank, the plant is restarted 10 minutes after it has been switched off via the dry-running switch.

Program the number of restart attempts after low water pressure under “Switch on” in menu “Funct. low water pressure”.

Confirm the fault display with the “Alarm” key.

The error display is only deleted after the fault has been eliminated.

Error message "Excess pressure"

Excess pressure
CD1: 16.8µS/cm

The pressure switch behind the pressure pump for the protection of the units against excess pressure has triggered.

The plant has been switched off after the programmed delay time (Delay HP). Restart the plant via the "RUN/STOP" key. If renewed excess pressure occurs, the plant is switched off again after the delay time.

Confirm the fault display with the "Alarm" key.
The error display is only deleted after the fault has been eliminated.

Error message "Motor protection"

Motor protect.
CD1: 16.8µS/cm

The motor protection circuit breaker of the pressure pump has triggered.

After triggering the protective switch, the plant has been switched off immediately. Restart the plant via the "RUN/STOP" key if the motor protection has been re-released.

Confirm the fault display with the "Alarm" key.
The error display is only deleted after the fault has been eliminated.

Error message "Concentrate flow"

Concentrate flow
CD1: 16.8µS/cm

The flow controller in the concentrate line has triggered because the concentrate quantity is too low.

The error message is displayed and, according to the programming, the plant has been switched off after the programmed delay time (Delay CO). Restart the plant with the "RUN/STOP" key.

Confirm the fault display with the "Alarm" key.
The error display is only deleted after the fault has been eliminated.

Error message "Conductivity measuring range has been exceeded"

Exceed range CD
CD1: OFL µS/cm

The measuring range of the conductivity measuring instrument has been exceeded.

Confirm the fault display with the "Alarm" key. Check whether short circuiting has occurred in the sensor or its supply lines and also check the programming of the cell constants.

Confirm the fault display with the "Alarm" key.
The error display is only deleted after the fault has been eliminated.

Error message "Maximum quality flushing duration has been exceeded"

Exc.Q-flush. time
CD1 16.8µS/cm

Even after quality flush, the permeate conductivity is still greater than the set limit value "LV Permeate Max".

The error message is displayed and emergency service starts (production in spite of the high conductivity, no switch off with LV permeate max). The yellow warning light "CDmax" additionally lights up.

Confirm the fault display with the "Alarm" key. Check the settings of the plant and the raw water quality or check the units for possible defects. The error display is only deleted after the fault has been eliminated.

Error message "Temperature low"

Temperature low Temp : 0 °C

The water temperature is lower than 1 °C.

The water temperature during production has fallen below the minimum water temperature. Check whether short circuiting has occurred in the sensor or the temperature sensor PT100 or in their supply lines.

Confirm the fault display with the "Alarm" key.
The error display is only deleted after the fault has been eliminated.

Error message "External error"

External error CD2 : 1.8 μS/cm

A plant component is faulty, the message signal occurs at contact input PROG and the input is programmed as "external fault".

Confirm the fault display with the "Alarm" key.
Check the respective plant component and, if necessary, check its error message.
The error display is only deleted after the fault has been eliminated.

In addition to confirmation via the "Alarm" key, error messages can also be confirmed via a signal at input PROG. Program the input as "delete fault" (also see page 16, Input PROG).

Terminal block identification

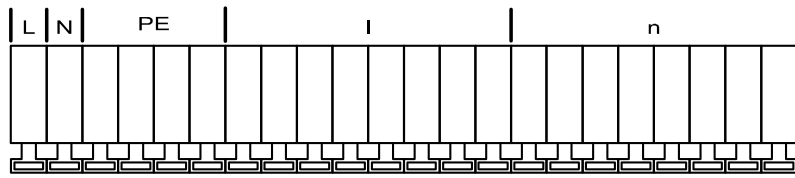
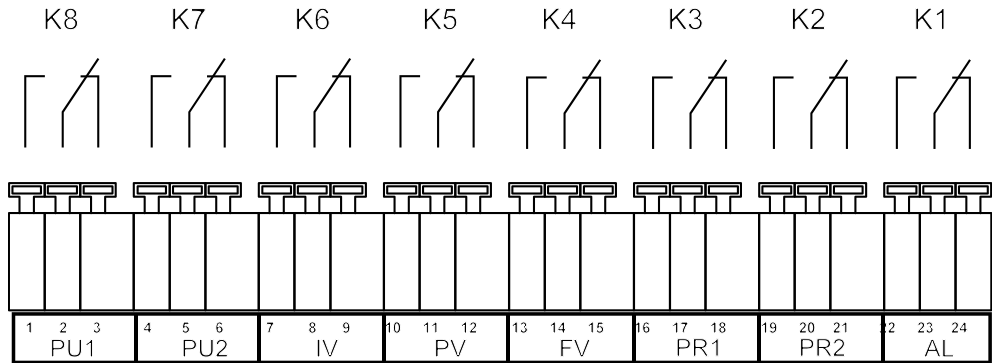
Functions (IN = input, OUT = output)

No.	Terminal	Type	Function	Note
	PE	IN	4x Mains-Protective earth	
	N L	IN	Mains, N = Neutral Mains, L = Live	Mains-input 230 - 240 V AC
	n l	OUT	8x Neutral switched 8x Live switched	Mains voltage, max. 4 A
1 2 3	PU1	OUT	Pump 1 - normally open Pump 1 - common Pump 1 - normally closed	Volt-free relay output max. load 240 V AC, 6 A
4 5 6	PU2	OUT	Pump 2 - normally open Pump 2 - common Pump 2 - normally closed	Volt-free relay output max. load 240 V AC, 6 A
7 8 9	IV	OUT	Input valve - normally open Input valve - common Input valve - normally closed	Volt-free relay output max. load 240 V AC, 6 A
10 11 12	PV	OUT	Output valve - normally open Output valve - common Output valve - normally closed	Volt-free relay output max. load 240 V AC, 6 A
13 14 15	FV	OUT	Flush valve - normally open Flush valve - common Flush valve - normally closed	Volt-free relay output max. load 240 V AC, 6 A
16 17 18	PR1	OUT	Programmable message output 1 "Tank empty", "Production" "CD1max", "Stop/Standby" (see "FUNCTIONS")	Volt-free relay output max. load 240 V AC, 6 A
19 20 21	PR2	OUT	Programmable message output 2 "CD2max", "CD2min", "CD2minmax" (see "FUNCTIONS")	Volt-free relay output max. load 240 V AC, 6 A
22 23 24	AL	OUT	Fault message output - normally open Fault message output - common Fault message output - normally closed	Volt-free relay output max. load 240 V AC, 6 A
25 26	WM1 ⊥	IN	Water meter input 1 common load for inputs	See water meter description!
27 28	WM2 ⊥	IN	Water meter input 2 common load for inputs	See water meter description!
29 30	+12V ⊥	IN	12V-supply for turbine common load for inputs	See water meter description!
31 32	HP ⊥	IN	Overpressure message common load for inputs	Only for volt-free normally open/ normally closed contact!
33 34	LP ⊥	IN	Low water message common load for inputs	Only for volt-free normally open/ normally closed contact!
35 36	CO ⊥	IN	Concentrate monitoring common load for inputs	Only for volt-free normally open/ normally closed contact!
37 38	HL ⊥	IN	Storage tank FULL common load for inputs	Only for volt-free normally open/ normally closed contact!
39 40	LL ⊥	IN	Storage tank EMPTY common load for inputs	Only for volt-free normally open/ normally closed contact!
41 42	MP ⊥	IN	external motor protection circuit breaker common load for inputs	Only for volt-free normally open/ normally closed contact!
43 44	STOP ⊥	IN	Stop plant common load for inputs	Only for volt-free normally open/ normally closed contact!
45 46	PROG ⊥	IN	Emergency service (By-pass), see "Funct. PROG" common load for inputs	Only for volt-free normally open/ normally closed contact!
47 48 49 50	nc I-OUT- nc I-OUT+	OUT	Current interface 0/4-20mA (optional with plug-in card, see Technical Data)	- Conductivity CD1 or CD2 - Indirect-coupled
51 52	Impulse ⊥	OUT	Metering impulse (open collector) common load	Max. load 100mA, see metering output description
53 54	CD1	IN	Conductivity electrode for permeate	
55 56	PT100	IN	Temperature sensor PT100	Water temperature (permeate or raw water)
57 58	CD2	IN	Conductivity electrode for second measuring point CD2	

