

Controllers

History



KL24base

- 1x 230V compressor
- 4x 24V stepper motor valves (1/2")
- 1x 24V alarm
- 1x COM (RS232)



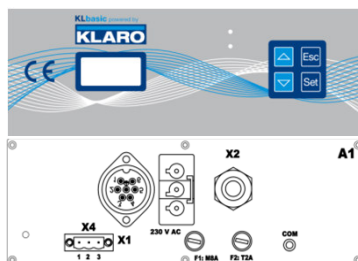
KL24plus

- 2x 230V compressor, UV/pump
- 4x 24V stepper motor valves (1/2")
- 3x 24V fan, dosing p., alarm
- 1x COM (RS232)
- 1x temperature sensor
- 1x pressure sensor



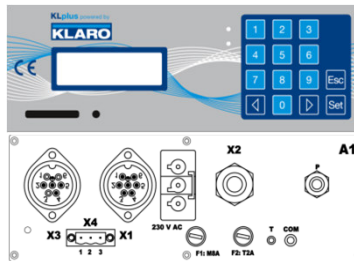
KL40plus

- 2x 230V compressor, UV/pump
- 4x 24V stepper motor valves (1")
- 3x 230V fan, dosing pump, alarm
- 1x COM (RS232)
- 1x temperature sensor
- 1x pressure sensor
- 1x contactor monitoring



KLbasic

- 1x 230V compressor
- 4x 230V solenoid valves
- 1x alarm (potential-free)
- 1x COM (RS232)



KLplus

- 3x 230V compressor, UV, dosing p.
- 5x 230V solenoid valves + fan
- 1x alarm (potential-free)
- 1x COM (RS232)
- 1x temperature sensor
- 1x pressure sensor
- 1x contactor monitoring



KL24one / easyOne / one2clean

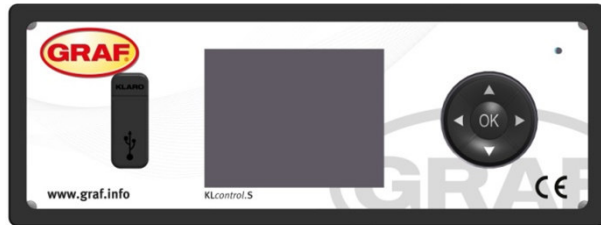
- 1x 230V compressor
- 2x 24V stepper motor v. (1/2")
- 2x 24V dosing pump, alarm
- 1x pressure sensor



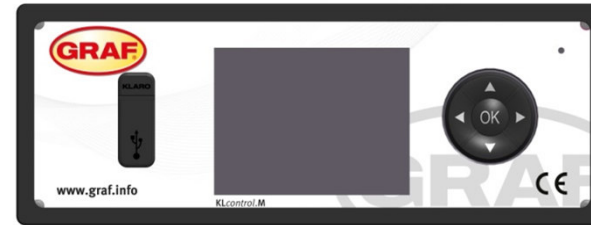
Controllers

Models

KLAROcontrol.S



KLAROcontrol.M

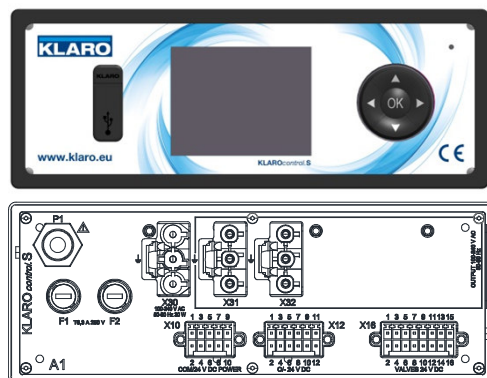


- Two models S and M
- Same size, front similar, but M with more equipment
- GRAF or KLARO design

Controllers

Operation and connections

KLAROcontrol.S

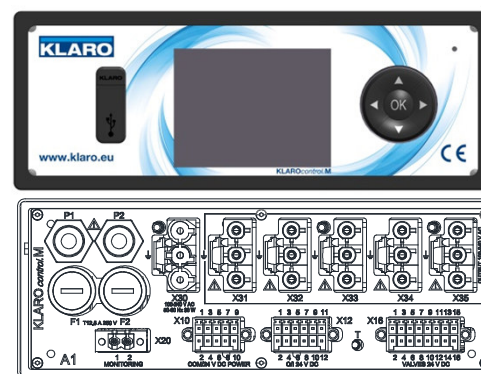


Connections:

- 2x 230V compressor + pump
- 4x 24V stepper motor valves
- 1x 24V consumer (flexible)
- 1x pressure sensor
- 1x USB
- 1x COM (serial interface)

**Standard for KLARO and One
up to approx. 30 PE**

KLAROcontrol.M



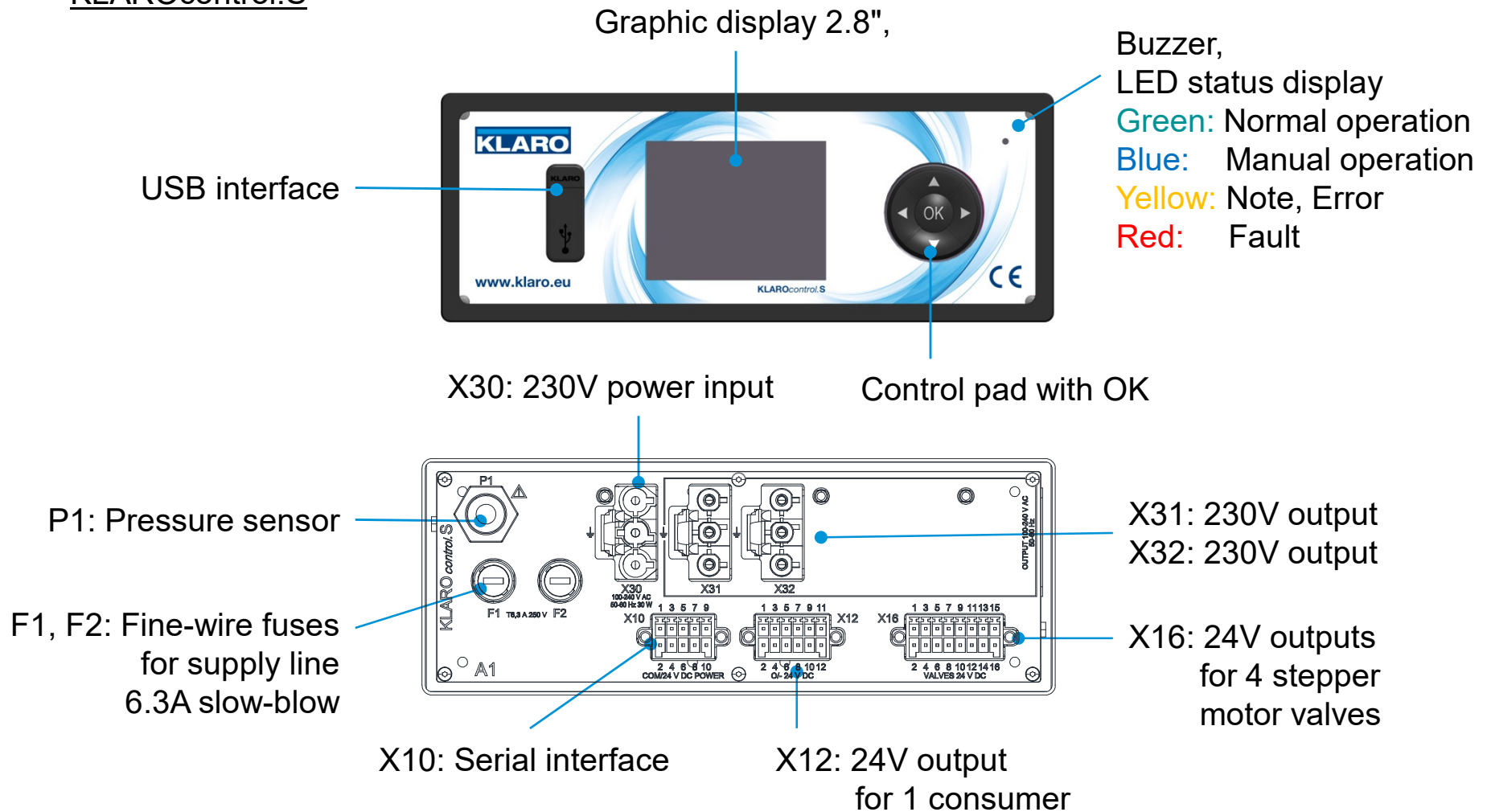
- 5x 230V compressor + options
- 4x 24V stepper motor valves
- 4x 24V consumer (flexible)
- 2x inputs voltage-free (float)
- 1x contactor monitoring
- 2x pressure sensors
- 1x USB
- 1x COM (serial interface)
- 1x temperature sensor

**Special applications, rotary valves,
large systems, solenoid valves, ...**

Controllers

Operation and connections

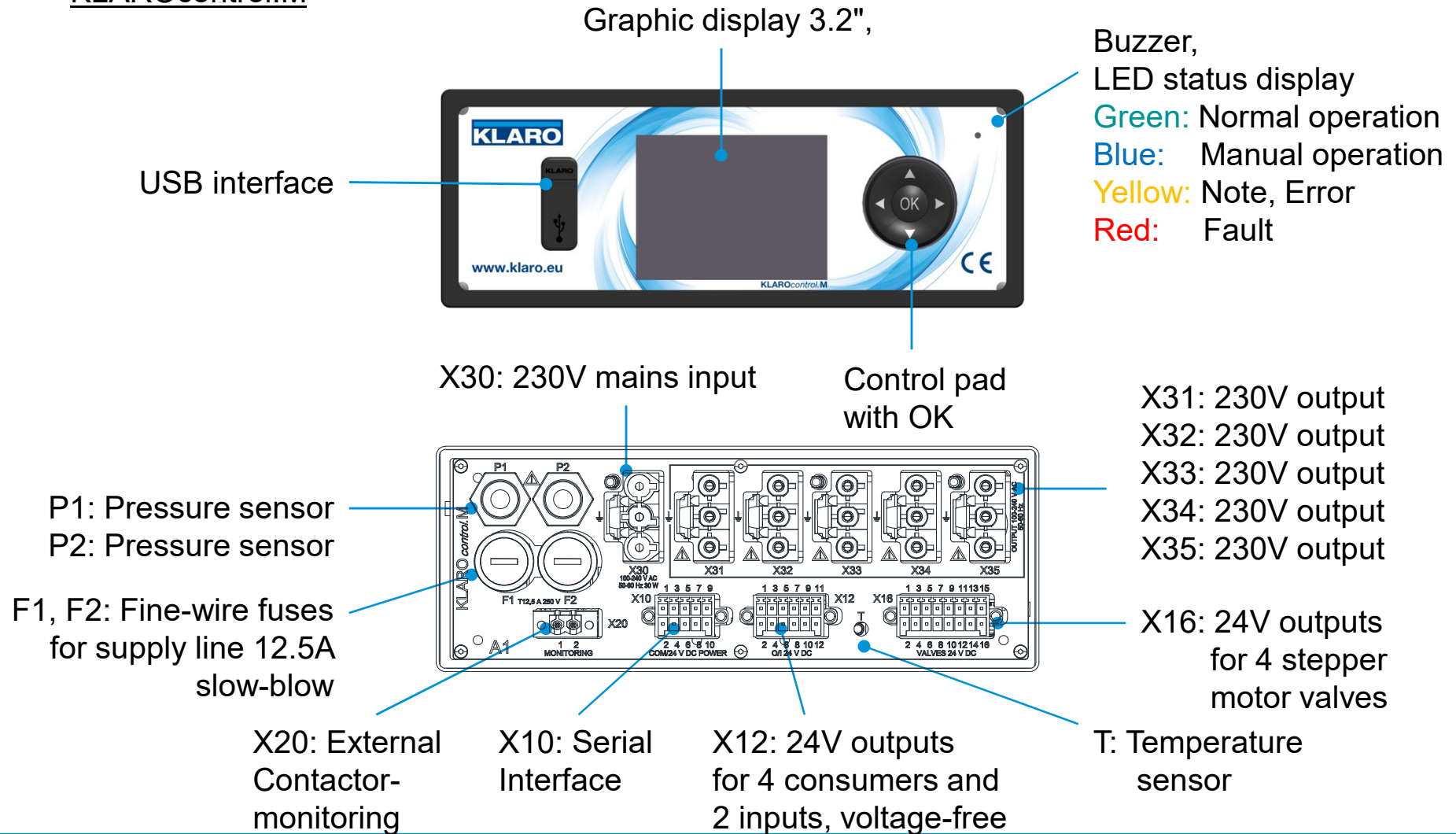
KLAROcontrol.S



Controllers

Operation and connections

KLAROcontrol.M



Behaviour in case of disturbances:

Event	LED	Sound	Logbook	Cycle	Examples
-	green	○	○	runs	-
Manual operation	blue	○	●	Stopped	-
Note	yellow	○	●	runs	Manual operation, temp., ...
Error	yellow	●	●	runs	Min. fill level, canister empty,
Fault	red	●	●	Stopped	Fault compressor, valve, ...
Mains failure	red, flashing	●	●	Stopped	-

Behaviour in the event of a power failure:

- Buffering via capacitor and accumulator, not battery
- Short-term display "power failure", entry in logbook, continuous loop red LED flashes, short alarm tone every 10 s
- Fault message is automatically acknowledged if voltage recurs
 - In the event of a power failure during the cycle pause, the cycle pause is always continued.
 - In the event of a brief power failure <90 min, the cycle is continued at the interrupted point.
 - In the event of a long power failure >90 min, start with clear water extraction, then cycle p.

Controllers

Operation and connections



Cables and plugs

		
<i>Cable 230V for main input</i>	<i>Cable 230V for output with Schuko plug</i>	<i>Cable 230V for output with Phoenix plug</i>
		
<i>Cable 230V for output with plug for solenoid valve</i>	<i>Cable 230V output with plug for UV module & submersible pump</i>	<i>Cable 24V for output stepper motor valves</i>
		
<i>Cable X10 for communication module</i>	<i>Connector X12 for 24V inputs and outputs</i>	<i>Connector X20 for contactor monitoring</i>



Release the safety claw for the 230V plug



Open clamp

Controllers

Operation and connections



Cables and plugs

		
<i>Cable 230V for main input</i>	<i>Cable 230V for output with Schuko plug</i>	<i>Cable 230V for output with Phoenix plug</i>
		
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Release the safety claw for the 230V plug

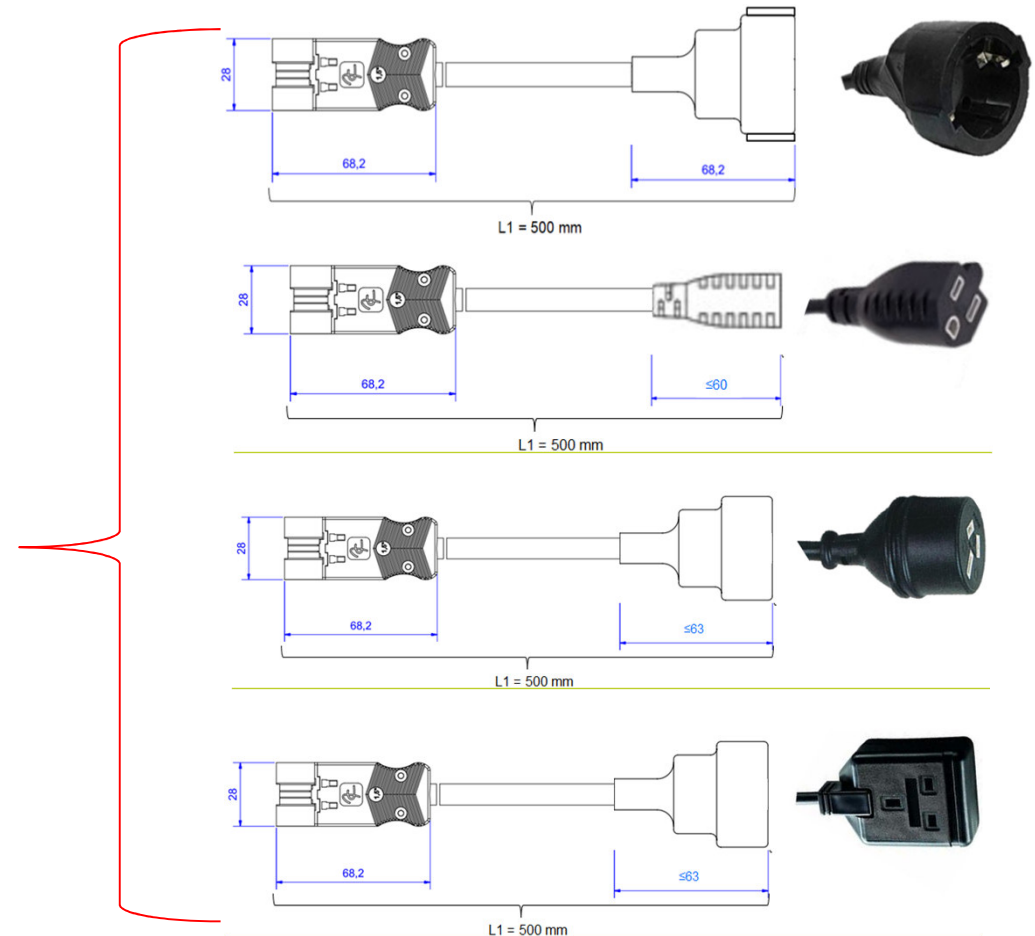
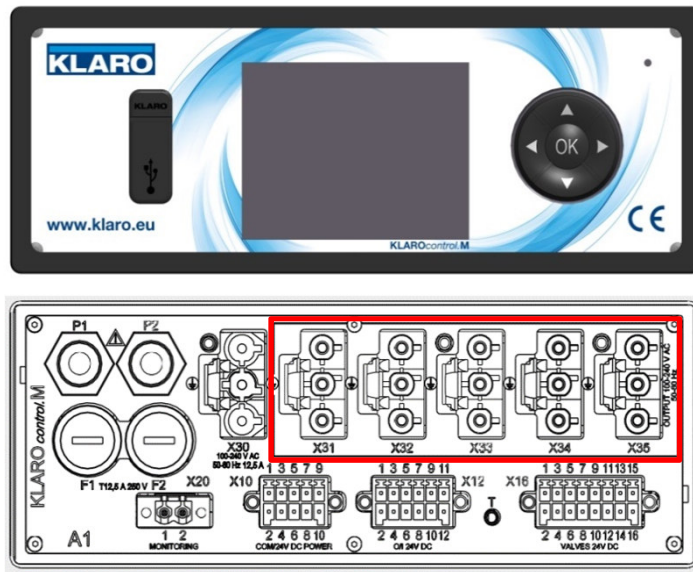


Open clamp

Controllers

Operation and connections

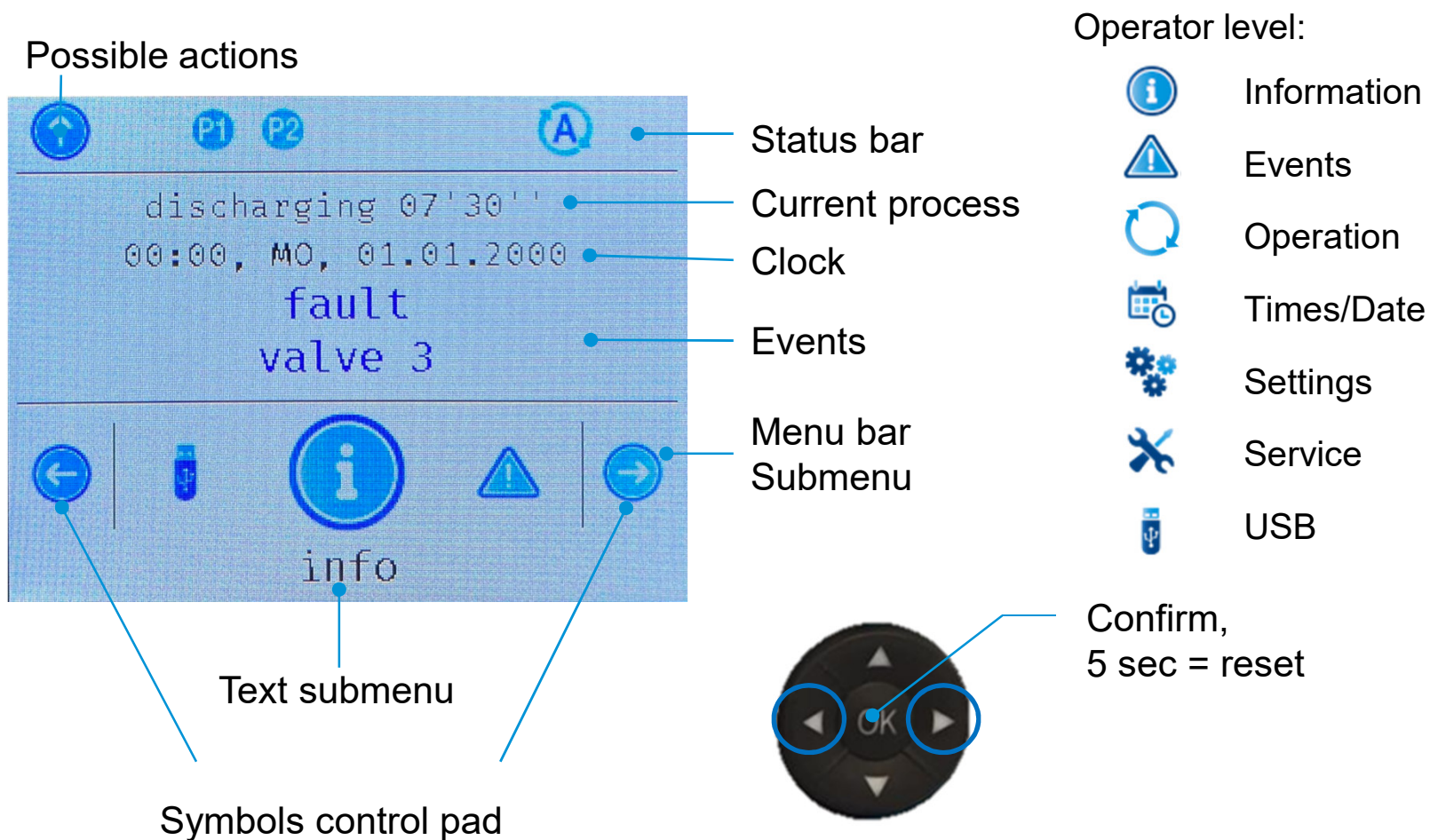
Cables and plugs



Controllers

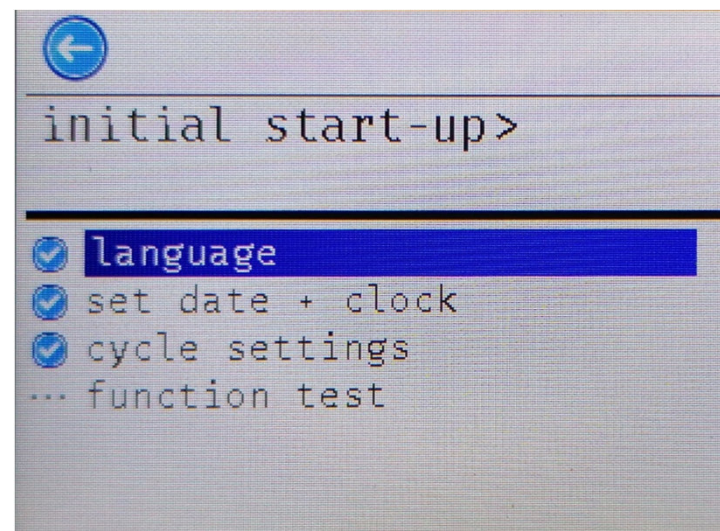
Operation and connections

Display



Initial start-up

- Query important basic settings
 - Language
 - Date/Time
 - Cycle settings
 - Function test
 - Can be skipped
 - disappears automatically after a few minutes
 - Test start can be delayed
- Finally completed only after function test
- Recall with code 1 3 1 1 possible, if not yet completed

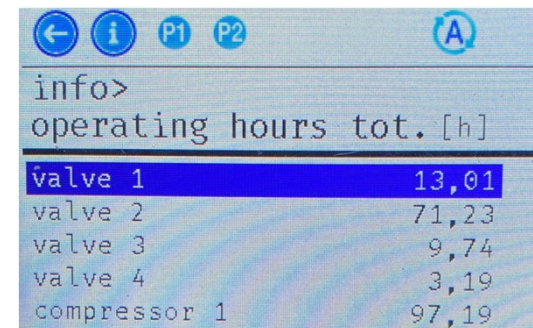
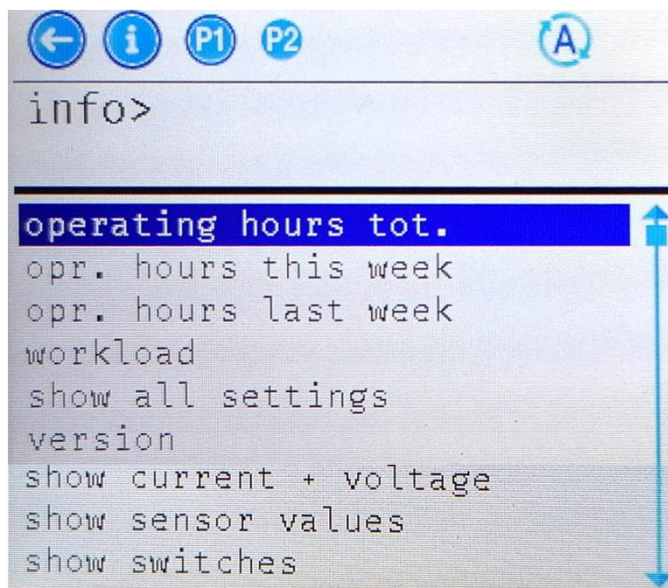


Operator level

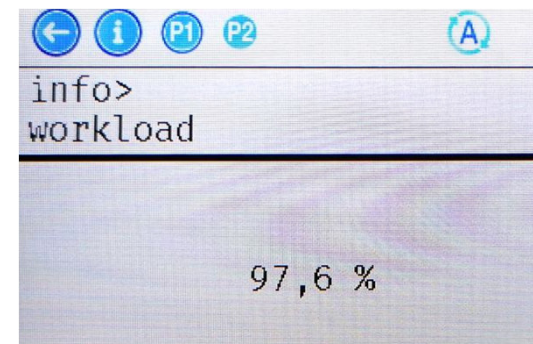


Info

- Read operating hours
- Workload info for level controlled operating mode
- ...



- Only existing consumers are displayed



- Shows the capacity utilisation in level-dependent operation mode
- Ratio of cycles driven / cycles possible

Operator level



Info

- Read sensor values: Amperage, voltage, pressure, temperature
- Read switching inputs

← i P1 P2 A

info>

operating hours tot.

opr. hours this week
opr. hours last week
workload
show all settings
version
show current + voltage
show sensor values
show switches

← i P1 P2 A

info>
show current + voltage

U_eff (~AC):	229	V
I_eff (~AC):	0	mA
U_out (24V):	24112	mV
I_out (24V):	0	mA

← i P1 P2 A

info>
show sensor values

sensor P1:	2	mbar
sensor P2:	0	mbar
temperature:	20,0	°C
level measurin.:	0	cm

← i P1 P2 A

info>
show switches

X12.9:	off
X12.11:	off
X20.1:	off

Operator level



Events

- View notes, errors, faults, etc.
- max. 125

S.9	13.01.22	05:20:20
H.11	12.01.22	09:15:46
H.6	12.01.22	09:15:46
F.15	12.01.22	04:38:10
S.9	08.01.22	07:29:12
F.16	08.01.22	07:29:11
H.7	08.01.22	07:29:11

error temperature 13.01.2022 05:20:20 S.9

Abbreviations:

- H. ... Note
Treatment cycle continues
- S. ... Error
Treatment cycle continues
- F. ... Fault
Treatment cycle is stopped

Operator level



Operation

- All available outputs can be viewed, individually and in combination
- You are still in automatic mode LED green
- Confirm again to start manual mode

operation mode	automatic
compr. + valve 1	off
compr. + valve 2	off
compr. + valve 3	off
compr. + valve 4	off
compressor 1	off
valve 1	off

- Cycle stopped, LED blue
- Switch consumer on/off
- In manual mode, it is also possible to switch to another menu
- Switch to „automatic“ to end
- Otherwise self-returning to automatic

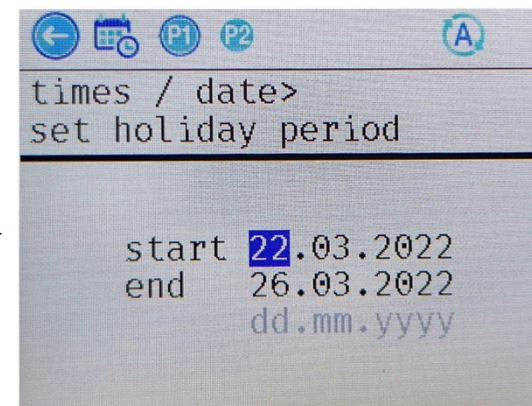
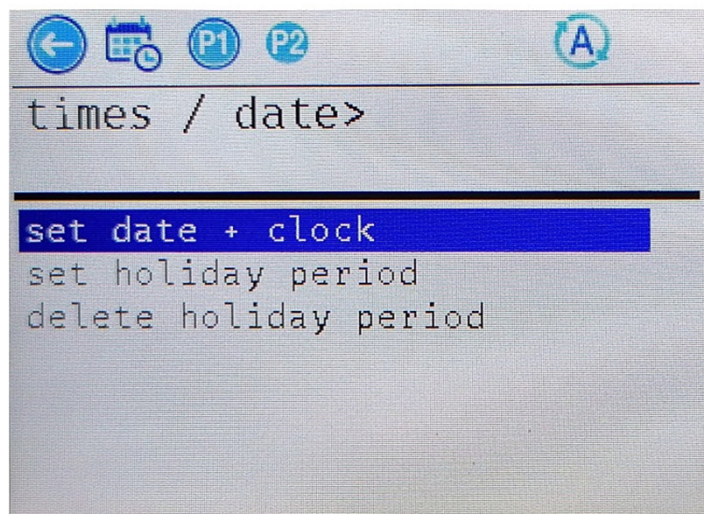
operation mode	manual
compr. + valve 1	off
compr. + valve 2	off
compr. + valve 3	off
compr. + valve 4	off
compressor 1	off
valve 1	off
valve 2	off
valve 3	off
valve 4	off
level measuring	

Operator level



Times/Date

- Set clock
- Stop holiday operation



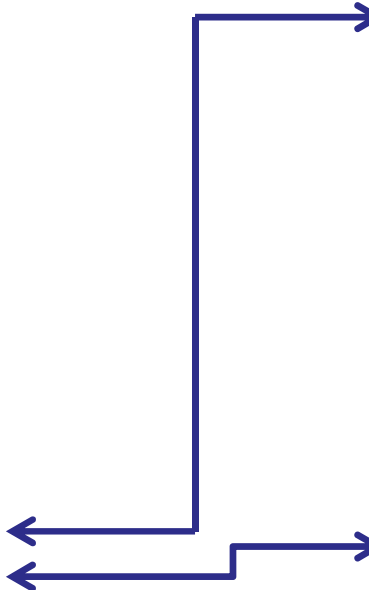
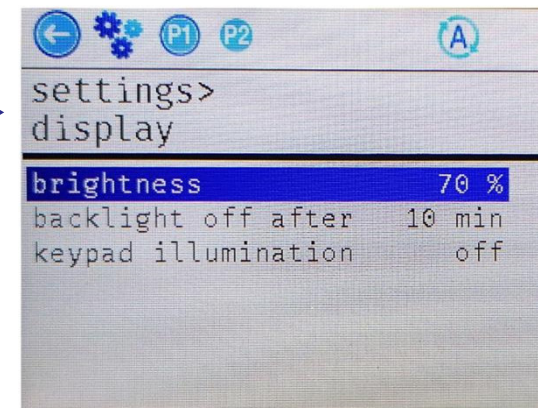
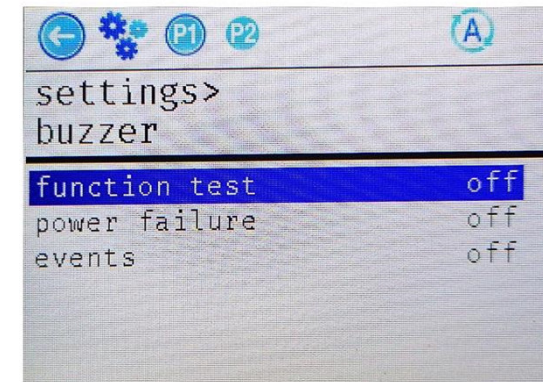
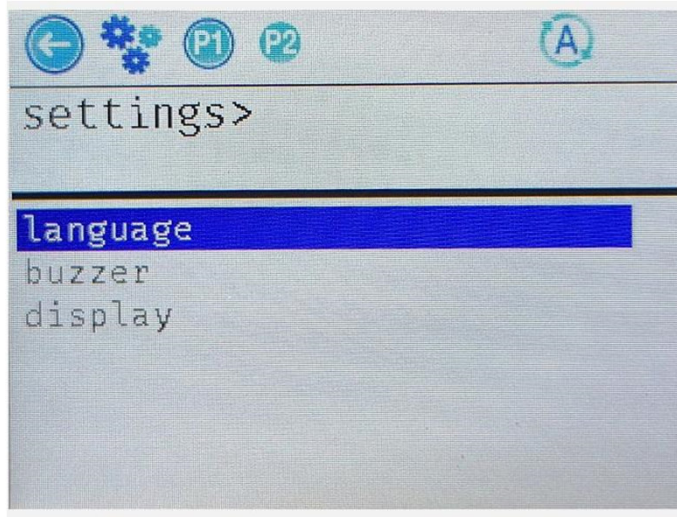
- Unlimited in time
- Only slight aeration
- No clear water discharge
- At each start time, recirculation takes place via the sludge airlift (if present)
 - Duration according to preset cycle time
 - Afterwards feeding
- Can be combined with C-module

Operator level



Settings

- Activate, deactivate buzzer
- Dim display
- Switch control pad illumination (red, blue)



Operator level

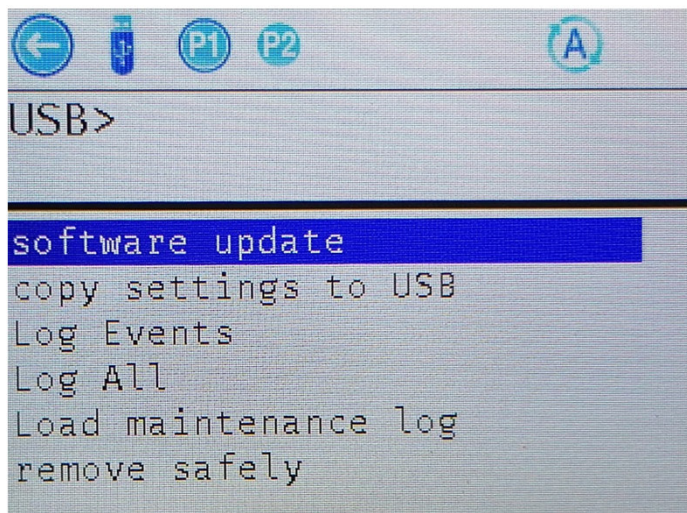


USB

- Data exchange possible at operator level
- Software update
- Copy cycle settings to USB
- Collect events and measurement data on external memory

USB

Additional function "Read out logbook" still in progress; this will allow the data to be copied to a USB stick and read in and processed on the PC via the WebMonitor.