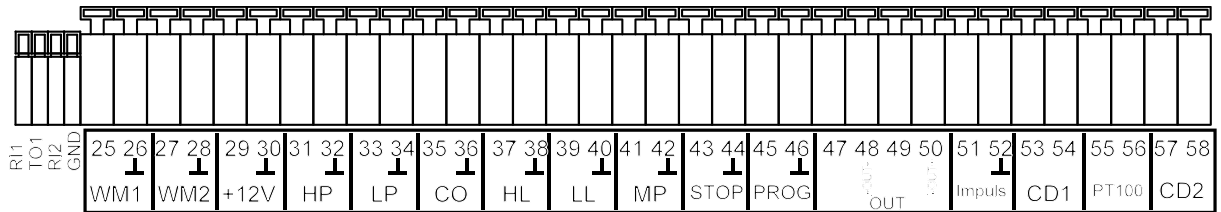
Continuation of terminal block identification

No.	Terminal	Type	Function	Note
	R11 TO1 RI2 GND	IN/ OUT	Serial interface RS232, RxD Serial interface RS232, TxD Serial interface RS232, DTR/DSR Serial interface RS232, load	Parallel to D-SUB-plug RS-232 (J3)

Terminal blocks for mains supply and relay outputs



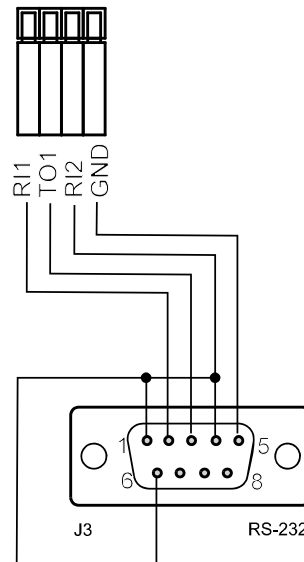
Terminal block for inputs and interface



Serial interface RS232

- PIN 2 - RxD
- PIN 3 - TxD
- PIN 4 - DSR, DTR
- PIN 5 - GND, load

Please observe that the peripheral devices are connected via a neutral modem cable!



Description of relay outputs

PU1 / PU2, pressure pumps 1 and 2

Driving motors with different power consumptions can be used for the pressure pump of the osmosis plant. Fuse protection occurs internally via a safety fuse T6.3A. When using a three-phase motor, an appropriate power protection contactor has to be pre-connected.

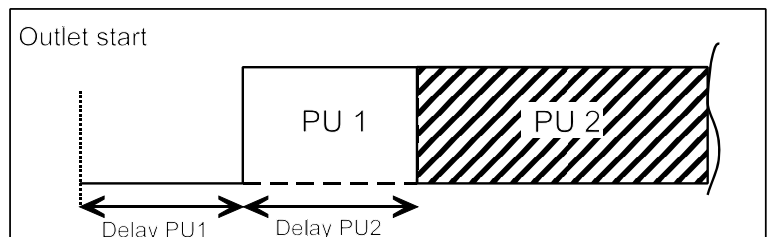
The input valve always opens when switching to production. The pressure pump starts after a programmable delay time. Four operating modes can be selected:

- Production only with pump 1,
 - Production only with pump 2,
 - Serial connection = Pump 1 and pump 2 are connected in series. Output PU2 is switched with a delay after PU1 has been switched on.
 - Change-over connection: The pumps are installed in parallel and are operated alternately.
- Set the operating mode and test time under menu option

"M" → BASIC PROGRAM → Fct. Pump

If the pump is equipped with a motor protection circuit breaker with a volt-free message contact, it is possible to connect it to input "MP". The controller will then monitor pump faults (see description of input MP motor protection).

Cycle diagram pump delay:



IV Input valve

The input valve is open during "Production", "Quality flush" and "Flush". It should be designed in a way that it opens under control voltage. Use the following menu option to program that the input valve is closed during flush:

"M" → BASIC PROGRAM → FLUSHING MODE → with input valve IV

FV Flush valve

The osmosis plant can be equipped with a flush valve in order to avoid unacceptable high deposits at the units. Flush can take place after the end of the "Production" and/or in fixed intervals after the last switching to the "Standby" position. Interval flush prevents unacceptable bacterial contamination of the units.

Flush is interrupted as soon as the controller switches to "Production", e.g. when pressing the "Production" key or if water is requested via a level transmitter in the storage tank.

No interval flush occurs after production stop.

Program the flushing duration (0 - 99 minutes), flushing mode (with/without pump or with pump 1 + 2) and the interval flush in the basic program.

"M" → BASIC PROGRAM → FLUSHING DURATION or FLUSHING MODE or INTERVAL FLUSH.

PV Output valve (Permeate valve)

This valve is open as long as the water conductivity is below the set limit value "LV Permeate Max". A flush valve which closes under voltage can be connected instead of the output valve. The use of both valves or of a 3/2-way valve is also possible. Use the following menu option to program whether the output valve should be closed or not during flush:

"M" → BASIC PROGRAM → FLUSHING MODE → with output valve PV

PR1 programmable function output 1

It is possible to program the function of this volt-free relay output as follows:

1. **Permeate max:** Message "LV permeate max" (CD1) has been exceeded
or
2. **Tank empty:** Message "Tank (storage tank) empty"
or
3. **Production:** Message "Plant in operation"
or
4. **Stop/Standby:** Message "Plant on Standby or STOP"

"M" → BASIC PROGRAM → Funct. OUT PR1

PR2 programmable function output 2

It is possible to program the function of this volt-free relay output as follows:

1. **CD2 Max:** Message conductivity "CD2 Max" has been exceeded
oder
2. **CD2 Min:** Message conductivity "CD2 Min" has not been achieved
oder
3. **CD2 MinMax:** Two-step controller, PR2 contact switches if conductivity "CD2 Min" has not been achieved and is released if conductivity "CD2 Max" has been exceeded.

"M" → BASIC PROGRAM → Funct. OUT PR2

AL Fault message output ("Alarm")

Output "AL" is a volt-free change-over relay contact. During trouble-free operation, the contact between the terminals 23 - 24 is closed and the one between terminals 22 - 23 is open. During power failure or if an error occurs, the contact between terminals 22 - 23 is closed and the one between 23 - 24 is open.

The controller monitors several plant statuses. Output "AL" remains activated (terminals 22 - 23 closed) until the fault ceases.

A fault is displayed with the red LED "Error message" and on the display.

The fault message signal at output "AL" is deleted by confirming the fault with the "Alarm" key.

The fault display can only be deleted if the fault has been eliminated.

The following faults activate output "AL" and are displayed if the osmosis plant has been equipped with the appropriate sensors:

Statuses which **always** trigger a fault message:

Power failure
Motor protection MP
Low water pressure LP (after switch off)
Concentrate low CO
Excess pressure HP
Max. q. flushing duration exceeded
Min. conductivity CD1/CD2 exceeded
Max. conductivity CD1/CD2 exceeded

Cond. measuring range CD1/CD2 exceeded
Max. water temperature exceeded
Min. water temperature insufficient

According to the programmed PROG input:
External fault

See page 22 for further descriptions about error messages and programming.

Impulse / Metering output

Use the output "Impulse" to control a dosing pump if an anti-scaling medium is to be dosed during production or flush. For this, a water meter has to be connected to input "WM1" or "WM2". The impulse ratio is adjustable.