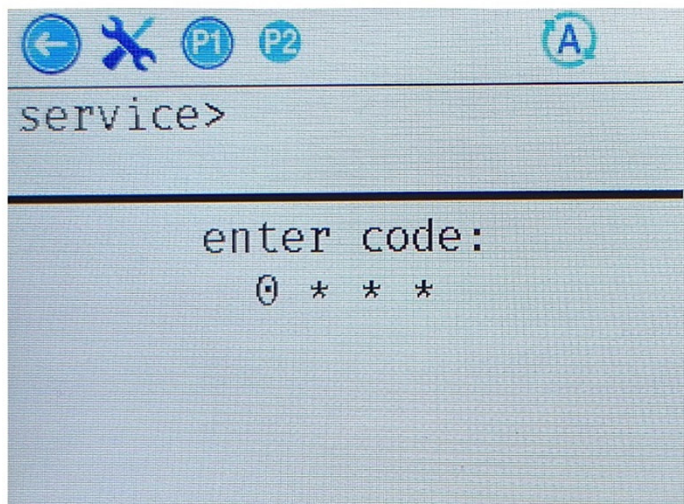


Operator level



Service

- Enter code here
- Unlocking the service level
- Different codes for S and M
- Further codes for calibration, reset,
...



Codes

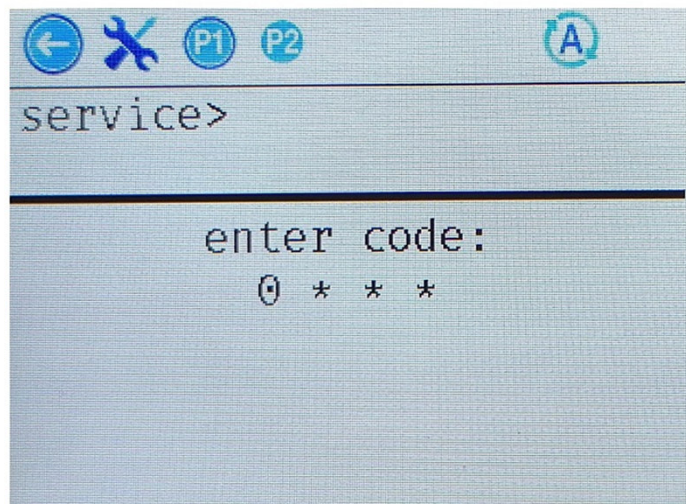
0 3 0 1 Service code S
1 9 7 8 Service code M
1 0 0 0 Mains failure, suppressed once.
1 3 1 1 Hardware reset
8 8 8 8 Calibration via membrane
9 9 9 9 Calibration via airlifter

Operator level



Service

- Enter code here
- Unlocking the service level
- Different codes for S and M
- Further codes for calibration, reset, ...

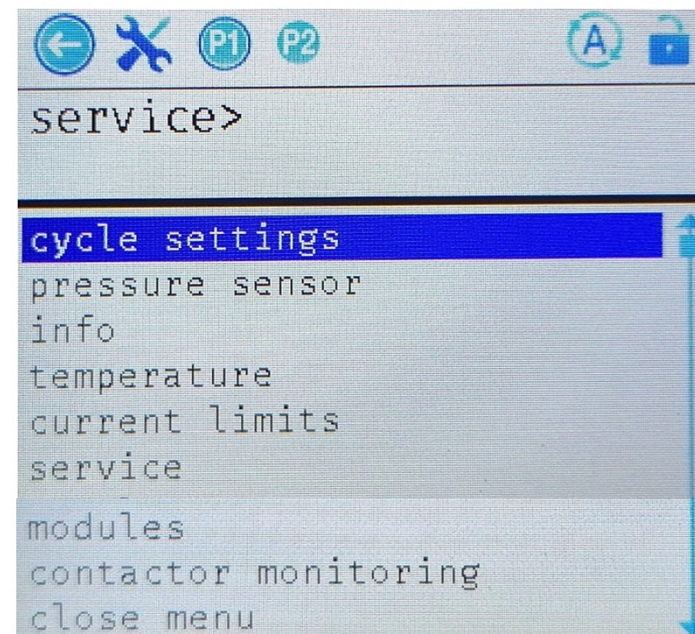


Service level



Service

- Overview of the submenus
- After activation, you can change levels without having to constantly re-enter the code.
- "Close menu" = exit + lock

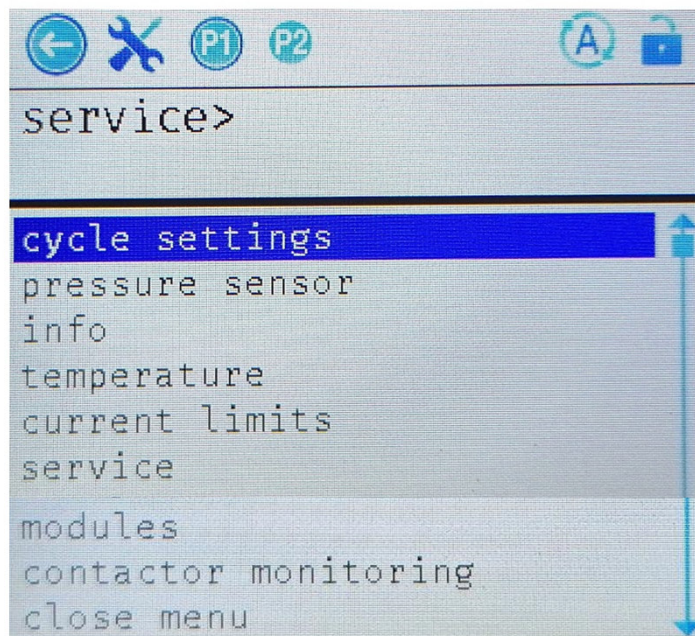


Service level



Service

- Overview of the submenus
- After activation, you can change levels without having to constantly re-enter the code.
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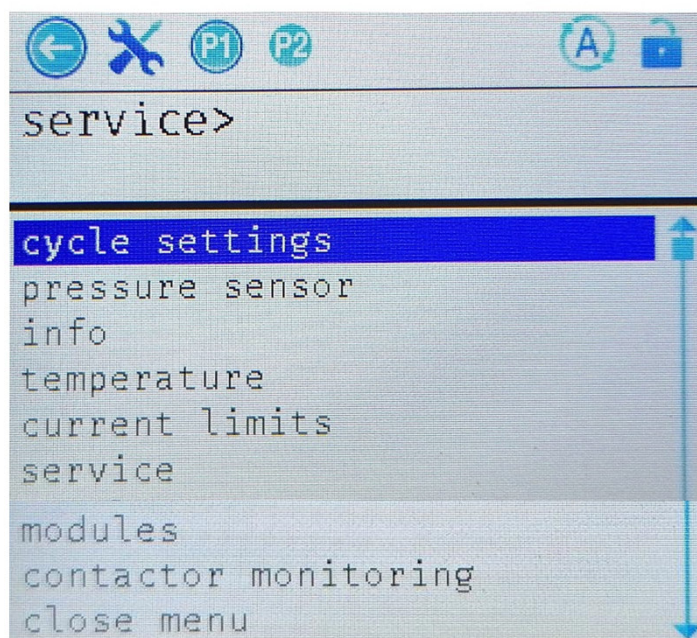


Service level



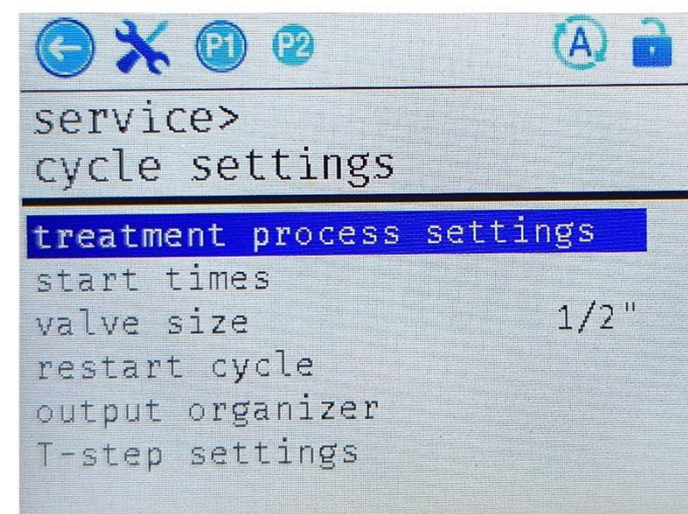
Service

- Overview of the submenus
- After activation, you can change levels without having to constantly re-enter the code.
- "Close menu" = exit + lock



Cycle settings

- Generate control tables
- View and change cycle times
- Restart cycle
- Assign outputs
- Setting the stroke of the stepper motor valves



Service level



Cycle settings

- Generate control tables
- View and change cycle times
- Restart cycle
- Assign outputs
- Setting the stroke of the stepper motor valves

```
service>
cycle settings

treatment process settings
start times
valve size                1/2"
restart cycle
output organizer
T-step settings
```

```
service>
cycle settings

treatment process      SBR 4V
system                 KLARO
population equivalent   10
treatment level        C
```

Treatment process

- SBR 4V
- SBR One 2V
- SBR One 3V
- Flow 1V
- Flow 2V

System

- KLARO, KLARO One, KLARO Easy, easyOne, ...

PE

- Select 1...2000

Treatment level

- C, N, D, D+

Service level



Cycle settings

- Control tables
- Cycle times

Features:

- Each treatment step has the same structure: Σ duration, on step, off step
- Charging + discharging depend on PE and airlift $\emptyset$
- Aeration (min) always the same regardless of PE:
 - C: 10 on, 10 off
 - N: 14 on, 6 off
 - D: 15 on, 5 off
- Always at least 10 min rest at the end of the cycle ("cyclepause")
- Input <1 min possible
- If total cycle time is exceeded, the display turns red.
- Number of cycles variable

Process: SBR 4V, System: KLARO					
Steps	8 PE C	8 PE N	8 PE D	Steps	8 PE D+
charging	X31, X16.V1	X31, X16.V1	X31, X16.V1	charging	X31, X16.V1
T 1 Σ	7,50 min	7,50 min	7,50 min	T 1 Σ	6,00 min
T 2 On	7,50 min	7,50 min	7,50 min	T 2 On	6,00 min
T 3 Off	0,00 min	0,00 min	0,00 min	T 3 Off	0,00 min
denitrification	X31, X16.V2	X31, X16.V2	X31, X16.V2	aeration	X31, X16.V2
T 4 Σ	0,00 min	0,00 min	30,00 min	T 4 Σ	214,00 min
T 5 Off	0,00 min	0,00 min	9,00 min	T 5 On	15,00 min
T 6 On	0,00 min	0,00 min	0,50 min	T 6 Off	5,00 min
aeration	X31, X16.V2	X31, X16.V2	X31, X16.V2	charging	X31, X16.V1
T 7 Σ	240,00 min	240,00 min	214,00 min	T 7 Σ	1,50 min
T 8 On	10,00 min	14,00 min	15,00 min	T 8 On	1,50 min
T 9 Off	10,00 min	6,00 min	5,00 min	T 9 Off	0,00 min
sedimentation	X31, -	X31, -	X31, -	denitrification	X31, X16.V2
T 10 Σ	90,00 min	90,00 min	90,00 min	T 10 Σ	30,00 min
T 11 On	0,00 min	0,00 min	0,00 min	T 11 Off	9,00 min
T 12 Off	90,00 min	90,00 min	90,00 min	T 12 On	0,50 min
discharging	X31, X16.V3	X31, X16.V3	X31, X16.V3	sedimentation	X31, -
T 13 Σ	7,50 min	7,50 min	7,50 min	T 13 Σ	90,00 min
T 14 On	7,50 min	7,50 min	7,50 min	T 14 On	0,00 min
T 15 Off	0,00 min	0,00 min	0,00 min	T 15 Off	90,00 min
sludge return	X31, X16.V4	X31, X16.V4	X31, X16.V4	discharging	X31, X16.V3
T 16 Σ	1,00 min	1,00 min	1,00 min	T 16 Σ	7,50 min
T 17 On	1,00 min	1,00 min	1,00 min	T 17 On	7,50 min
T 18 Off	0,00 min	0,00 min	0,00 min	T 18 Off	0,00 min
cyclepause	X31, X16.V2	X31, X16.V2	X31, X16.V2	sludge return	X31, X16.V4
T 19 Off	15,00 min	15,00 min	15,00 min	T 19 Σ	1,00 min
T 20 On	2,00 min	2,00 min	2,00 min	T 20 On	1,00 min
holiday	X31, X16.V2	X31, X16.V2	X31, X16.V2	T 21 Off	0,00 min
T 21 one	2,00 min	2,00 min	2,00 min	cyclepause	X31, X16.V2
T 22 Off	15,00 min	15,00 min	15,00 min	T 22 Off	15,00 min
total cycle time	346,00 min	346,00 min	350,00 min	T 23 On	2,00 min
total aeration time	8,00 h/d	11,20 h/d	11,03 h/d	holiday	X31, X16.V2
total runtime	9,06 h/d	12,26 h/d	12,10 h/d	T 24 On	2,00 min
cycles per day	4 1/d	4 1/d	4 1/d	T 25 Off	15,00 min
				total cycle time	350,00 min
				total aeration time	11,03 h/d
				total runtime	12,10 h/d
				cycles per day	4 1/d

Service level



Cycle settings

- Control tables
- Cycle times

Treatment level D and D+:

- Only with SBR 4V
- Different arrangement of the process steps
- Steps D:
 - Charging
 - Deni
 - Aeration (nitrification)
 - ...
- Steps D+
 - Charging (large)
 - Aeration (nitrification)
 - Charging (small)
 - Denitrification
 - ...
- With D+ better discharge values for TN possible

Process: SBR 4V System: KLARO					
Steps	8 PE C	8 PE N	8 PE D	Steps	8 PE D+
charging	X31, X16.V1	X31, X16.V1	X31, X16.V1	charging	X31, X16.V1
T 1 Σ	7,50 min	7,50 min	7,50 min	T 1 Σ	6,00 min
T 2 On	7,50 min	7,50 min	7,50 min	T 2 On	6,00 min
T 3 Off	0,00 min	0,00 min	0,00 min	T 3 Off	0,00 min
denitrification	X31, X16.V2	X31, X16.V2	X31, X16.V2	aeration	X31, X16.V2
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T 5 Off	0,00 min	0,00 min	9,00 min	T 5 On	15,00 min
T 6 On	0,00 min	0,00 min	0,50 min	T 6 Off	5,00 min
aeration	X31, X16.V2	X31, X16.V2	X31, X16.V2	charging	X31, X16.V1
T 7 Σ	240,00 min	240,00 min	214,00 min	T 7 Σ	1,50 min
T 8 On	10,00 min	14,00 min	15,00 min	T 8 On	1,50 min
T 9 Off	10,00 min	6,00 min	5,00 min	T 9 Off	0,00 min
sedimentation	X31, -	X31, -	X31, -	denitrification	X31, X16.V2
T 10 Σ	90,00 min	90,00 min	90,00 min	T 10 Σ	30,00 min
T 11 On	0,00 min	0,00 min	0,00 min	T 11 Off	9,00 min
T 12 Off	90,00 min	90,00 min	90,00 min	T 12 On	0,50 min
discharging	X31, X16.V3	X31, X16.V3	X31, X16.V3	sedimentation	X31, -
T 13 Σ	7,50 min	7,50 min	7,50 min	T 13 Σ	90,00 min
T 14 On	7,50 min	7,50 min	7,50 min	T 14 On	0,00 min
T 15 Off	0,00 min	0,00 min	0,00 min	T 15 Off	90,00 min
sludge return	X31, X16.V4	X31, X16.V4	X31, X16.V4	discharging	X31, X16.V3
T 16 Σ	1,00 min	1,00 min	1,00 min	T 16 Σ	7,50 min
T 17 On	1,00 min	1,00 min	1,00 min	T 17 On	7,50 min
T 18 Off	0,00 min	0,00 min	0,00 min	T 18 Off	0,00 min
cyclepause	X31, X16.V2	X31, X16.V2	X31, X16.V2	sludge return	X31, X16.V4
T 19 Off	15,00 min	15,00 min	15,00 min	T 19 Σ	1,00 min
T 20 On	2,00 min	2,00 min	2,00 min	T 20 On	1,00 min
holiday	X31, X16.V2	X31, X16.V2	X31, X16.V2	T 21 Off	0,00 min
T 21 one	2,00 min	2,00 min	2,00 min	cyclepause	X31, X16.V2
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cycles per day	4 1/d	4 1/d	4 1/d	T 25 Off	15,00 min
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- If total cycle time is exceeded, the display turns red.
- Number of cycles variable

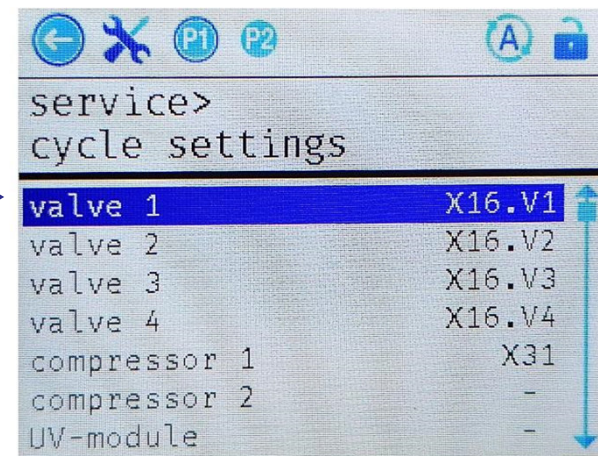
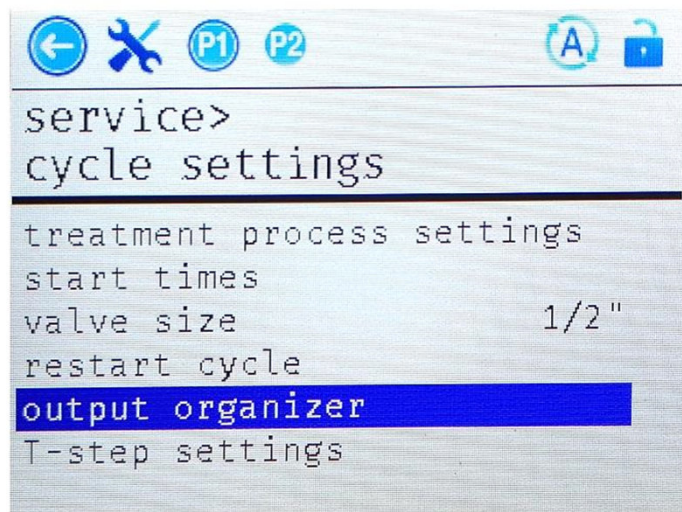
Steps	SBR One 3V, KLARO One			Flow 2V, fixed bed	
	8 PE C	8 PE N	8 PE D	8 PE C	8 PE N
charging	X31, -	X31, -	X31, -	X31, -	X31, -
T 1 Σ	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min
T 2 On	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min
T 3 Off	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min
denitrification	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1
T 4 Σ	0.00 min	0.00 min	90.00 min	0.00 min	0.00 min
T 5 Off	0.00 min	0.00 min	18.00 min	0.00 min	0.00 min
T 6 On	0.00 min	0.00 min	1.00 min	0.00 min	0.00 min
aeration	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1
T 7 Σ	480.00 min	480.00 min	480.00 min	960.00 min	960.00 min
T 8 On	10.00 min	14.00 min	15.00 min	10.00 min	14.00 min
T 9 Off	10.00 min	6.00 min	5.00 min	10.00 min	6.00 min
sedimentation	X31, -	X31, -	X31, -	X31, -	X31, -
T 10 Σ	120.00 min	120.00 min	120.00 min	0.00 min	0.00 min
T 11 On	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min
T 12 Off	120.00 min	120.00 min	120.00 min	0.00 min	0.00 min
discharging	X31, X16.V2	X31, X16.V2	X31, X16.V2	X31, X16.V2	X31, X16.V2
T 13 Σ	15.00 min	15.00 min	15.00 min	0.00 min	0.00 min
T 14 On	15.00 min	15.00 min	15.00 min	0.00 min	0.00 min
T 15 Off	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min
sludge return	X31, X16.V3	X31, X16.V3	X31, X16.V3	X31, X16.V3	X31, X16.V3
T 16 Σ	1.00 min	1.00 min	1.00 min	60.00 min	60.00 min
T 17 On	1.00 min	1.00 min	1.00 min	5.00 min	5.00 min
T 18 Off	0.00 min	0.00 min	0.00 min	10.00 min	10.00 min
cyclepause	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1	X31, X16.V1
T 19 Off	30.00 min	30.00 min	30.00 min	15.00 min	15.00 min
T 20 On	4.00 min	4.00 min	4.00 min	2.00 min	2.00 min
holiday	X31, X16.V2	X31, X16.V2	X31, X16.V2	X31, X16.V2	X31, X16.V2
T 21 one	4.00 min	4.00 min	4.00 min	2.00 min	2.00 min
T 22 Off	30.00 min	30.00 min	30.00 min	15.00 min	15.00 min
total cycle time	616.00 min	616.00 min	706.00 min	1020.00 min	1020.00 min
total aeration time	8.00 h/d	11.20 h/d	12.13 h/d	8.00 h/d	11.20 h/d
total runtime	8.53 h/d	11.73 h/d	12.66 h/d	8.33 h/d	11.53 h/d
cycles per day	2 1/d	2 1/d	2 1/d	1 1/d	1 1/d

Service level



Cycle settings

- Assignment of consumer outputs
- are preset at the factory
- In manual mode, only the set loads/outputs are displayed



Provided as standard:

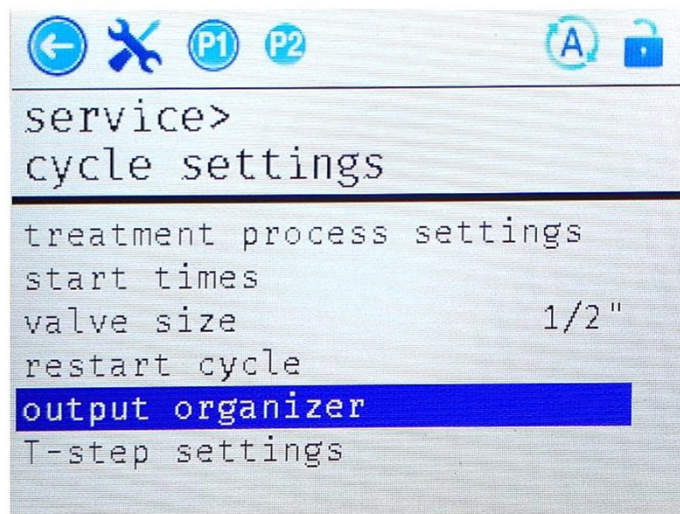
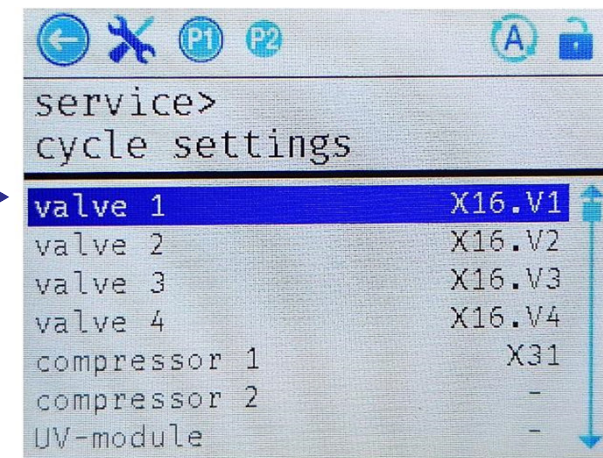
Function	Control.S	Control.M	Comment
Valve 1	X16.1	X16.1	Standard assignment for pumping with airlifters via stepper motor valves. Alternatively, solenoid valves (see chapter 6.7) or submersible pumps (see chapter 6.6) are also possible.
Valve 2	X16.2	X16.2	
Valve 3	X16.3	X16.3	
Valve 4	X16.4	X16.4	
Compressor 1	X31	X31	If single compressor, always select <compressor 1>.
Compressor 2		X32	Runs in parallel with compressor 1. For monitoring, check setting of <current limits>.
UV module		X33	
Cooling fan 1		X34	Fan 230V
Cooling fan 2		X35	Fan 230V
Pump	X32	X32	For submersible pump, e.g. for additional buffer. Operating parameters adjustable via <reserve module>.
Dosing pump 1	X12.7	X12.7	C-module
Dosing pump 2	X12.7	X12.1	P-module
Dosing pump 3		X12.5	Chlorine-module
Warning lamp	X12.7	X12.5	For external warning lamp 24V
Cooling fan 3		X12.3	Fan 24V
Output 24V		...	Reserve; currently not used

Service level

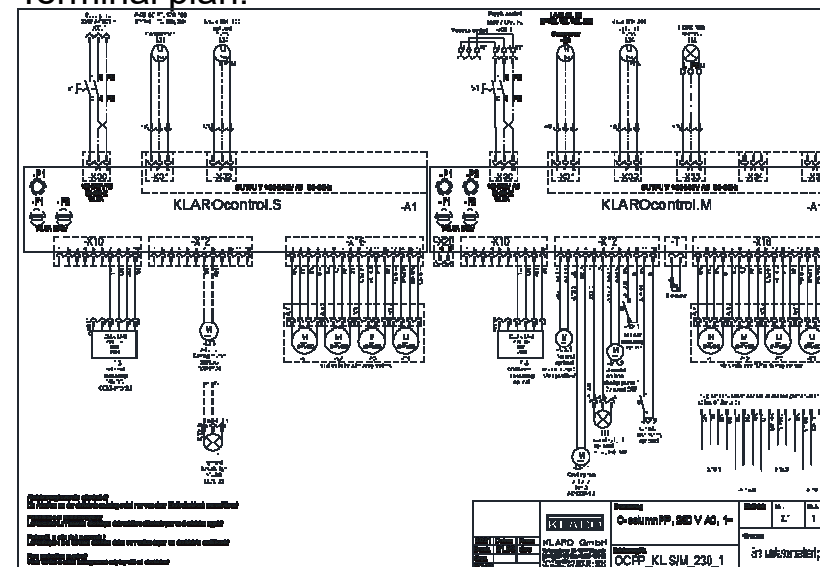


Cycle settings

- Assignment of consumer outputs
- are preset at the factory
- In manual mode, only the set loads/outputs are displayed



Terminal plan:

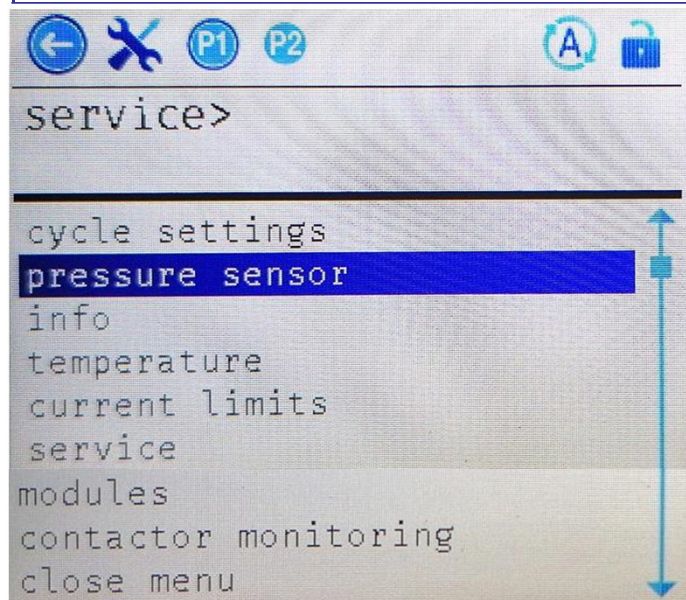


Service level



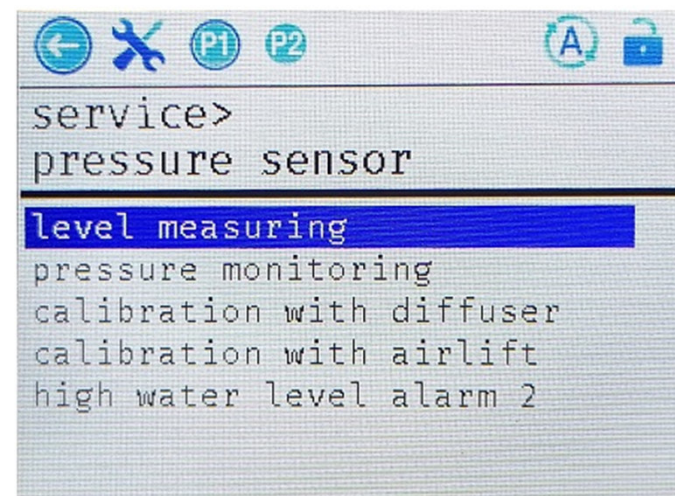
Pressure sensor

- Activate use of the sensor
- Calibrate
- Make settings
- ...



Level measurement

- Level controlled operating mode
- Save energy
- Save on consumables
- Overflow alarm

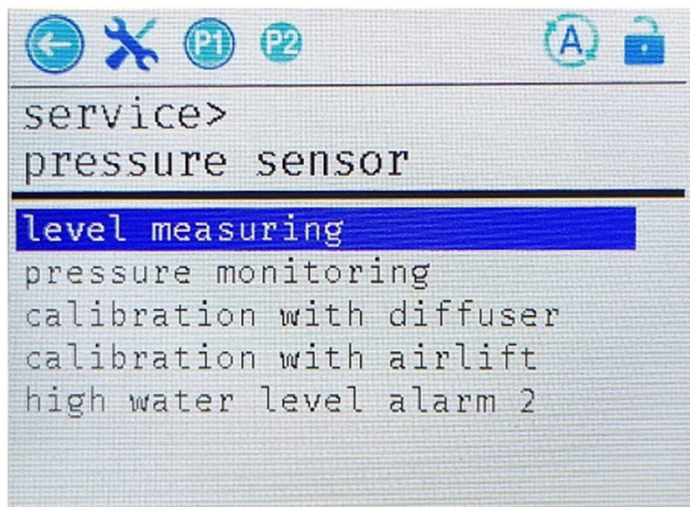


Service level

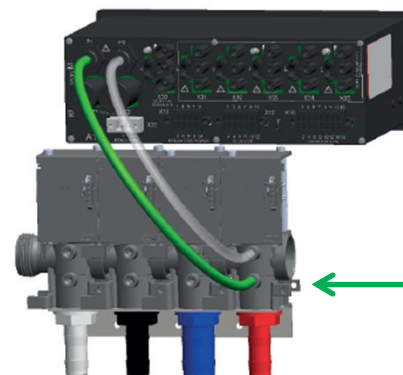


Level measurement

- Level controlled operating mode
- Save energy
- Save on consumables
- Overflow alarm



KLARO	One
Measurement via charging airlifter	Measurement via membrane diffuser
Red hose	Blue hose



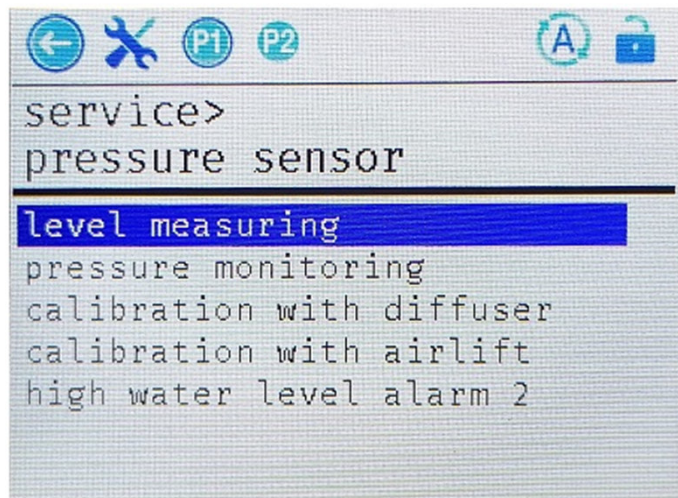
Level measurement:
Connect the measuring hose at the bottom

Service level

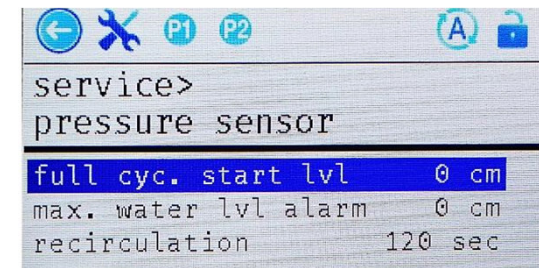


Level measurement

- Level controlled operating mode
- Save energy
- Save on consumables
- Overflow alarm

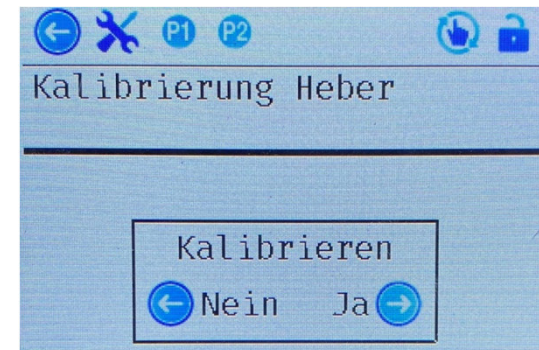


2



- "0 cm" = deactivated
- Enter start level

1



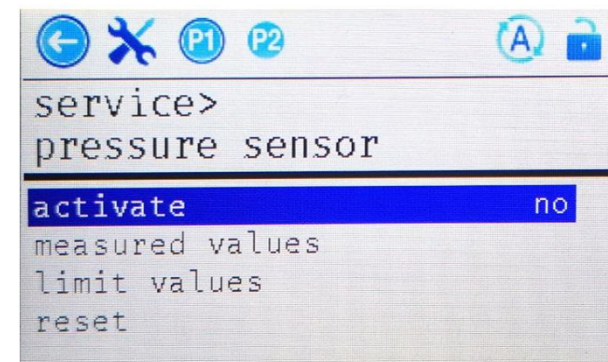
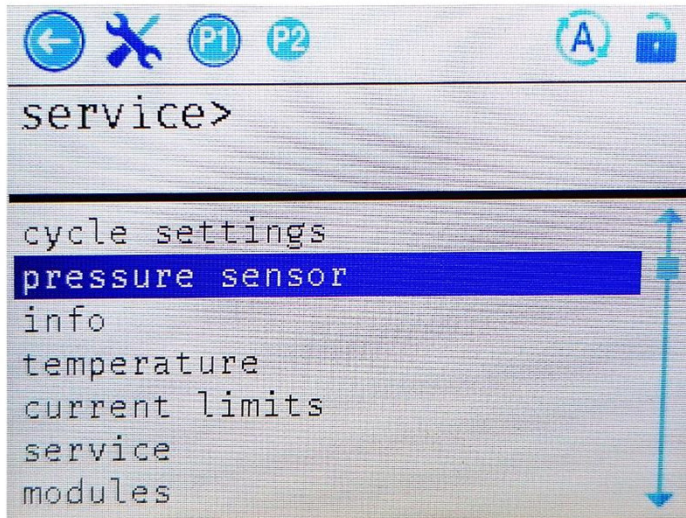
- Level in wastewater treatment plant should be at desired start level

Service level

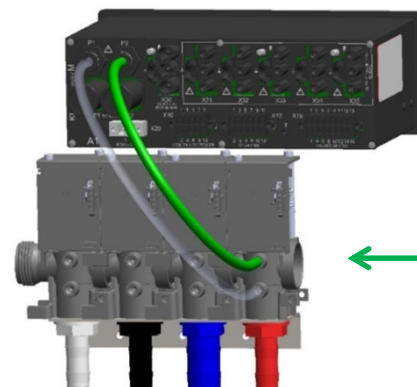


Monitoring operating pressure

- Constant monitoring across all valves
- Fault message if deviation from standard
- More operational safety