Example:

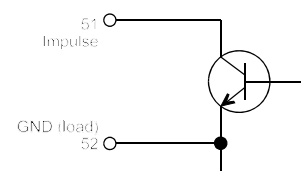
An impulse length of 1 second should be given per 50 litres: $L/Imp. = 50, l.length = 1sec$

"M" → BASIC PROGRAM → Metering

"M" → BASIC PROGRAM → Water meter 1

"M" → BASIC PROGRAM → Water meter 2

The output is an open collector transistor with a **max. load capacity of 100mA**.



Description of signal inputs

Note!

Connect the signal inputs "MP", "HL", "LL", "HP", "LP", "STOP", "CO" and "PROG" only to **volt-free** contacts!

MP Motor protection

When using pumps which are equipped with a motor protection circuit breaker with a volt-free message contact, it is possible to connect this switch to input "MP". The controller will then monitor and, according to the programming, evaluate pump faults.

Type of connection in plant concepts with two pumps:

Function	Test time	Type of contact	Type of contact connection	Action
– Message contact of an external motor protection circuit breaker	none	Normally closed	Serial connection	– Switch off – Continuous alarm – Entry in error list
		Normally open	Parallel connection	

Please program the input "MP" according to the operating mode of the message contact:

"M" → BASIC PROGRAM → Funct. Motor prot.

HL and LL High and Low level

Connections for volt-free contacts

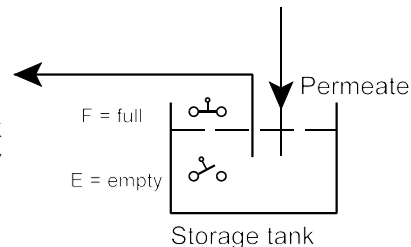
Function	Type of contact	Test time	Action
HL – Level transmitter input "High Level" – Pressure switch input	Normally closed	2 seconds	– End production (with a connected high level transmitter) – Start production (with a connected pressure switch)
LL – Level transmitter input "Low Level"	Normally open	2 seconds	– Start production (with a connected low level transmitter)

The connections "HL" and "LL" can be used for controlling the production:

a) For plants with a storage tank:

As soon as the lower level "Tank empty" (connection "LL") has been reached, the contact transmitter closes and the plant is switched on ("Production"). It is only switched off again if the upper level "Tank full" (connection "HL") has been reached and this contact transmitter opens.

It is also possible to use only an upper level transmitter (float switch) or a remote control switch (Production/Standby) instead of two level transmitters. In this case, the connection "LL" has to be connected via a bridge with "⊥". The "Run / Stop" key ("Production / Standby") will then be without function.



Note!

If using automatic concentrate displacement via permeate (flush), observe that, depending on the pressure ratios, soft water can still run into the storage tank until the end of the flushing duration. Due to this, the upper level transmitter has to be arranged in a way that an tank overflow is avoided. For safety reasons, the tank should in any case have an tank overflow to the drain.

Note!

When operating the osmosis plant without a level transmitter (manual operation), a bridge has to be connected across the connection "HL". A bridging of the connection "LL" is **not** allowed.

b) For plants with one pressure switch or remote control switch:

Connect a bridge to the connection "LL" and the pressure switch to the connection "HL". The pressure switch must have a normally closed contact.

HP Excess pressure

Connection for volt-free pressure switch

Function	Type of contact	Test time	Action
Pressure monitoring in front of or behind the unit	programmable normally closed/ normally open	programmable 00 - 99 seconds	<ul style="list-style-type: none">– Switch off of the plant– Continuous alarm– Entry in error list

Install a excess pressure governor either at the raw water side or at the concentrate side in order to protect the unit. A serial or parallel connection of two pressure governors is also possible.

If the pressure governor switches, the plant is switched off after a programmable test time. The fault is displayed with the red LED "Error message" and on the display. A continuous alarm occurs at output "Alarm" and an entry in the error list takes place.

"M" → BASIC PROGRAM → Funct. Excess pressure

Press the "Production" key to restart the plant. If the pressure is still too high, the plant is once again switched off after the test time.

Note!

When operating the osmosis plant without excess pressure governor, the connection "HP" has to be bridged and programmed as normally open.

LP Low water pressure

Connection for volt-free pressure switch

Function	Type of contact	Test time	Action
Pressure monitoring in front of the pump	programmable normally closed/ normally open	programmable 00 - 99 seconds	programmable <ul style="list-style-type: none">– Restart, up to 5 x not programmable <ul style="list-style-type: none">– Switch off of the plant– Continuous alarm after switch off– Entry in error list

Install a pressure governor in front of the pump in order to protect the pressure pump. A serial or parallel connection of two pressure governors is also possible.

If the pressure governor switches, the plant is switched off after a programmable test time. The fault is displayed with the red LED "Error message" and on the display. A continuous alarm occurs at output "Alarm" and an entry in the error list takes place.

"M" → BASIC PROGRAM → Funct. Low water press.

It is possible to program the reaction of the controller during low water. Determine how often the plant is to be restarted. Restart occurs after 10 minutes (fixed). If the water is still too low, the plant is once again switched off after the test time and until the number of restarts has been reached.

Note!

When operating the osmosis plant without a pressure governor for low water identification, the connection "LP" has to be bridged or programmed as normally open.

STOP Switch off of the plant

Connection for volt-free pressure contact

Function	Type of contact	Test time	Action
External switch-off of the plant	programmable normally closed/ normally open	programmable 00 - 99 seconds	<ul style="list-style-type: none">– switch off of the plant

During production, it might be necessary to interrupt the production externally via a switch. In the case of pre-connected single filter plants, the osmosis plant should not switch to "Production" during regeneration in order to avoid the operation of units with hard water.

Interval flush is suppressed via the function "STOP".

The plant switches off if the input is activated (as normally closed or normally open).

"M" → BASIC PROGRAM → Funct. Stop

CO Concentrate monitoring
 Connection for volt-free contact

Function	Type of contact	Test time	Action
Concentrate flow monitoring	programmable normally closed/normally open	programmable 00 - 99 seconds	<ul style="list-style-type: none"> - Continuous alarm - Entry in error list programmable: - Switch off of the plant

In order to protect the unit, it is possible to monitor the concentrate flow with a flow meter equipped with a limit contact maker. The plant can be switched off after a programmable test time if the limit contact maker switches. The fault is displayed with the red LED "Error message" and on the display. According to the programming, a continuous alarm or a message impulse occurs at output "Alarm" and an entry in the error list takes place.

"M" → BASIC PROGRAM → Funct. Concentrate

Note!

When operating the osmosis plant without concentrate monitoring, the connection "CO" has to be bridged or programmed as normally open.

PROG Programmable function input

Connection for volt-free contact

Function	Type of contact	Test time	Action
programmed as message input "external fault"	programmable normally closed/normally open	none	<ul style="list-style-type: none"> - By-pass valve opens - Continuous alarm - Entry in error list
programmed as signal input "eliminate fault"	programmable normally closed/normally open	none	<ul style="list-style-type: none"> - Flush stop - Continuous alarm - Entry in error list

"M" → BASIC PROGRAM → Funct. PROG

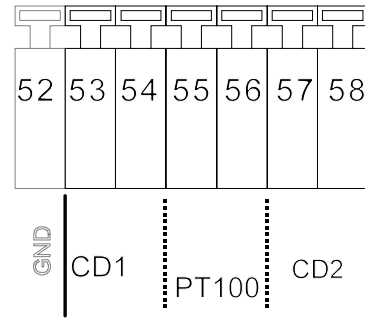
CD1 Connection for conductivity sensor

The device is equipped with two measuring amplifiers for conductivity measurement.

The conductivity sensor at connection CD1 measures the permeate conductivity. The conductivity sensor at connection CD2 measures and monitors the conductivity of the flowing water or the product water of a downstream system (e.g. EDI).