- "Activate Yes" starts a 30 days learning phase
- "Reset" restarts learning phase



Operating pressure:
Connect the measuring hose at the top

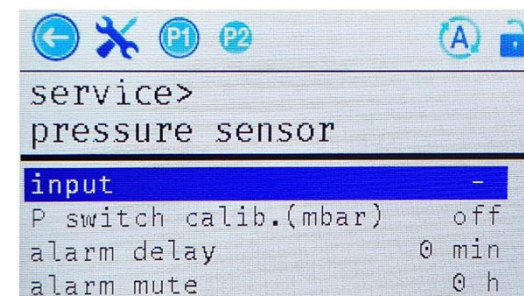
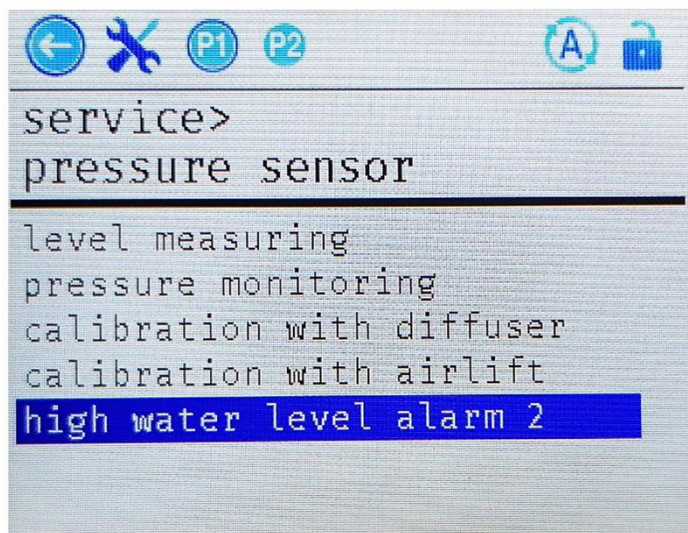


Service level



High water level alarm 2

- Constant monitoring of the fill level and immediate alerting
- Only control.M
- Currently only possible via float switch



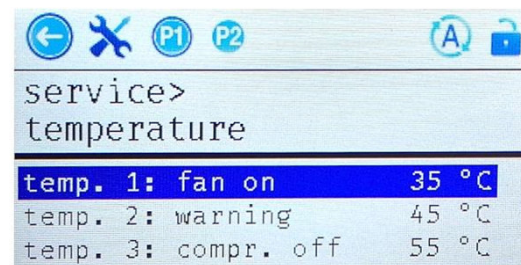
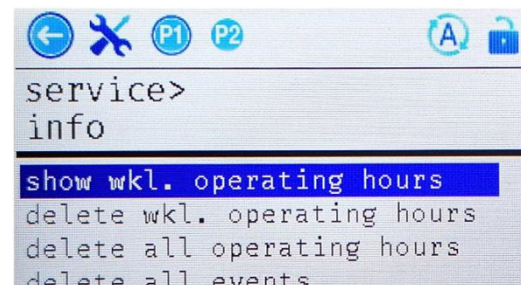
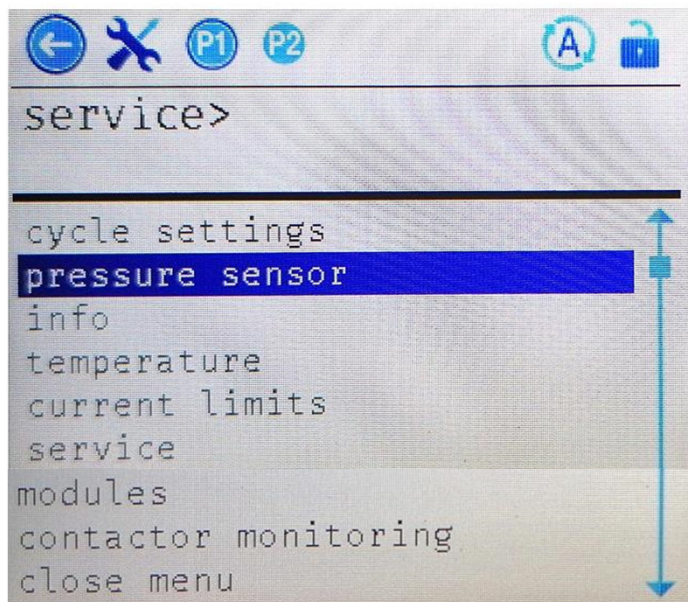
- Set input for float switch
- Delay to suppress fluctuations in the water level
- Mute to remind operator if problem still exists

Service level



Service

- Manage logbook
- Set temperature monitoring



Temp.2

- Overheating warning
- If exceeded, note H.7 "Temp.2 warning" is displayed.

Temp.3

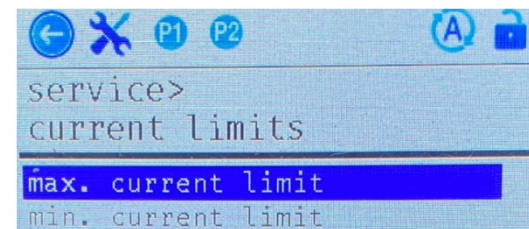
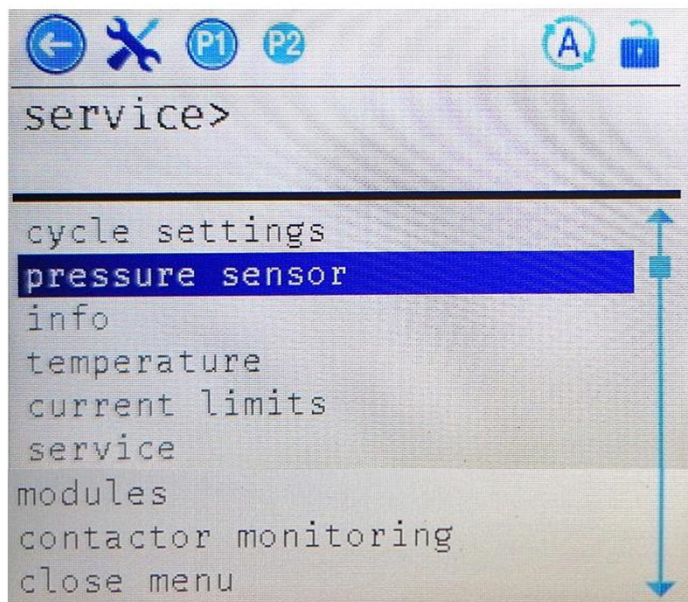
- Emergency shutdown - Only fan still running
- If exceeded, error F.16 occurs "Temp.3: Compr. off"

Service level

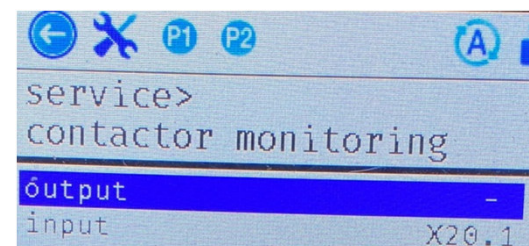
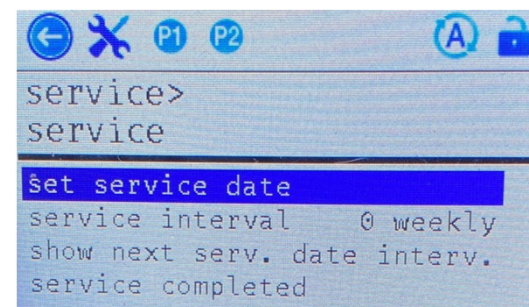


Service

- Set current limits for current monitoring
- Set maintenance dates, generate reminder
- Contactor monitoring



- Adaptation necessary e.g.
 - for 2 cooling fans
 - With 2 compressors
- If min. is set to "0", then the consumer is not monitored.



Service level

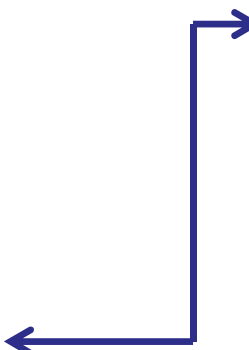
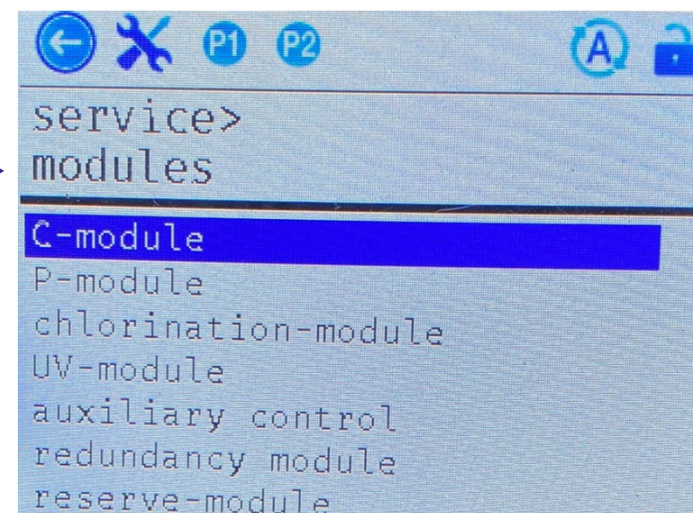
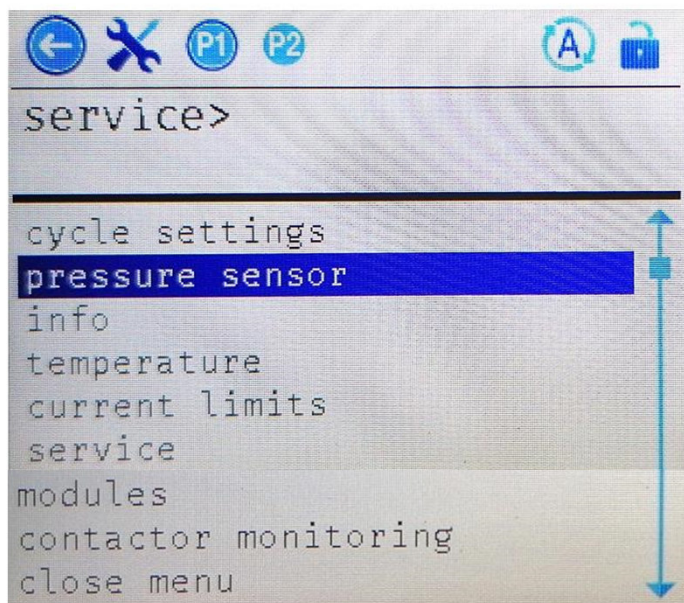


Service

- Modules for additional cleaning stages or special applications

Modules

- Dosing technology
- UV disinfection
- Special functions



Service level



Modules

- C-module for addition of an external carbon source
 - With underload
 - In support of the Deni
- P module for phosphate precipitation (+P)
- ...

```
service>
modules
C-module
P-module
chlorination-module
UV-module
auxiliary control
redundancy module
reserve-module
```

```
service>
modules
output -
modules 1
start with T-step T08
runtime 0 min
holiday mode off
canister monitoring -
```

- Start time and running time depending on the cleaning goal
- Addition possible in holiday mode; at any cycle start time
- Select input for float switch

```
service>
modules
output -
modules 1
start with T-step T08
runtime 0 min
canister monitoring -
```

Service level



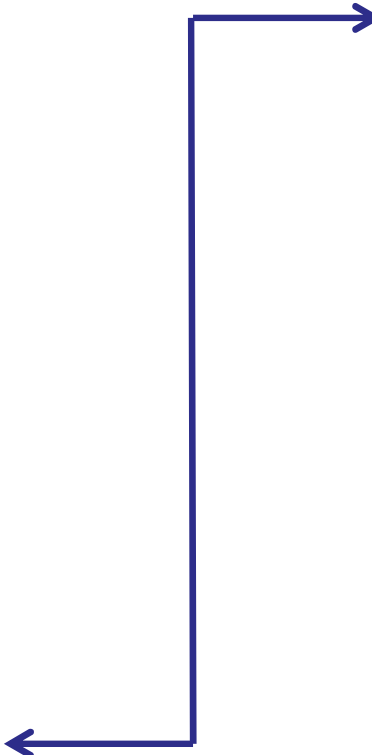
Modules

- UV module for hygienisation (+H)

```
service>
modules
C-module
P-module
chlorination-module
UV-module
auxiliary control
redundancy module
reserve-module
```

```
service>
modules
output
start with T-step
runtime 0 min
input
max. operating hours 1500 h
reset
```

- Start time and running time depending on the type of UV module
- Level-dependent operation also possible
- "Operating hours countdown" for radiator replacement

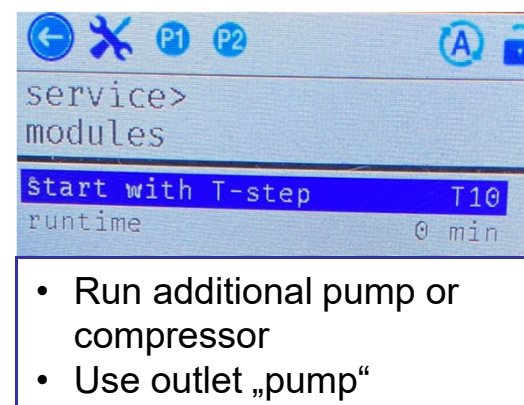
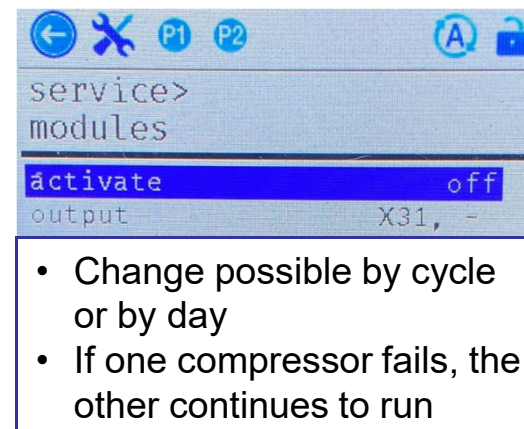
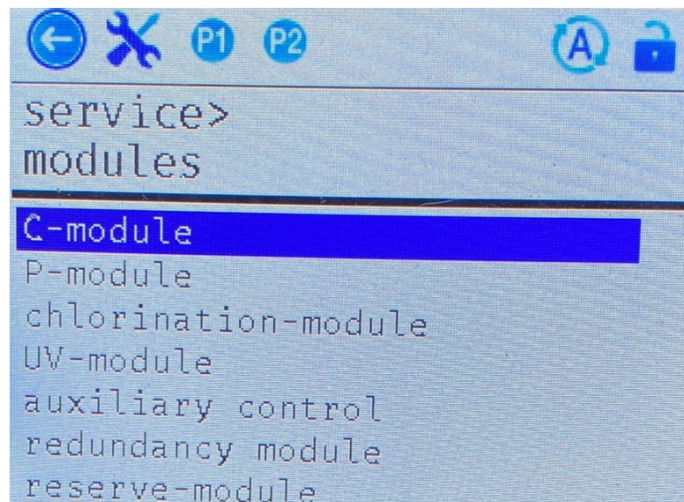


Service level



Modules

- Redundancy module for alternate operation of two compressors
- Reserve module for operation of an additional buffer pump



Controllers

Examples of use



1. Add dosing pump 24V, cooling fan 24V, warning lamp 24V
2. Run effluent pump instead of discharge airlifter
3. Run pump for additional buffer tank
4. Run solenoid valves instead of stepper motor valves

Controllers

Examples of use

Dosing pump 24V, cooling fan 24V, warning lamp 24V

Connection principle



Parts needed:

- Additional package DP24...
- Additional package fan...
- Additional package warning light 24V...

970734



Cooling fan additional package KLAROcontrol.M 24 V for indoor cabinets 1+2 and the O-cabinet3 and "Universal"
Cooling fan dimensions: 120 x 120 x 32 mm. 24 VDC and 5W.
Includes: protecting grille, connector X12 and small parts.

970733

Cooling fan additional package KLAROcontrol.M 24 V for "O-column" Geyer type
Cooling fan dimensions: 120 x 120 x 32 mm. 24 VDC and 5W.
Includes: protecting grille, connector X12 and small parts.

970732

Cooling fan additional package KLAROcontrol.M 24 V for "PP-O-column"
Cooling fan dimensions: 120 x 120 x 32 mm. 24 VDC and 5W.
Includes: protecting grille, connector X12 and small parts.

970725



Visual alarm additional package 24 V KLAROcontrol.* for "O-column" Geyer type, O-cabinet3 and "Universal"
Includes: a warning light, connector X12, a spiral cable and small parts

970724

Visual alarm additional package 24 V KLAROcontrol.* for "PP-O-column"
Includes: a warning light, connector X12, a spiral cable and small parts

970726

Visual alarm additional package 24 V KLAROcontrol.* for O-cabinets 4/5
Includes: a warning light, connector X12, a spiral cable and small parts

Controllers

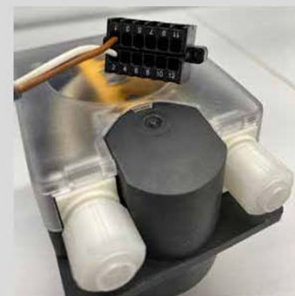
Examples of use

Dosing pump 24V, cooling fan 24V, warning lamp 24V

1. Connection to control.S and M

Function	Control.S	Control.M	Comment
Valve 1	X16.1	X16.1	Standard assignment for pumping with airlifters via stepper motor valves. Alternatively, solenoid valves (see chapter 6.7) or submersible pumps (see chapter 6.6) are also possible.
Valve 2	X16.2	X16.2	
Valve 3	X16.3	X16.3	
Valve 4	X16.4	X16.4	
Compressor 1	X31	X31	If single compressor, always select <compressor 1>.
Compressor 2		X32	Runs in parallel with compressor 1. For monitoring, check setting of <current limits>.
UV module		X33	
Cooling fan 1		X34	Fan 230V
Cooling fan 2		X35	Fan 230V
Pump	X32	X32	For submersible pump, e.g. for additional buffer. Operating parameters adjustable via < reserve module>.
Dosing pump 1	X12.7	X12.7	C-module
Dosing pump 2	X12.7	X12.1	P-module
Dosing pump 3		X12.5	Chlorine-module
Warning lamp	X12.7	X12.5	For external warning lamp 24V
Cooling fan 3		X12.3	Fan 24V
Output 24V		...	Reserve; currently not used

①



P module

Werkzeug: Schlitzschraubendreher 2,5 x 0,4 mm

KLAROcontrol.M

X12 Pin 1 (braun) und 2 (weiß)

KLAROcontrol.S

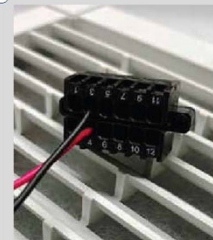
X12 Pin 7 (braun) und 8 (weiß)

Bei Schlauchpumpe Compact ist der Anschluss polungsfrei.



Note: Pay attention to the colours of the cores! Do not mix them up!

①



Cooling fan (only control. M)

Beim Anschluss die Polung beachten!

X12 Pin 3 (schwarz) und 4 (rot) nur bei KLAROcontrol.M

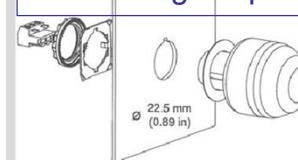
②



Stecker mit der Steuerung verschrauben.

①

Warning lamp



Einbau in Schaltschrank

②



Anschluss an
KLAROcontrol

Anschluss ist
polungsfrei.

KLAROcontrol.M
X12 Pin 5 und 6

KLAROcontrol.S
X12 Pin 7 und 8

③



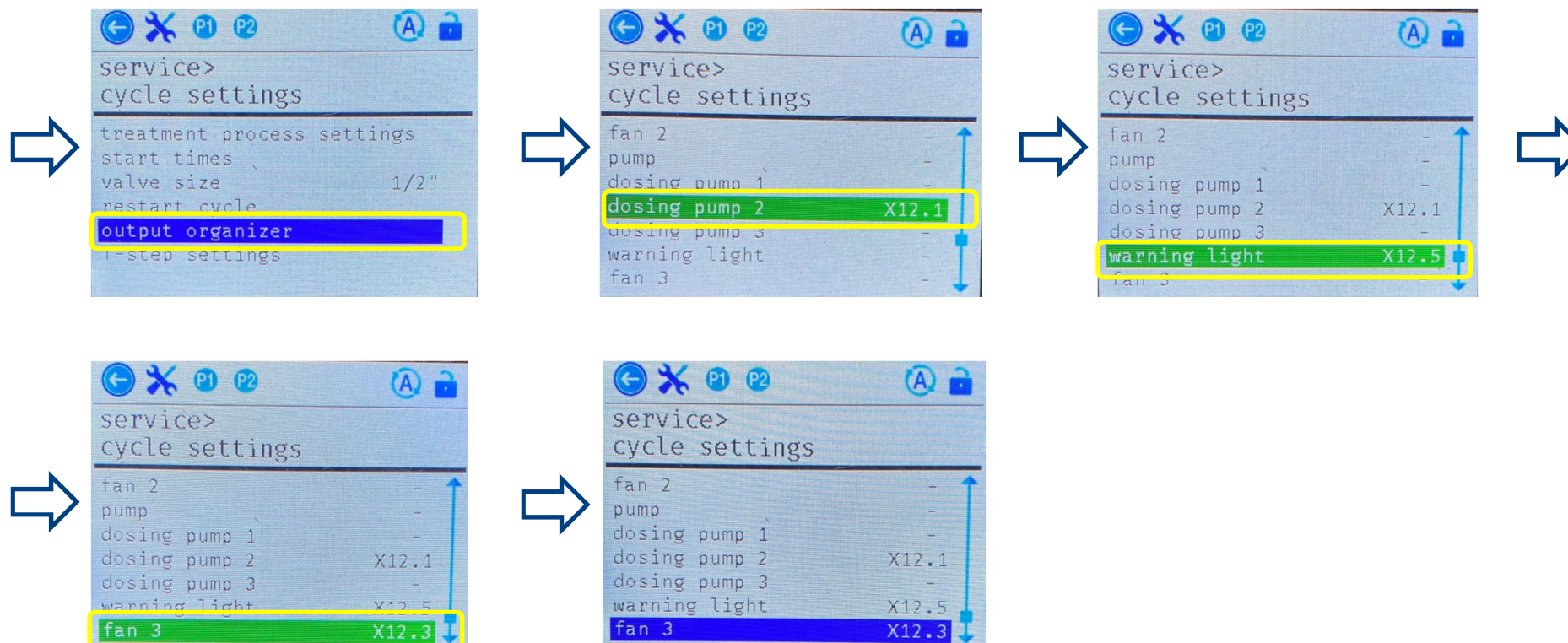
Stecker mit der Steuerung verschrauben.

Controllers

Examples of use

Dosing pump 24V, cooling fan 24V, warning lamp 24V

2. Assign outputs:



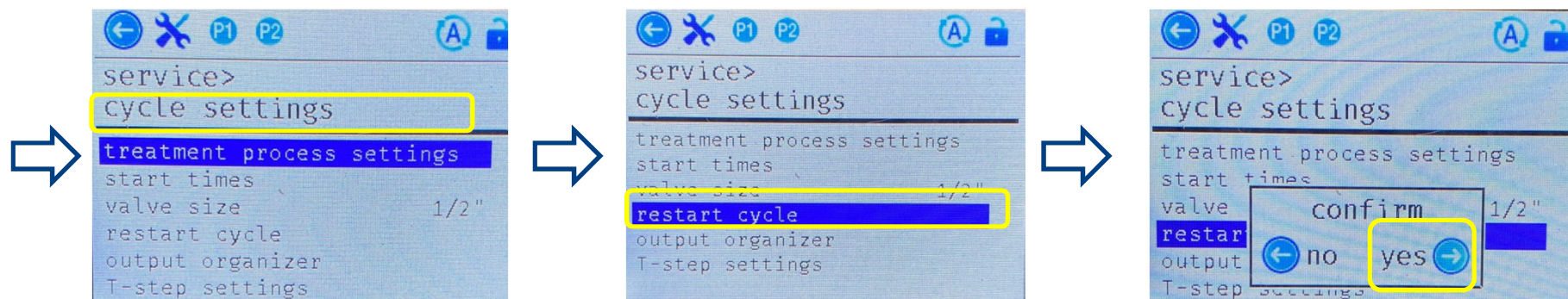
Note: Adjusting the current limits is normally not necessary.

Controllers

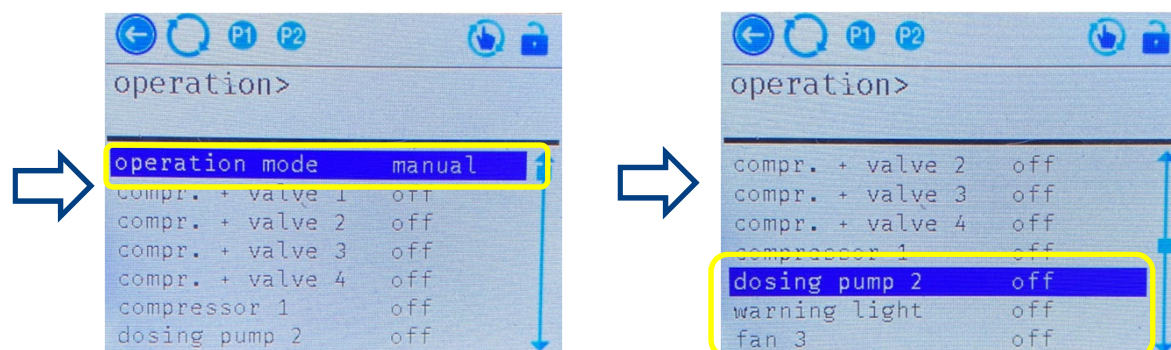
Examples of use

Dosing pump 24V, cooling fan 24V, warning lamp 24V

3. Restart cycle



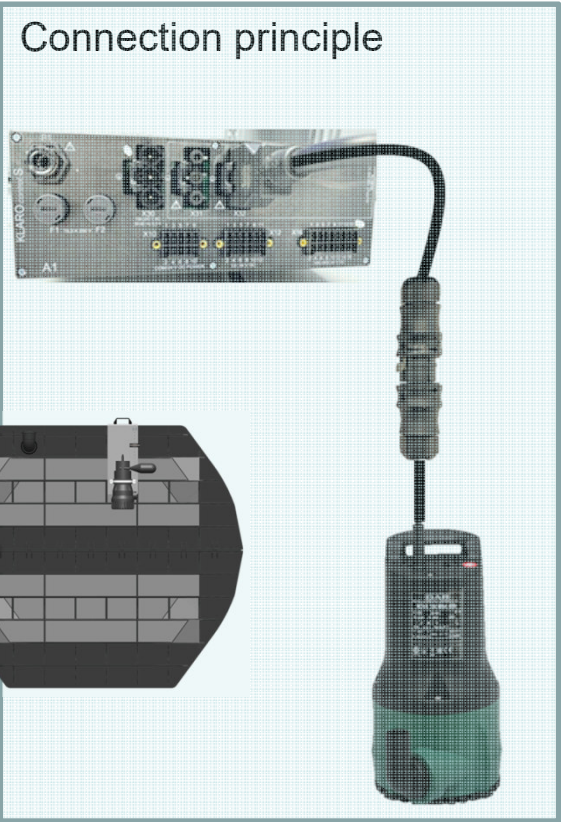
4. Test in manual mode



Controllers

Examples of use

Run effluent pump instead of discharge airlifter



Parts needed:
Additional package connection pump 230V



970708		Pump connect 230V additional package KLAROcontrol.* for "PP-cabinet" and "PP-O-column" <u>includes:</u> Connection cable X3N, plug with strain relief, small parts
970707		Pump connect 230V additional package KLAROcontrol.* for indoor cabinets 1/2/3/4, outdoor cabinets 3/4/5, "Universal", "O-column" Geyer type <u>includes:</u> Connection cable X3N, plug with strain relief, angle socket, small parts

Controllers

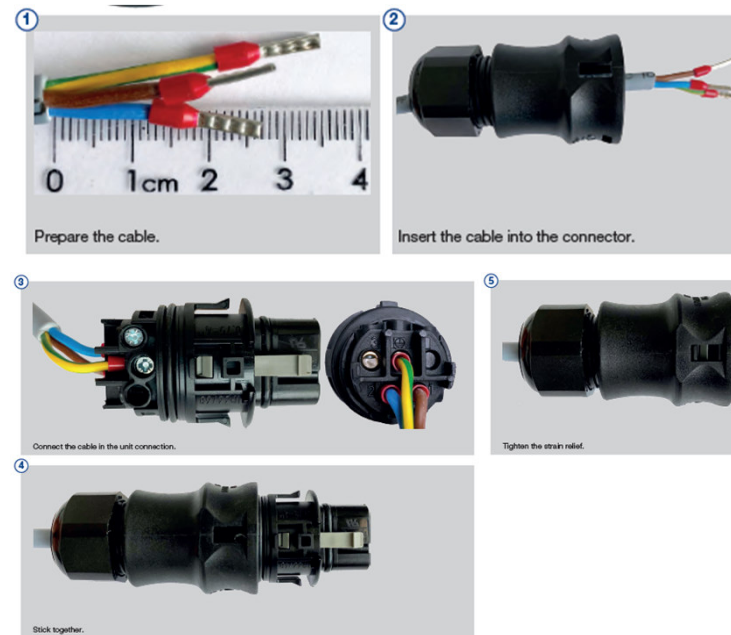
Examples of use

Run effluent pump instead of discharge airlifter

1. Connection to control unit:
via output X32



2. Fit the plug to the pump cable



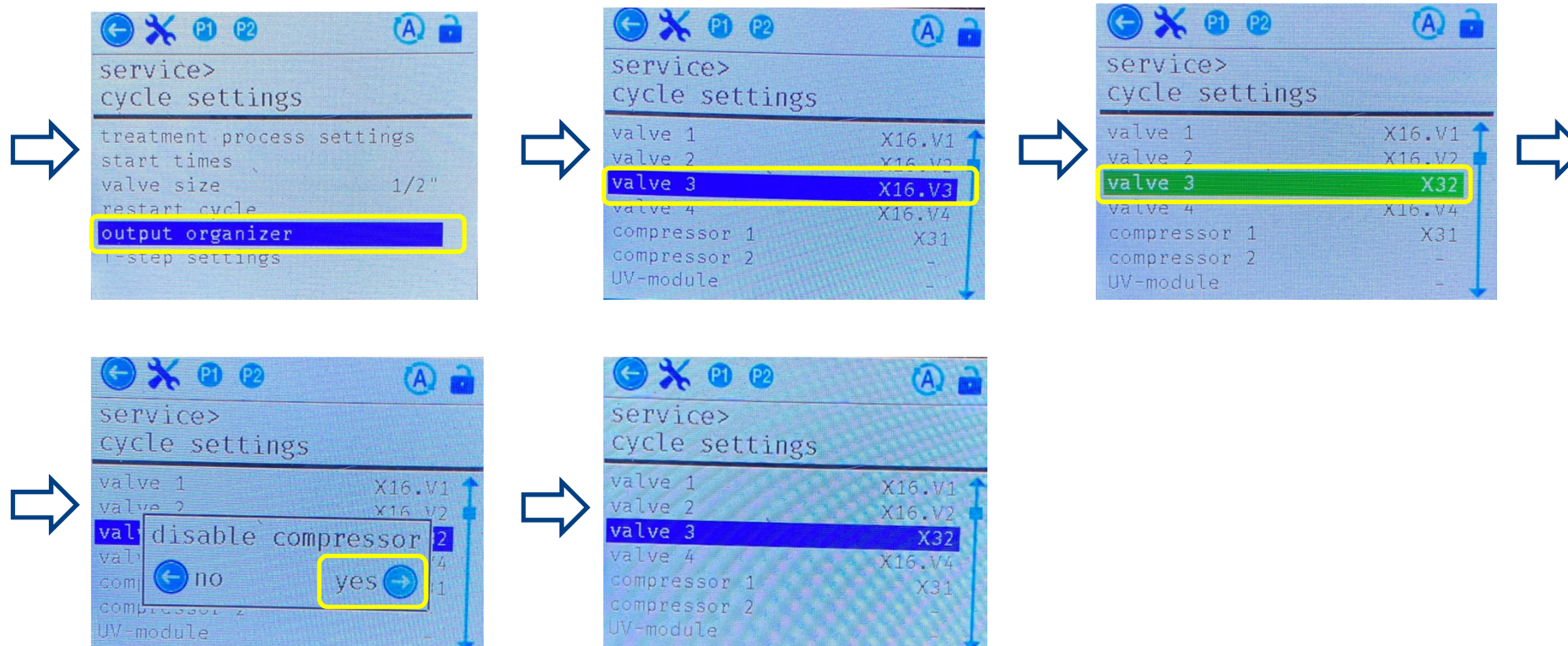
Note: Assignment in coupling:
Pin 1 - L; Pin 2 - N; Pin PE - PE

Controllers

Examples of use

Run effluent pump instead of discharge airlifter

3. Assign outputs:



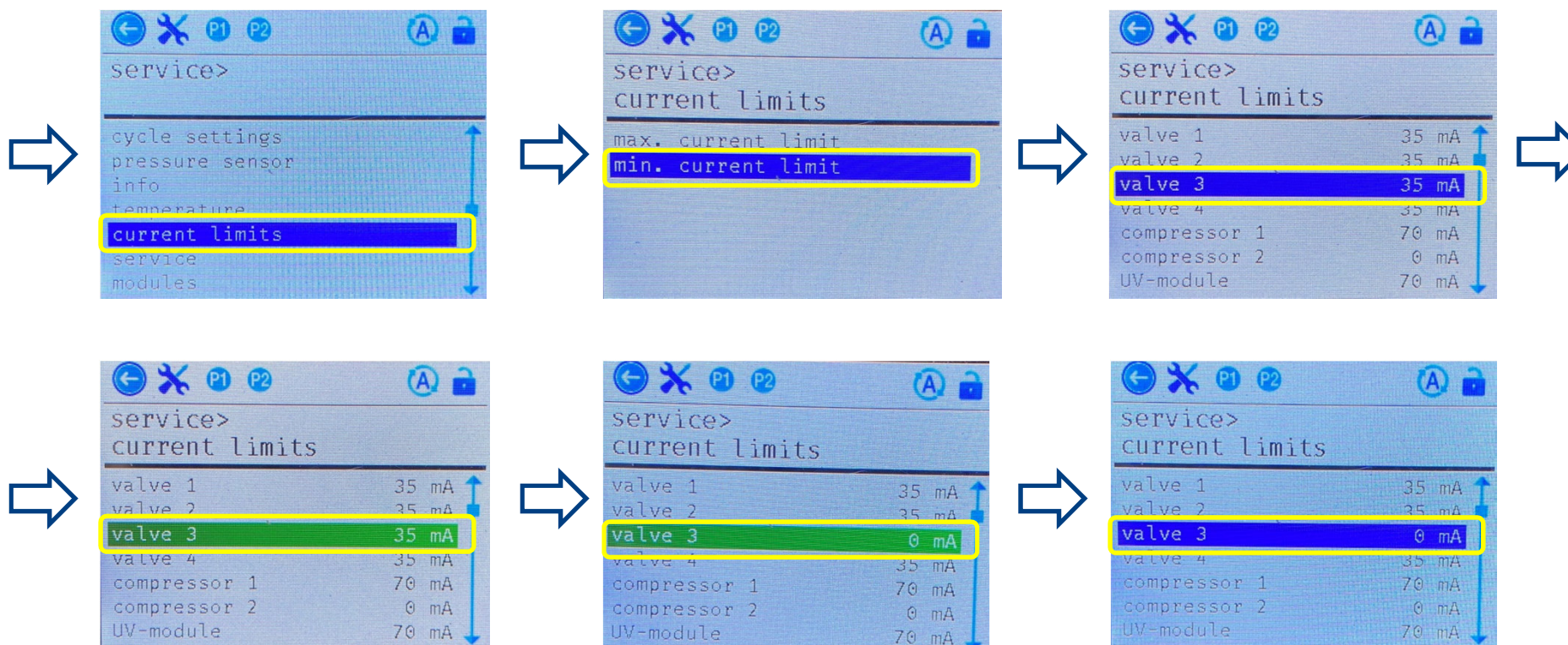
Note: Deactivate the compressor because water is to be pumped with a submersible pump and not with compressed air.