Different measuring ranges arise due to the connection of sensors with different cell constants:

Terminal block identification:



Measuring range	Cell constant	Sensor name, e.g.
0.01 - 99.9 $\mu\text{S/cm}$	0.01 cm^{-1}	SOE0, STE0 PT100
0.1 - 999.9 $\mu\text{S/cm}$	0.1 cm^{-1}	SO1, ST1 PT100, SOE1
0.5 - 4999 $\mu\text{S/cm}$	0.5 cm^{-1}	SO5, SOE5, ST5 PT100
1 - 9999 $\mu\text{S/cm}$	1.0 cm^{-1}	SD10, SO10
5 $\mu\text{S/cm}$ - 49.99 mS/cm	5.0 cm^{-1}	STE50 PT100

If the measuring range is exceeded, "OFL" appears in the conductivity display and the error message "Exceed measuring range CD" is additionally displayed.

Program the used cell BASIC PROGRAM VALUES → Probe Permeate

Program the used cell constant of the second permeate monitoring under:

"M" → BASIC PROGRAM → Probe CD2

It is possible to use deviating cell constants by calibrating the sensor with a conductivity calibration solvent. Use "dry" or zero point calibration to balance measured value distortions due to cable capacities. For this, please observe the description about calibration.

See the function description "conductivity monitoring" for information about the functionality of the limit values.

PT100 Connection for temperature sensor PT100

Function	Connection	Test time	Action
Temperature compensation	PT100, integrated in sensor or external	none	Temperature compensation factor programmable 0.1 - 9.9%/°C
Temperature monitoring	PT100, integrated in sensor or external	programmable 1 - 99 seconds	<ul style="list-style-type: none"> - Continuous alarm - Entry in error list programmable - Switch off of the plant

Both functions can be used simultaneously.

Please connect a **temperature sensor PT100** to the input "PT100" if automatic temperature compensation (of the conductivity) is to be used; preferably use a conductivity sensor with integrated PT100. It is also possible to use a separate temperature sensor, but it has to be installed near the conductivity sensor.

"M" → BASIC PROGRAM → Temp. compensat.

Water temperature monitoring

In addition to the temperature compensation, the device can also monitor the water temperature. If a maximum value is exceeded the plant can be switched off and an alarm given.

"M" → BASIC PROGRAM → LV temperature

I-OUT+ / I-OUT- current interface 0 /4 - 20 mA (terminals 47 - 50)

Function	Connection	Test time	Action
Current interface 0/4 - 20 mA	Terminals 48 / 50 Load max. 500 Ohm	Con permeate Con CD2 0-20mA 4-20mA 20mA = xxx µS/cm	- Conductivity Permeate CD1 - Conductivity CD2 - Range 0-20mA - Range 4-20mA - Range conductivity-current

It is possible to change the function of the current output via selection in the menu:

"M" → BASIC PROGRAM → 0/4-20mA OUT

Functioning

Switching on and power failure

After switching the unit on and after each power failure, the plant automatically returns to the Standby position. Prior to the Standby-position another flush takes place according to the programmed flushing duration (see programming). The plant can either be switched on manually by pressing the "RUN/STOP" key ("Production/Standby") or, e.g., automatically via existing level transmitters in the storage tank.

Production / Run

Use the "RUN/STOP" ("Production/Standby") key to switch on the pressure pump(s) of the osmosis plant. The control lamp "Pump" ("PU") lights up, the input valve opens and after a delay time the motor of the pressure pump starts. During production, it is possible to monitor the raw water pressure in front of the pressure pump (dry-running protection) as well as the pressure behind the pressure pump (overpressure protection) via pressure switches and to monitor the concentrate (concentrate flow) via a flow controller if the osmosis plant is equipped with the appropriate sensors. Additionally, the permeate conductivity is measured, displayed and compared with a minimum and maximum limit value.

The switching on and off can also take place automatically via level transmitters in the storage tank if the osmosis plant is equipped with a storage tank.

It is possible to interrupt the production temporarily via an external switch (input "STOP") in order to, e.g., regenerate a pre-connected softening plant.

Standby

Press the "RUN/STOP" ("Production/Standby") key if water is no longer required. The pressure pump is switched off and the display shows "Standby". If the osmosis plant is equipped with a storage tank, the switching on and off can also take place automatically via level transmitters in the storage tank. In the case of plants with a flush valve, there is a re-rinsing phase (flush after production) prior to the position "Standby". During this time, "Flush" is shown on the display and the control lamp "flush valve" ("FV") lights up.

While switching from production to flush the pressure pump is, with opened input and flush valve, switched off for 5 seconds in order to achieve a pressure compensation of the plant.

The water pressure before and after the pressure pump, the concentrate flow as well as the conductivity limit values are not monitored in the "Standby" position.

Flush after production

The osmosis plant can be equipped with a flush valve (connection "FV") in order to avoid unacceptable high deposits at the units. Flush is started after the end of the production if the storage tank is filled or by pressing the "RUN/STOP" ("Production/Standby") key.

Program the necessary flushing duration in the basic program under "Flushing duration". Please set the flushing duration to 0 minutes if no flush is to take place after the production.

Flush is cancelled as soon as the "RUN/STOP" ("Production/Standby") key is pressed or if water is requested via a limit transmitter in the storage tank.

Interval flush

After the last switch off (in the Standby position), flush can occur at fixed intervals. Unacceptable bacterial contamination of the units is avoided due to this interval flush. Enter the interval time (0 - 99 hours) and the flushing duration (1 - 999 minutes) in the basic program ("Interval flush").

Flush is cancelled as soon as the "RUN/STOP" ("Production/Standby") key is pressed or if water is requested via a limit transmitter in the storage tank.

With production stop, no interval flush takes place.

Quality flush and emergency service

During production, it is checked whether the permeate conductivity rises above the upper limit value (LV Permeate Max). If it is too high and **quality flush** (Quality flush: ON) but no switch off at too high conductivity (LV Permeate Max: Switch off) has been programmed, quality flush is started for the programmed duration after the end of the set test time for the upper limit value.

It is switched back to production if the conductivity falls again due to the flush. If, on the other hand, the conductivity remains as high, **emergency service** starts after the quality flush. The storage tank is filled despite the too high conductivity. The emergency service is not shown extra on the display (display: "Production").

Emergency service is terminated as soon as the conductivity is below the upper limit value.

Conductivity monitoring

The integrated conductivity measuring instrument is used for the quality monitoring of the plant.

"OFL" appears on the display if the measuring range is exceeded.

Temperature compensation of the conductivity can either take place automatically or manually with a programmable compensation factor. Sensors with PT100 temperature sensors (or external sensors) have to be used for the automatic compensation. In the case of manual compensation (suitable with constant water temperature), enter the temperature. See "Description of the inputs: PT100" for further explanations.

Description of the functionality and programming of the conductivity limit values:

LV Permeate Max: Maximum conductivity value which should guarantee a sufficient water quality.

"M" → BASIC PROGRAM → LV Permeate Max

LV Permeate Min: Minimum conductivity value which is necessary due to the existing raw water quality. However, if conductivity should fall below this value, an error in the plant or the controller is present.

(e.g. in the case of an interruption between controller and measuring sensor = parting of a cable).

"M" → BASIC PROGRAM → LV Permeate Min

CD2 Max: Maximum conductivity value at sensor CD2 which should guarantee a sufficient water quality.

"M" → BASIC PROGRAM → Probe CD2 → Max:

CD2 Min: Minimum conductivity value at sensor CD2 which has to be maintained. However, if conductivity should fall below this value, there is possibly an error in the subsequent plant (e.g. no water at the measuring sensor).

"M" → BASIC PROGRAM → Probe CD2 → Min:

The functionality of the limit values is stated in the table below:

Limit value	Test time	Action
LV Permeate Max exceeded	programmable 1 - 99 seconds	<ul style="list-style-type: none"> - LED display "CDmax" lights up - Continuous alarm - Entry in the error list programmable <ul style="list-style-type: none"> - Switch off of the plant
LV Permeate Min fallen below	programmable 1 - 99 minutes	<ul style="list-style-type: none"> - Continuous alarm - Entry in the error list programmable <ul style="list-style-type: none"> - Switch off of the plant
CD2 Max exceeded	programmable 0 - 99 seconds	<ul style="list-style-type: none"> - LED display "CDmax" lights up programmable <ul style="list-style-type: none"> - PR2 switches - Continuous alarm - Entry in the error list - Switch off of the plant
CD2 Min fallen below	fixed 10 seconds	programmable <ul style="list-style-type: none"> - PR2 switches/releases - Continuous alarm - Entry in the error list

Programming

Start menu

Call the menu via the "M" key.

Menu selection

The current line position is displayed as a heading in CAPITAL LETTERS. Activate the selected/displayed menu option with the "ENTER" key, i.e. you "jump" into a submenu. Call the next menu point with the "DOWN" arrow key: thus you "scroll" the menu.

Input

Inputs are only possible in the program menu and in some SERVICE menu options.

Select a programming step with the "DOWN" and "UP" arrow keys and activate the input function via the "ENTER" key.

When entering digits, the digit/position to be changed flashes.

Change to the next or previous digit (now flashing) with the "Right" and "Left" arrow keys.

Change the value or selection with the "DOWN" and "UP" arrow keys.

Selected functions are marked with a ✓ if selection is possible.

Terminate the input function with "ENTER".

Change to the higher-order menu with the "M" key.

End menu

Return to the higher-order menu with the "M" key. After returning from the highest menu level, the unit is once again in the display function. The controller returns to the normal operating display (automatic menu end) after 2 minutes in the menu if a key is not pressed.

Information menu

"M" → Information

Request the current settings without entering a password in the information menu.

The information menu is still displayed even if an incorrect password has been entered.

Programming

"M" → BASIC PROGRAM

Enter password

The programming menu is protected by a 3-digit password (number between 000 and 999) in order to prevent unauthorised intervention in the programming.

Enter the password under

"M" → BASIC PROGRAM → Password input and confirm the input with "ENTER".

You are now in the menu **BASIC PROGRAM**.

Change password

Enter or change your individual password at any time. For this, enter the old password (OLD:) and then the new one (NEW:).

FLUSHING MODE	
with Pump 1	*
with Pump 2	-
with valve PV	*
with valve IV	-



MENU
Service
Information
Basic program

BASIC PROGRAM
Password input
Password change
Password

Flushing mode

It is possible to select and combine the units which are to be activated during flush as desired:

With pump 1 and/or with pump 2,
with output valve/permeate valve PV
and/or with input valve IV.

The flush valve FV is generally active for the duration of the flush.

Flushing duration

Enter the desired duration for the re-rinsing (also see "Flush after production"):

The components selected under "Flushing mode" as well as the flush valve FV are active during flush.

Interval flush

Enter the interval for the automatic flush during standstill of the plant in hours and the desired duration in minutes.

The components selected under "Flushing mode" as well as the flush valve FV are active during interval flush.

Quality flush

Depending on the permeate conductivity (quality), it is possible to start a flush during the production. If the conductivity rises above the limit value LV Permeate Max, the unit is flushed for the entered duration.

If the permeate conductivity is still too high after the flushing duration, the emergency service will be started. (See page 18)

Probe CD1 Permeate

Program the cell constant C of the used conductivity sensor CD1:
(Possible values: 0.01 - 5.0/cm)

LV Permeate Max., Maximum limit value permeate conductivity

Max.:

Enter the maximum conductivity which should guarantee sufficient water quality.

Delay Max.

Delay time in minutes after which an alarm should be triggered if the maximum limit value has been exceeded.

Switch-off

Program "Switch-off" if the plant should be switched off after the end of the delay time if the maximum limit value has been exceeded.

LV Permeate Min., Minimum limit value permeate conductivity

Min.:

Minimum conductivity value which is necessary due to the existing raw water quality. However, if conductivity does fall below this value, an error in the plant or the controller is present.

Delay Min.

Delay time in seconds after which an alarm is triggered if the value has fallen below the minimum limit value.

Switch-off

Program "Switch-off" if the plant should be switched off after the end of the delay time if the value has fallen below the minimum limit value.

FLUSHING DURAT.	
Duration	10m

INTERVAL FLUSH	
Interval	99h
Duration	99m

QUALITY FLUSH	
ON	
Durat. max.	9m

PROBE PERM.	
C =	01.00/cm

LV PERMEATE MAX.	
Max.:	100.0µS/cm
Delay max.	10m
Switch off	*

LV PERMEATE MIN.	
Min.:	5.0µS/cm
Delay min.	100s
Switch off	*

Probe CD2

Program the cell constant C of the used conductivity sensor:
(Possible values: 0.01 - 5.0/cm)

Max.: Maximum limit value conductivity CD2

Enter the maximum conductivity which should guarantee sufficient water quality.

Min.: Minimum limit value conductivity CD2

Minimum conductivity value which is necessary due to the existing water quality. However, if conductivity does fall below this value, an error in the plant or the controller is present.

Delay Max.

Delay time in minutes after which the switch function is active, an alarm should be triggered or the plant switched off if the maximum limit value **CD2 Max** has been exceeded.

Switch-off

Program "Switch-off" if the plant should be switched off after the end of the delay time if the value has exceeded the maximum limit value **CD2 Max**.

Alarm

Program alarm if the alarm relay should be switched after the end of the delay time if the value has exceeded the maximum limit value **CD2 Max**.

PROBE CD2	
C =	0.10/cm
Max.:	5.0µS/cm
Min.:	1.5µS/cm
Delay	1s
Switch off	-
Alarm	-

Temperature compensation

Automatic/manual

Please connect a **temperature sensor PT100** to the connection "PT100" and program automatic compensation if the temperature compensation of the conductivity should occur automatically.

Factor (temperature coefficient in %/°C)

Enter the temperature compensation factor of the medium to be measured. The value for natural waters is approx. 2%/°C. Use reference measurements to determine the temperature coefficient for ultra pure water and with very small conductivities:

First, program the factor to 1.0 and measure the conductivity and the temperature of the medium at a temperature T1. Then measure the same medium at a temperature T2. Use the following formula to calculate the factor.

$$\text{Factor} = \frac{((\text{Conductivity}(T1) / \text{Conductivity}(T2)) - 1)}{(T1 - T2)}$$

Temperature

Please enter the existing water temperature for the manual compensation.

TEMP.-COMPENSAT.	
automatic	*
manual	
Factor	2,0
Temperature	24°C

LV Temperature, Maximum limit value water temperature

Enter the maximum temperature for monitoring excess temperature:

Delay

Delay time in seconds after which an alarm is triggered and/or the plant should be switched off if the maximum temperature has been exceeded.

Switch-off

Program "Switch off" if the plant should be switched off after the end of the delay time if the maximum temperature has been exceeded.

LV TEMPERATURE	
	45°C
Delay	100s

Function Pump

Program the operating mode of the pressure pump/s of the osmosis plant:

Alternate: The pumps are installed in parallel and are operated alternately.

Serial: Pump 1 and pump 2 are connected in series. Output PU2 is switched with delay after PU1 has been switched on.

Select the output to which the pump is connected if the plant is operated with only one pump:

only pump 1: Output PU1 is switched

only pump 2: Output PU2 is switched

It is possible to enter the delay times for both pumps separately.

FCT.PUMP	
Alternate	
Serial	
only pump 1	
only pump 2	
Delay PU1	10s
Delay PU2	10s

Function Low water pressure, Input low water pressure monitoring LP

Program the desired effect of the connected contact for low pressure monitoring, normally closed or normally open.

Delay LP

Delay time in seconds after which an alarm is triggered and/or the plant should be switched off if the water/pressure is low.

Restart

Program how often the plant is to be switched on again after the switch off caused by low water pressure.

The plant can be re-started up to 9 times until the final switch off.