Controllers

Examples of use

Run effluent pump instead of discharge airlifter

4. Adjust current limits: Set current limit min. to 0 mA



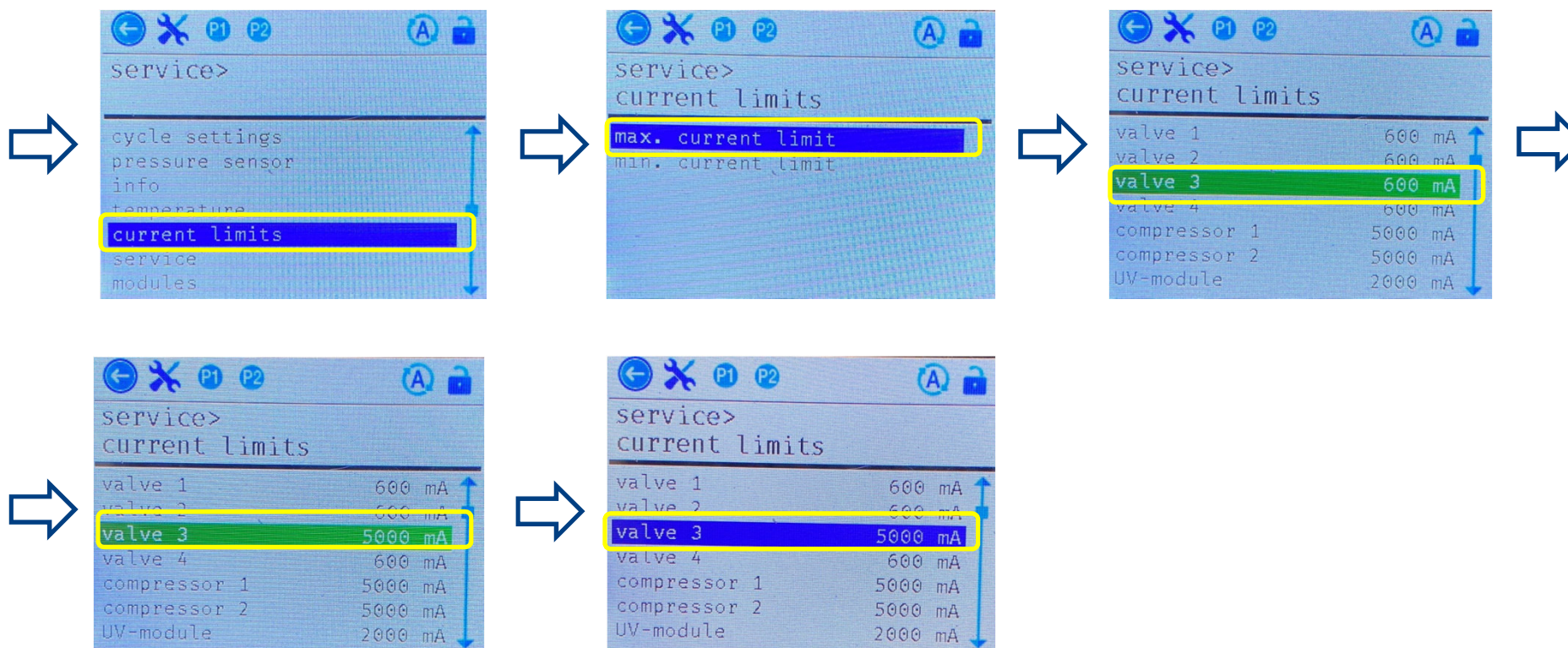
Note: The lower current limit cannot be monitored because the float switch can switch off the pump by itself.

Controllers

Examples of use

Run effluent pump instead of discharge airlifter

5. Adjust current limits: Set current limit max. to 5000 mA



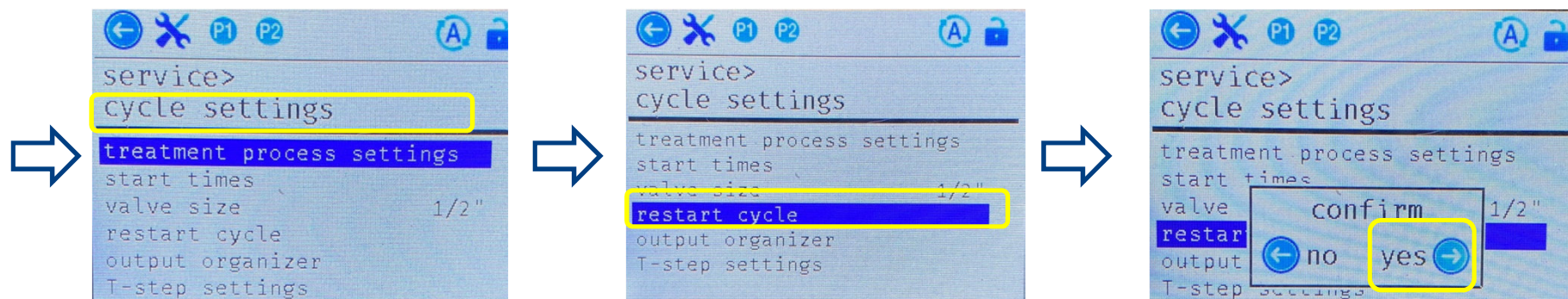
Note: A value of 5000 mA is recommended for the upper current limit.

Controllers

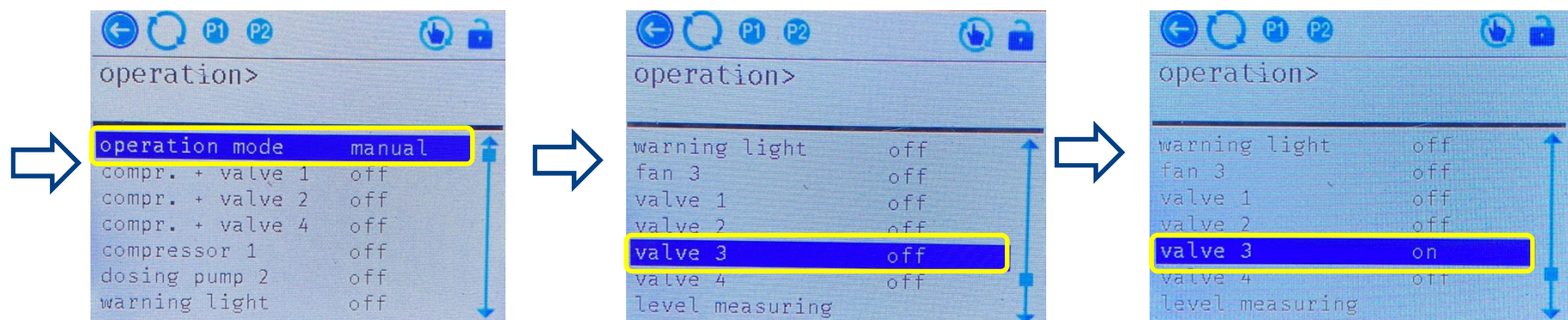
Examples of use

Run effluent pump instead of discharge airlifter

6. Restart cycle



7. Test in manual mode



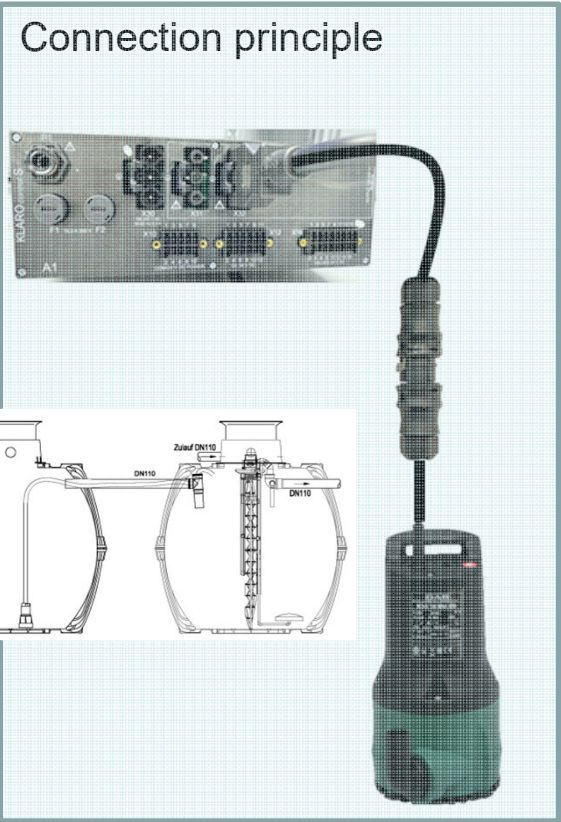
Note: The float switch must be up for the pump to start.

Controllers

Examples of use



Run pump for additional buffer tank



Parts needed:
Additional package connection pump 230V



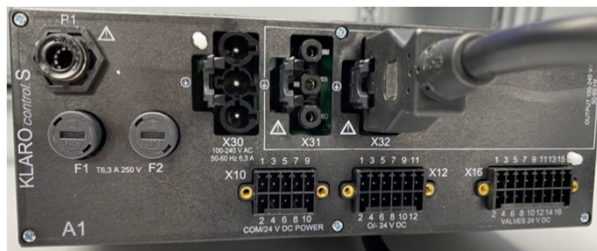
970708		Pump connect 230V additional package KLAROcontrol.* for "PP-cabinet" and "PP-O-column" <u>includes:</u> Connection cable X3N, plug with strain relief, small parts
970707		Pump connect 230V additional package KLAROcontrol.* for indoor cabinets 1/2/3/4, outdoor cabinets 3/4/5, "Universal", "O-column" Geyer type <u>includes:</u> Connection cable X3N, plug with strain relief, angle socket, small parts

Controllers

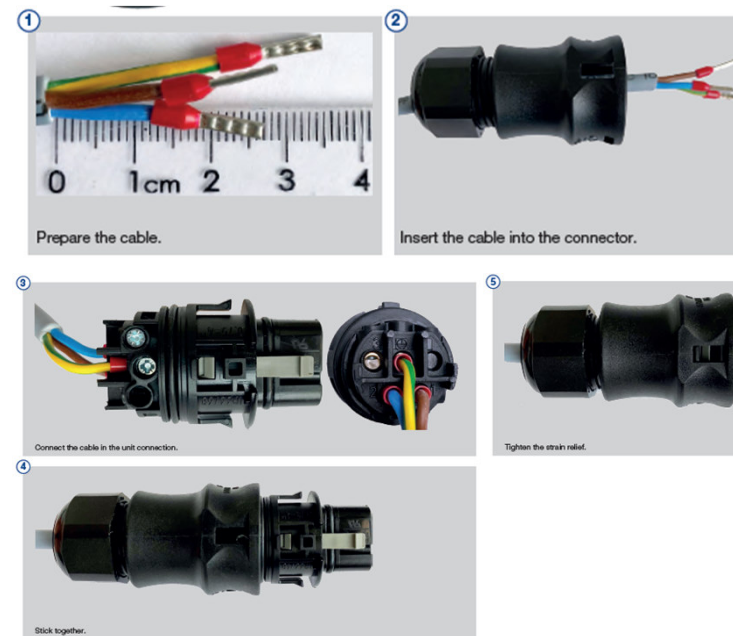
Examples of use

Submersible pump for additional buffer

1. Connection to control unit:
via output X32



2. Fit plug to pump cable



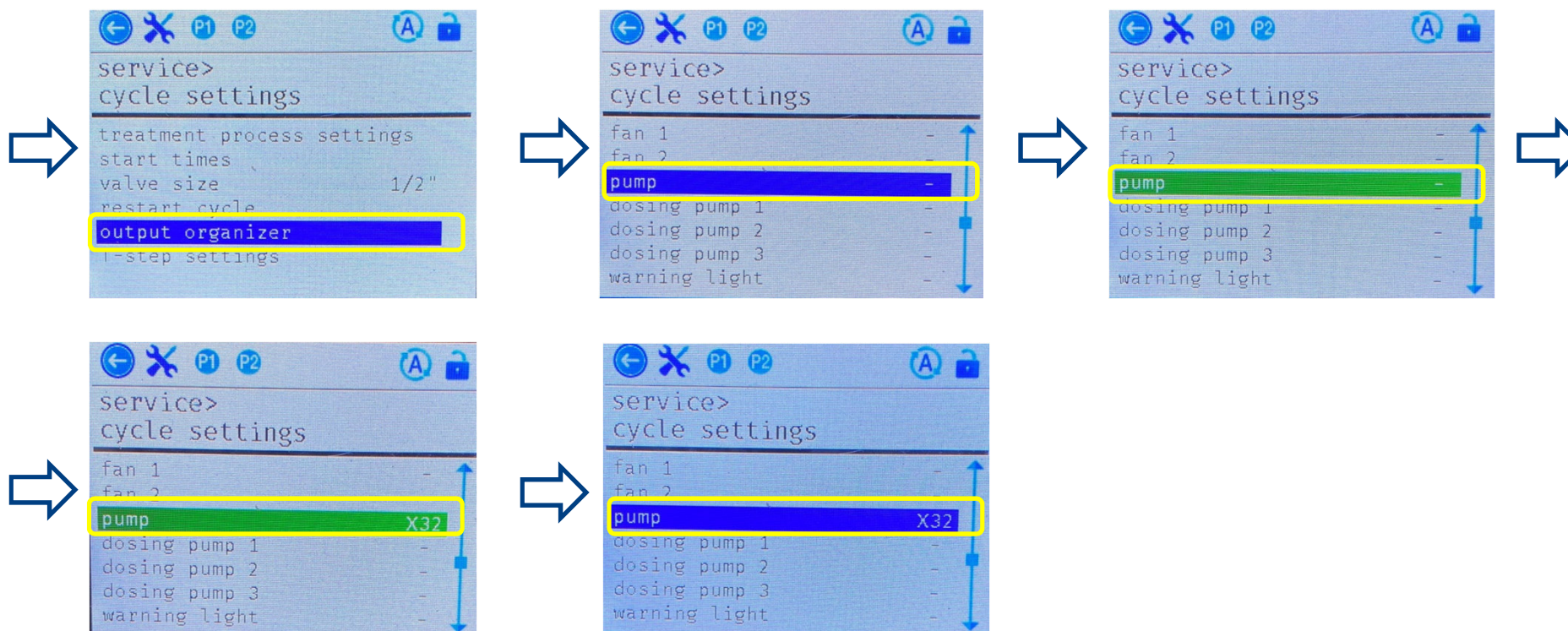
Note: Assignment in coupling:
Pin 1 - L; Pin 2 - N; Pin PE - PE

Controllers

Examples of use

Submersible pump for additional buffer

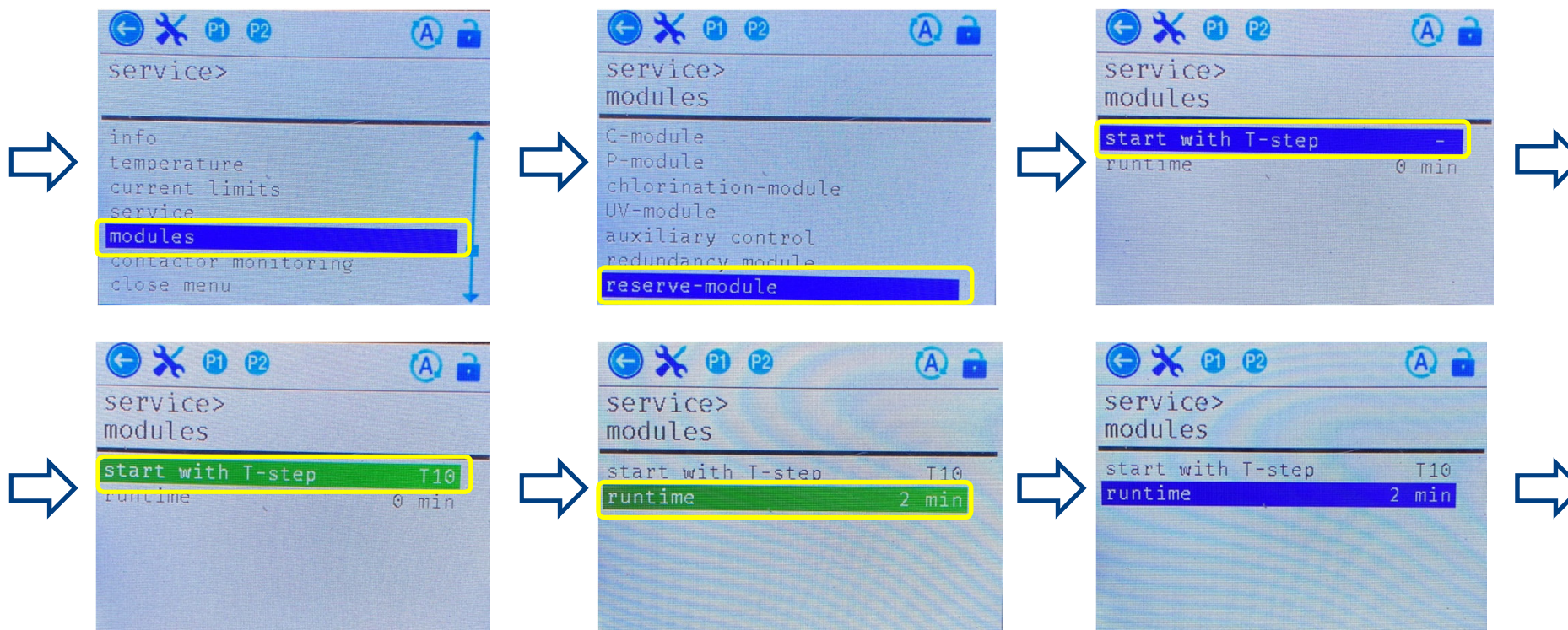
3. Assign outputs:



Note: Adjustment of the current limits is not necessary. These are already min 0 mA and max 5000 mA for "Pump".