FCT.LOW W.PRESS.	
Norm. closed	
Norm. open	*
Delay LP	10s
Restart	5x

Function Excess pressure, Input excess pressure monitoring HP

Program the desired effect of the connected contact for monitoring the pressure pump, normally closed or normally open.

Delay HP

Delay time in seconds after which an alarm is triggered and/or the plant should be switched off if the pressure is too high.

FCT.EXCES.PRESS.	
Norm. closed	
Norm. open	*
Delay HP	10s

Function Concentrate, Input concentrate flow monitoring CO

Program the desired effect of the connected contact for concentrate flow monitoring, normally closed or normally open.

Delay CO

Delay time in seconds after which an alarm is triggered and/or the plant should possibly be switched off.

Switch-off

Program "Switch-off" if the plant should be switched off after the end of the delay time if the concentrate flow is too low.

FCT.CONCENTRATE	
Norm. closed	
Norm. open	*
Delay CO	10s
Switch off	*

Function Motor protection, Input motor protection monitoring MP

Program the desired effect of the connected contact for monitoring the driving motor of the pressure pump/s, normally closed or normally open.

The delay time of 1 second after which an alarm is triggered and the pump/s is/are switched off is predetermined and cannot be changed.

FCT.MOTOR PROT.	
Norm. closed	
Norm. open	*

Function Stop, Stop input

Program the desired effect of the connected contact for the switch off of the plant, normally closed or normally open.

Delay stop

Delay time in seconds after which the plant should be switched off.

FCT.STOP	
Norm. closed	
Norm. open	*
Delay Stop	10s

Function PROG, programmable function input

Program the desired effect of the connected contact through which the following programmed function should be triggered, normally closed or normally open.

Delete error

Error messages can be acknowledged via a signal. Acknowledgement occurs the same as manually pressing the "Alarm" key. Please read the description of the error messages.

External fault message

The contact input is used as the message input for monitoring a plant component (e.g. downstream EDI). An alarm "external fault" is triggered if there is a signal.

FCT.PROG	
Norm. closed	
Norm. open	*
Error deletion	*
External error	-

Water meter

The controller has two independently operating water meter inputs.

Water meter 1 can, e.g., be used to record the raw water quantity.

Water meter 2 can be used to record the permeate quantity.

Set the impulse numbers for the contact water meters or turbines in the menu:

Request the recorded quantities in the SERVICE menu, e.g.:

"M" → SERVICE → Water meter 1 → Quantity: 9143 l

"M" → SERVICE → Water meter 2 → Quantity: 4360 l

The memories of the water meters are also deleted in the SERVICE menu.

WATER METER 1	
L/Imp.	000.020

WATER METER 2	
L/Imp.	001.000

Metering

Use the output "Impulse" for the control of a dosing pump if metering is to take place during operation. Program the water meter to be used for metering, the volume for which an impulse is given as well as the impulse length. **Please note that it is not possible to enter an impulse interval in litres which is smaller than the basic number of the water meter.**

Alternatively, it is also possible to use the impulse output to duplicate the contact of the water meter signal. We recommend this if you, e.g., wish to control a hardness measuring instrument (e.g. Testomat 2000) quantity-dependently. For this, please observe the instructions of the connected hardness measurement instrument.

METERING	
activ WM1	*
activ WM2	
L/Imp.	010.000
I.length	00.5sec

Function PR1 output

Program the function of this volt-free relay output PR1:

Permeate max: Relay switches if the conductivity CD1 "Permeate max." has been exceeded

or

Tank empty: Relay switches if the storage tank is empty

or

Production: Relay switches if the plant is in operation

or

Stop/Standby: Relay switches if the plant is in standby or has been stopped.

FCT.OUT PR1	
Permeate Max	*
Tank empty	-
Production	-
Stop/Standby	-

Function PR2 output

Program the function of this volt-free relay output **PR2**:

CD2 Max: Relay switches if the conductivity "CD2 Max" has been exceeded
or

CD2 Min: Relay switches if the conductivity "CD2 Min" has not been achieved
oder

CD2 MinMax: Relay switches if the conductivity "CD2 Min" has not been achieved and is released if the conductivity "CD2 Max" has been exceeded.

FCT.OUT PR2	
CD2 max.	*
CD2 min.	-
CD2 MinMax	-

0/4-20mA OUT

The interface card RS232/RTC/0-20mA is equipped with a current transformer which can be used for the output of the conductivity.

Program the desired/necessary output signal.

Current signal for the permeate conductivity CD1 or signal for the conductivity of sensor CD2 in the range of 0-20mA or 4-20mA

Enter the range according to the existing maximum conductivity: A current of 20mA complies to the set maximum conductivity

0/4-20mA OUT	
Cond. permeate	
Cond. CD2	*
0-20mA	*
4-20mA	
20mA = 100µS/cm	

Release

With the built-in serial interface, it is possible to program the controller or to request controller data via a PC/laptop (program "Softmaster Vision" is necessary):

Release mode: none = Data transfer locked
 read-only = Only reading of data is allowed
 active = Reading/writing of data and programming allowed

RELEASE	
none	
read only	*
active	

The release mode "active" has to be set in connection with the "WEB-Connector" to enable software updates.

Language

Selection of the desired display language:

At present, these four "standard" languages are available. Other languages are available if desired by customers.

LANGUAGE	
German	*
English	
French	
Italien	

“SERVICE” menu

Request and change current settings and statuses of the unit in the service menu.

Manual flush

Start a flush of the plant via this manual function. After the start a return to the operating display occurs. The maximum flushing duration is limited to 99 minutes. End the flush with the “Run/Stop” key.

MANUAL FLUSH 99m

Automatic flush

Start a flush of the plant with the programmed flushing duration (also see "M" → BASIC PROGRAM → Flushing duration) via this manual function. After the start a return to the production display occurs. It is possible to end the flush at any time with the “Run/Stop” key.

AUTOM. FLUSH 10m

Error history

Open the error history via “display”. The error history is a list of the errors which have occurred during current operation.

An occurred error is recorded with error number, time and date,

e.g.: Low w. press. 6
 16:56 16.09.03

ERROR HISTORY
display
clear

A maximum of 20 errors are stored in a circular buffer, i.e. the oldest error is overwritten by the next error if the buffer is full. The buffer of the error history is deleted via “delete” and recording restarted.

The list is not deleted after a power failure.

Calibration of the conductivity sensors CD1 or CD2

**Calibration should only take place with calibration solvents in accordance with DIN EN 27888 !
Inappropriate calibration leads to undefined display values !**

Dry and zero point calibration

With the **calibration method CAL. CD ZERO**, it is possible to compensate measuring errors (offset) which occur due to very long supply lines to the measuring sensor.

The sensor is calibrated "dry", i.e. it is not dipped into the measuring medium:

- a) Either with a built-in sensor, before the tube system is filled
- or
- b) with a not yet built-in sensor, but already equipped with the correct cable length.

Call the following menu option to start calibration

"M" → SERVICE → Cal. CD Zero and start by pressing "ENTER".

The unit now corrects the measuring error caused by the cable length via subtraction. The process ends automatically.

Desired value calibration

With the **calibration method CAL. CD desired value**, it is possible to correct measuring errors caused by a soiled sensor. It is recommended to also calibrate with this method if there are high accuracy demands in a small measuring range. This calibration method also enables measurements with a sensor whose cell constant is not exactly known.

Procedure:

Carry out the calibration with an appropriate KCl standard calibration solvent. For this, dip the measuring sensor into the calibration solvent. Please observe that the sensors are free moving in the vessel.

-With automatic temperature compensation: First, enter a temperature coefficient of 1.90%/°C in the BASIC PROGRAM menu "Temp.-comp." and the value of the standard calibration solvent at 25°C under desired value. After dipping the sensor into the calibration solvent, wait approx. 2 minutes before starting the calibration until the sensor has the same temperature as the solvent.

-With manual temperature compensation: If you wish to calibrate a sensor without a temperature transmitter, you have to enter "manual temp.-compensation" in the basic program and the temperature of the calibration solvent under "Temperature". The temperature of 25°C for the calibration solvent is also valid here.

1. Call the menu "Calibrate CD"

"M" → Service → Cal. CD value

2. Enter the desired value of the conductivity and save the value by pressing "ENTER".

3. Call the following menu option to start the calibration

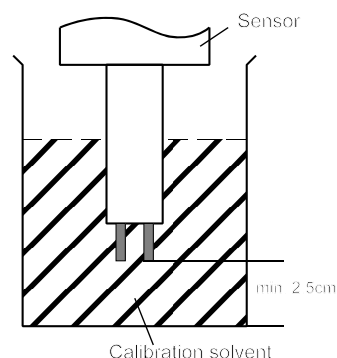
"M" → Service → Cal. CD Start and start by pressing "ENTER".

The unit now corrects the measuring error by forming a correction factor. Calibration is ended automatically.

Note!

Inappropriate calibration can lead to the display of undefined values. Incorrect calibrations can only be corrected via a new calibration or via a "CAL. CD RESET".

Note on calibrating:



Operating hours

The device records the operating hours of the pressure pump(s) and thus the load of the units. Request the current operating time in the service menu:

"M" → Service → Operating time

Reset the operating hour meter:

After exchanging the pump(s) or the module, it is possible to reset the current operating time to 0 hours:

"M" → Service → Operating time → Reset

Water meter

Both water meters are equivalent and can be used freely.

Water meter 1

Water meter 1 records, e.g., the supplied raw water quantity in litres for quantity-dependent metering.

Reset (ENTER): Leads to a reset of the currently saved total quantity.

Water meter 2

Water meter 2 records, e.g., the permeate quantity in litres counted since the last reset.

Reset (ENTER): Leads to a reset of the currently saved total quantity.

Time / Date

Please observe that in the case of units without a clock module the time only runs if the unit is switched on. Correct, if necessary, the time and date after a longer period of power failure or if the plant has been switched off.

Display: "M" → Service → Time Date

The display shows the date and time of the controller.

Set: Press the "ENTER" key under menu "M" → Service → Time Date.

Set the time and date by selecting the desired function with the arrow keys and trigger it by pressing "ENTER". Press the "ENTER" key again to save the setting and to return to the display function.

TIME	DATE
10:23	23.03.05

Diagnosis

The diagnosis menu displays the current statuses of the in- and outputs. For checking purposes (e.g. during commissioning), the output statuses can be manually manipulated with the "DOWN" and "UP" keys. Please make sure that downstream plant parts cannot be damaged.

Active statuses (switched relay, switched input) are represented with "on", inactive statuses with "off", e.g.:

OUTPUT IV or INPUT MP
off on

The analogue input displays the existing value, e.g.:

INPUT MA
10.0mA

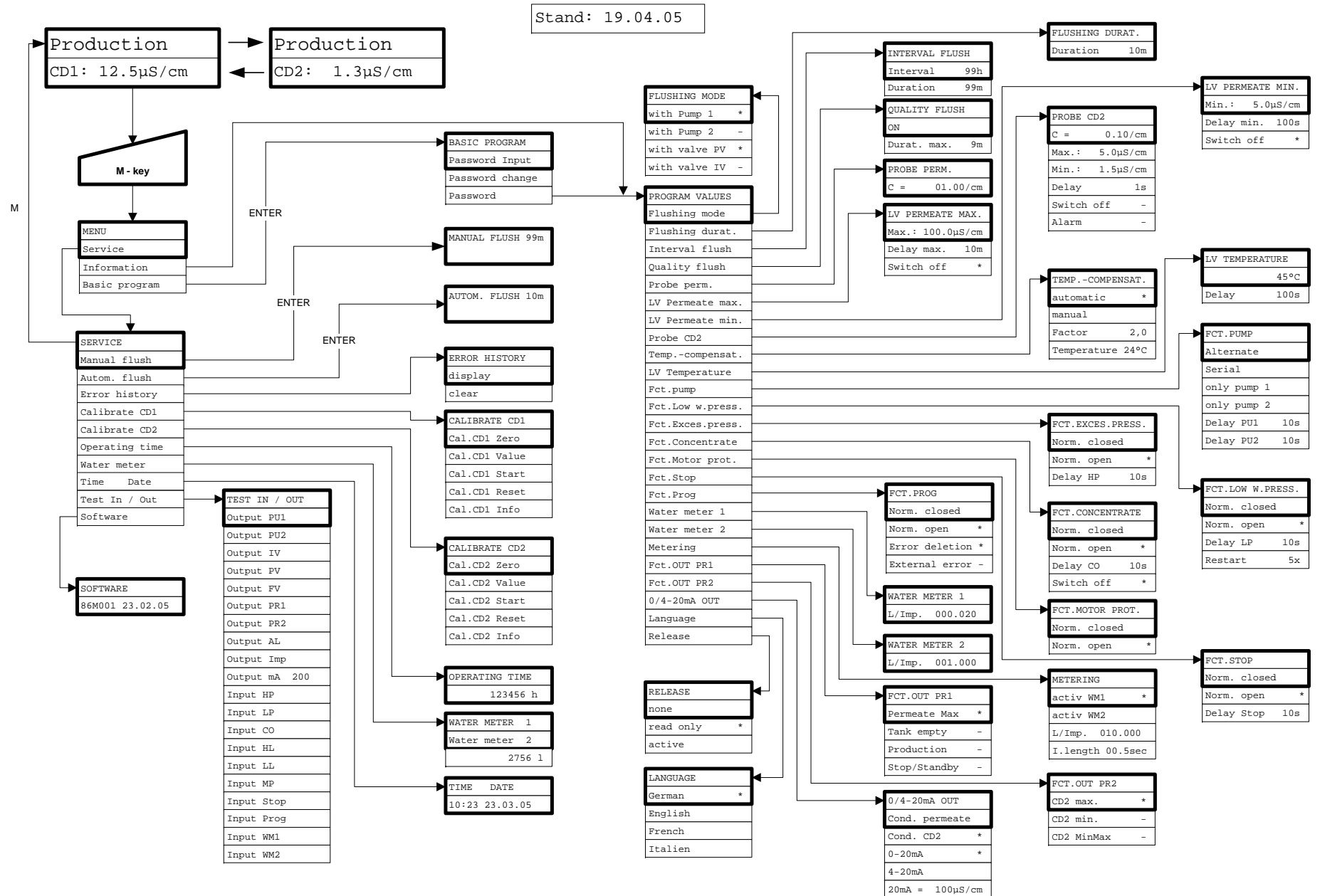
Via the "UP" and "DOWN" key it is possible to change the current to be entered in 5mA steps.

Software status

Request the current software status here:

SOFTWARE
86M001 23.02.05

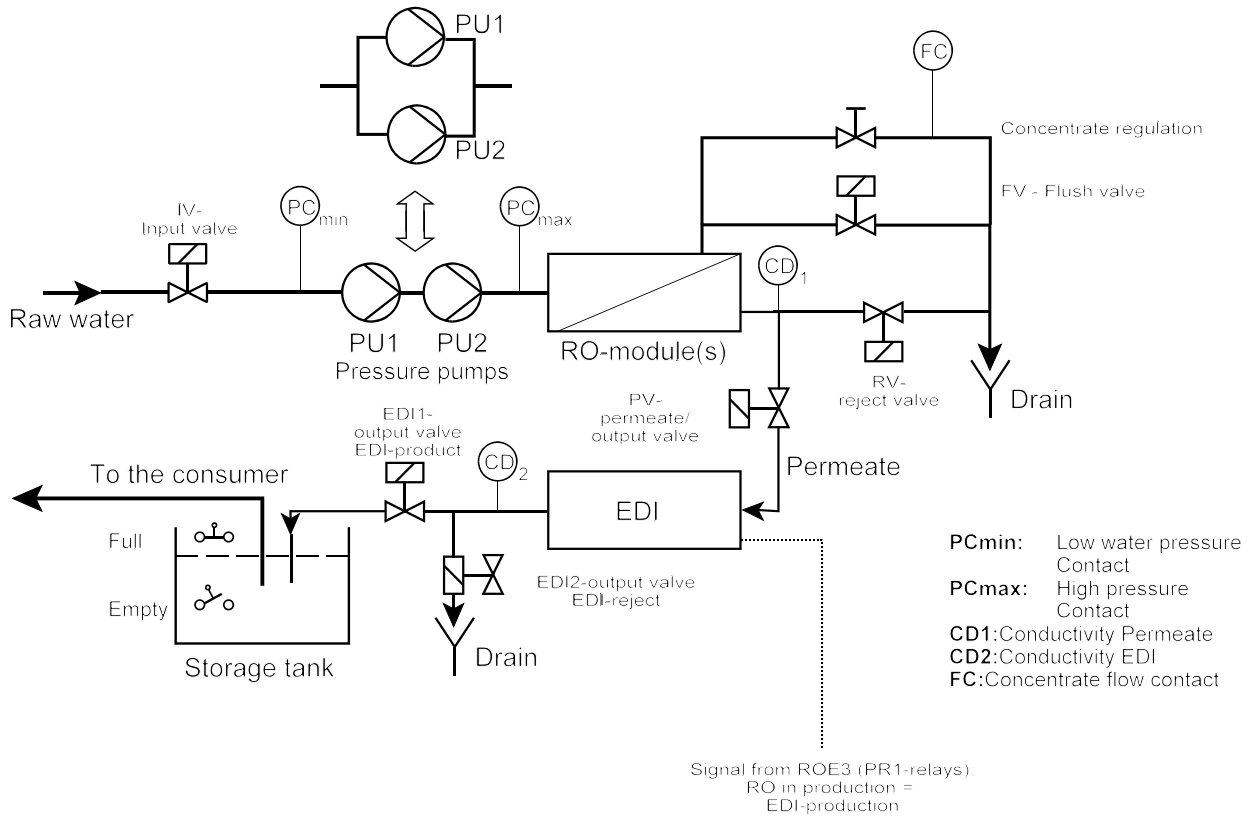
Menu structure



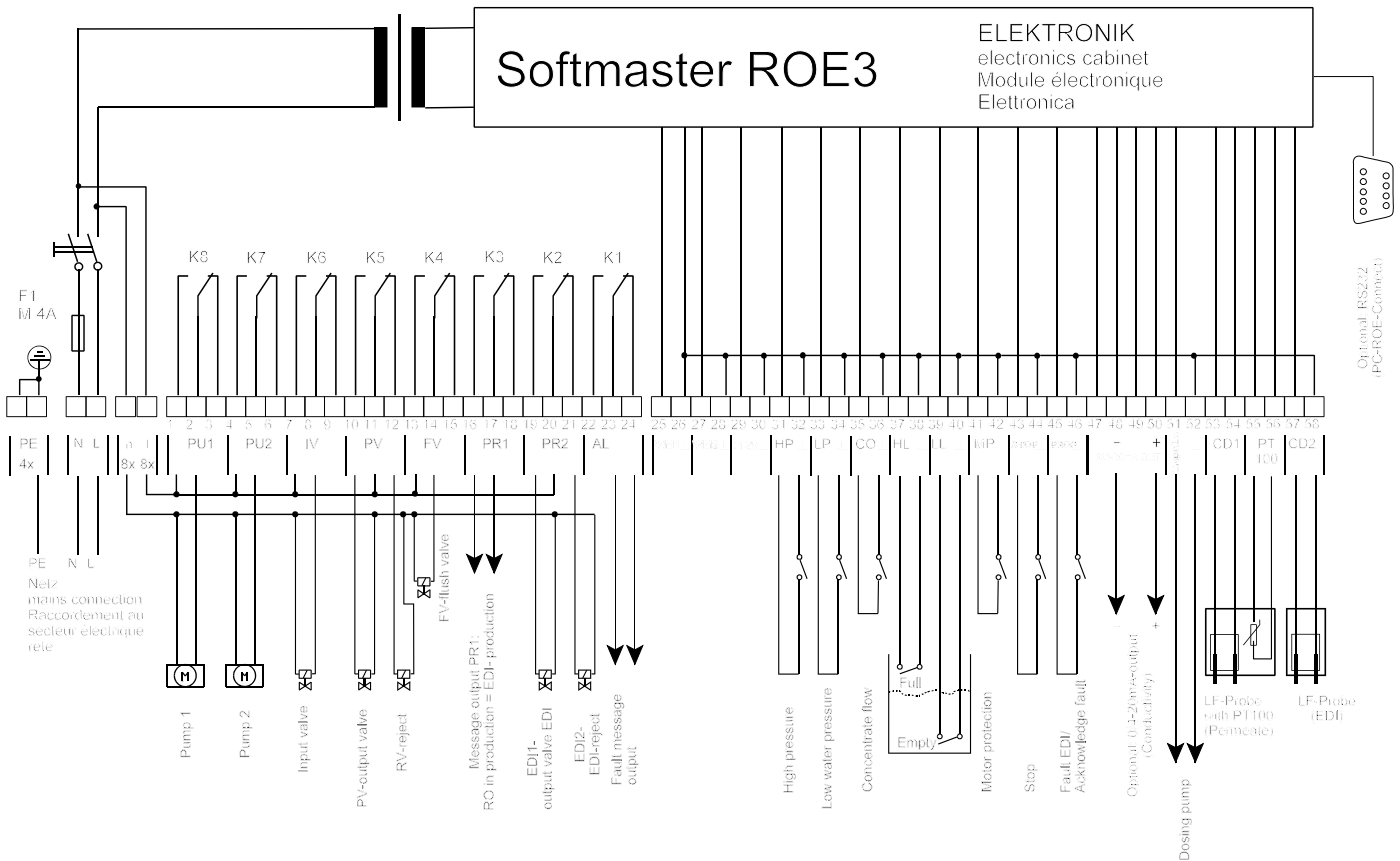
In order to call the factory's basic setting, switch the unit on while pressing the "DOWN" key. Your individual programming will be lost!

Technical appendix

Example for an osmosis plant layout with downstream EDI (Electronic Deionisation Module)



Connection example for the above plant



Technical Data

Power supply:	230 - 240 V or 24 V or 115V+/-10% / 50 -60 Hz, Safety fuse T6.3A
Power consumption without external load:	max. 15 VA
Degree of protection:	IP65
Protection class:	I
Conformity:	EN 50081-1, EN 50082-2, EN 61010-1
Ambient temperature:	0 - 45°C



Measuring ranges:

Measuring range	Cell constant	Sensor name, e.g.
0.1 - 99.9 $\mu\text{S/cm}$	0.01 cm^{-1}	SOE0, STE0 PT100
1 - 999.9 $\mu\text{S/cm}$	0.1 cm^{-1}	SO1, ST1 PT100, SOE1
5 - 4999 $\mu\text{S/cm}$	0.5 cm^{-1}	SO5, SOE5, ST5 PT100
10 - 9999 $\mu\text{S/cm}$	1.0 cm^{-1}	SD10, SO10
50 $\mu\text{S/cm}$ -49.99 mS/cm	5.0 cm^{-1}	STE50 PT100

Accessories for calibration:

Conductivity solvent 1413 $\mu\text{S/cm}$ 230 ml Art. No.: 425404

Housing dimensions

surface/panel-mounted ROE 2:

W x H x D = approx. 270 x 295 x 130 mm
Housing made of ABS,
Panel cut-out 262mm x 146mm, +1mm,
Mounting depth approx. 90mm,
Front frame dimensions 270mm x 155mm

Weight:

approx. 2.6 kg

Options:

Art. No.	Name	Functions
37259	Interface card RS232, without clock	Serial RS232 0-20mA output
37263	Interface card RS232, RTC,mA	Serial RS232 Real time clock 0-20mA output

valid for software status: 86M004 and higher

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