Submersible pump for additional buffer

4. Activate pump: Set the starting point and running time via the "Reserve module".



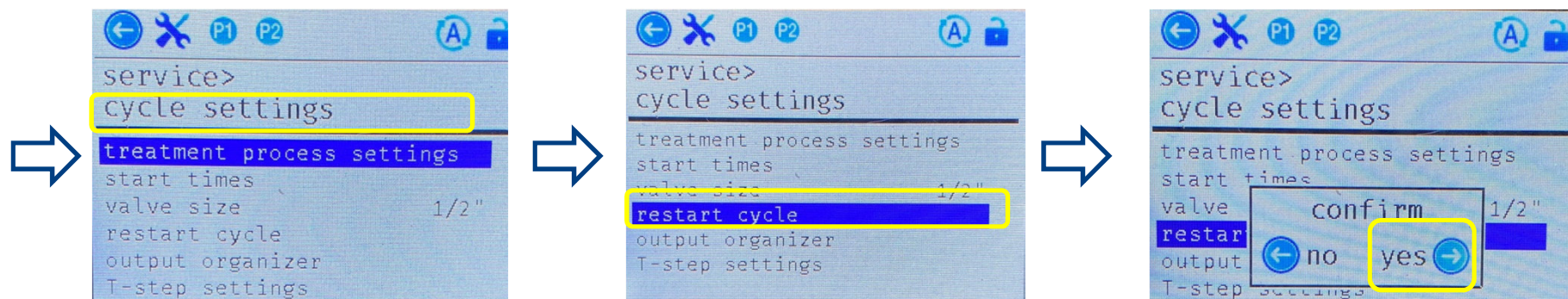
Note: It is recommended to start the recirculation during the sedimentation phase (T10). The running time depends on the desired quantity and delivery rate of the pump.

Controllers

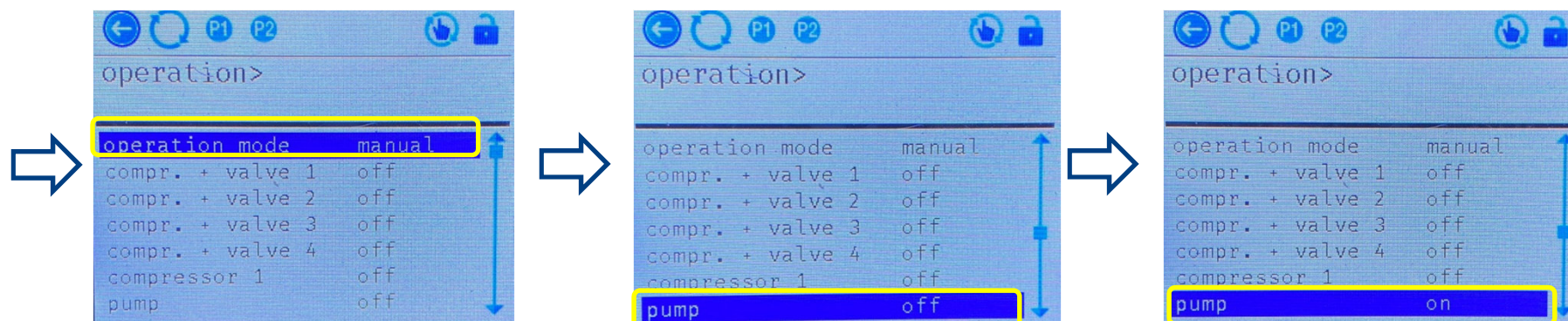
Examples of use

Submersible pump for additional buffer

5. Restart cycle



6. Test in manual mode



Note: The float switch must be up for the pump to start.

Controllers

Examples of use

Solenoid valves instead of stepper motor valves

Connection principle



Parts needed:

Valve cables in appropriate number and length



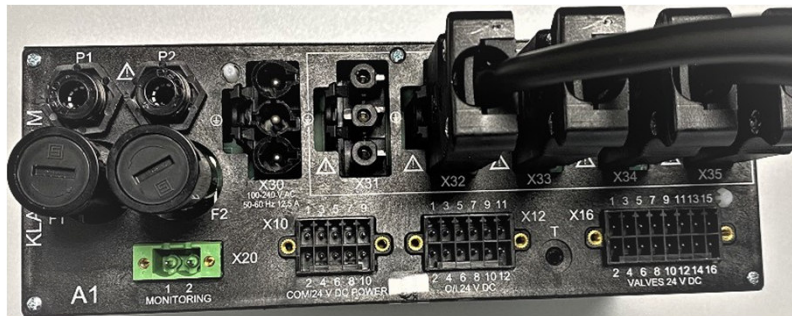
970602		Cable-Set KLAROcontrol.M 230V for I-Cabinet 1/2 for retrofitting of ZK, ZKplus, KLbasic or KLplus <u>Includes:</u> 4 pieces 982219 valve cable vor solenoid valves X3N 1,42m 1 piece 982206 Compressor cable F-cable X3N
970603		Cable-Set KLAROcontrol.M 230V for EPP/O-column for retrofitting of ZK, ZKplus, KLbasic or KLplus <u>Includes:</u> 4 pieces 982220 valve cable vor solenoid valves X3N 0,7m 1 piece 982206 Compressor cable F-cable X3N

Controllers

Examples of use

Solenoid valves instead of stepper motor valves

1. Connection to control unit control.M
 - via output X32: Valve 1
 - via output X33: Valve 2
 - via output X34: Valve 3
 - via output X35: valve 4
2. Connect the cube plug to the valve and screw it tight. Do not forget the seal.

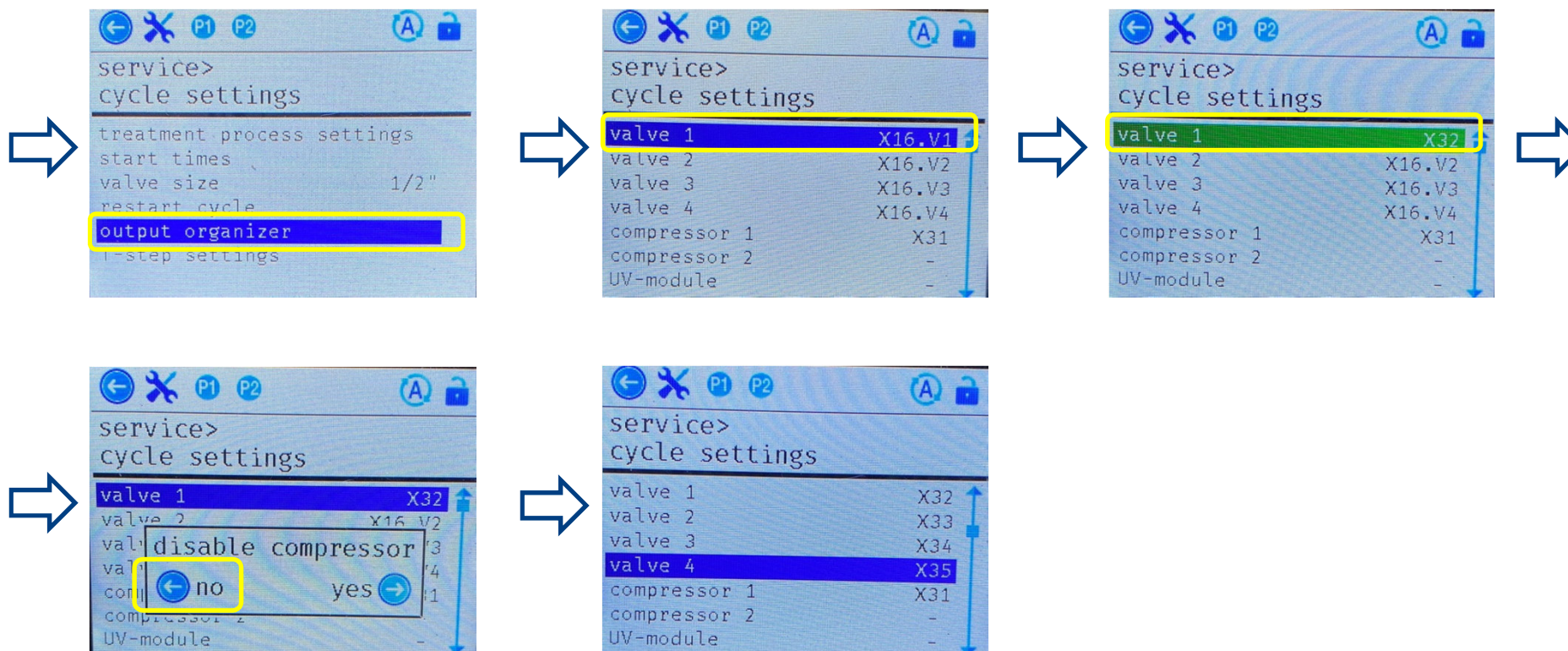


Controllers

Examples of use

Solenoid valves instead of stepper motor valves

3. Assign outputs:



Note: Do not deactivate the compressor because water is to be pumped with compressed air.

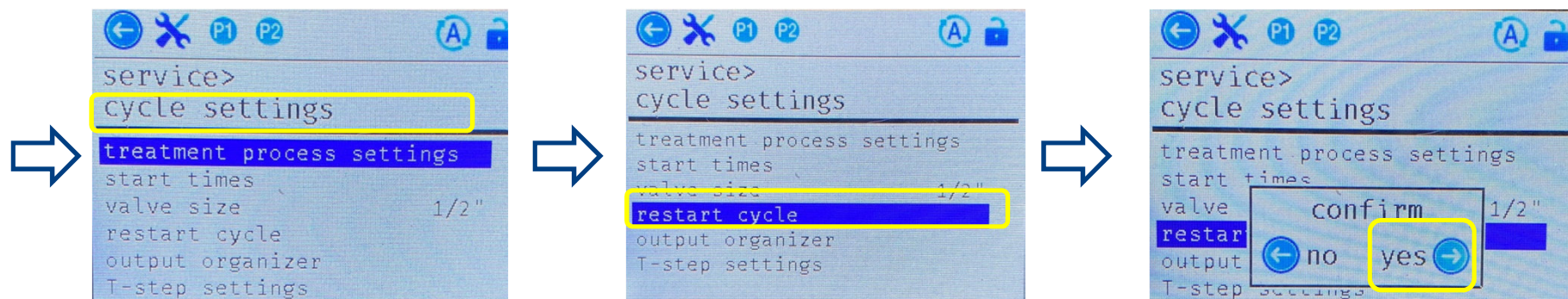
Note: Adjusting the current limits is normally not necessary.

Controllers

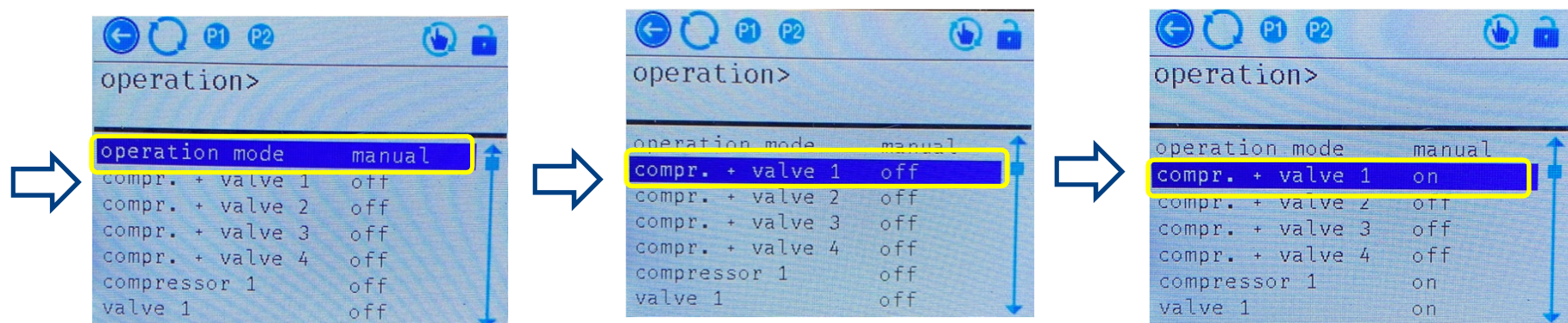
Examples of use

Solenoid valves instead of stepper motor valves

4. Restart cycle



5. Test in manual mode



Note: First test all valves individually, without compressor. Check for any abnormalities in current consumption.

Controllers

Examples of use

Solenoid valves instead of stepper motor valves

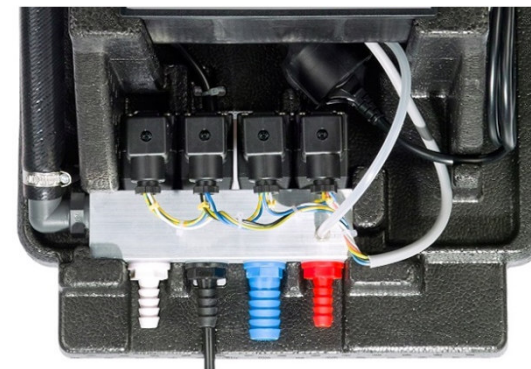
Installation instructions:

- The control unit and valves must be arranged in their originally intended position in the KLARO/GRAF control cabinet.
- Tip: For EPP cabinets, secure the solenoid valve manifold with a cable tie to prevent slippage.
- For other cabinets, a minimum distance of 14 cm between valve and control should be maintained

Correct



wrong



Controllers

Examples of use

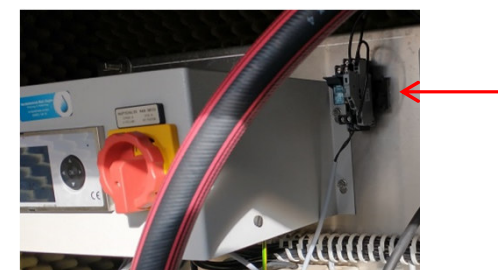
Solenoid valves instead of stepper motor valves

What do I do if all 230V outputs are occupied and a warning lamp, dosing pump, cooling fan etc. are also to be operated?

- Warning lamp:
 - Convert to 24V
- Dosing pump:
 - Convert to 24V
- Cooling fan
 - Convert small cooling fan to 24V (W x H = 12 x 12 cm)
- Coupling relay
 - For controlling 230V consumers via 24V output
 - Set current limit min. to 0 mA
 - Electricity diagram supplied, Electrician knowledge necessary



Example: Cabinet BJ 2013



Two cooling fans 24V in parallel operation

Connection principle



Parts needed:

- 2x additional package fan 24V

Ventilation grilles, cooling fans and filters

set	901399	Cooling fan additional package KLplus 230 V for indoor cabinets 1+2 and the outdoor cabinet "Universal". Cooling fan dimensions: 120 x 120 x 38 mm, 230 VAC and 35 W. <u>Includes:</u> protecting grille and small parts.
set	901415	Cooling fan additional package KLplus 230 V for the outdoor cabinet "O-column" Geyer type. Cooling fan dimensions: 120 x 120 x 38 mm, 230 VAC and 35 W. <u>Includes:</u> protecting grille and small parts.
set	906657	Cooling fan additional package KL26plus 24 V for indoor cabinets 1+2 and the outdoor cabinet "Universal". Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille and small parts.
set	906663	Cooling fan additional package KL26plus 24 V for the outdoor cabinet "O-column" Geyer type. Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille and small parts.
set	908558	Cooling fan additional package KL26plus 24 V for the BPP outdoor cabinet. Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille and small parts.
set	970734	Cooling fan additional package KLAROcontrol.M 24 V for indoor cabinets 1+2 and the O-cabinet3 and "Universal". Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille, connector X12 and small parts.
set	970733	Cooling fan additional package KLAROcontrol.M 24 V for "O-column" Geyer type Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille, connector X12 and small parts.
set	970732	Cooling fan additional package KLAROcontrol.M 24 V for outdoor cabinet PP Cooling fan dimensions: 120 x 120 x 32 mm, 24 VDC and 5 W. <u>Includes:</u> protecting grille, connector X12 and small parts.

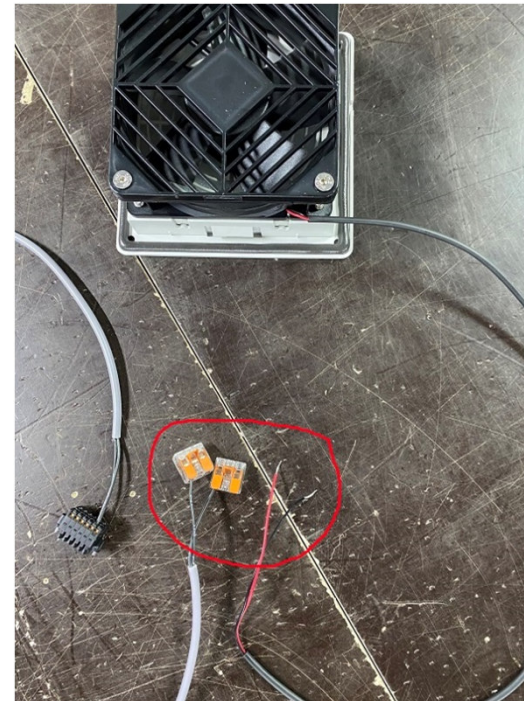
Additional package connector cable:

Controls

Application examples

Two cooling fans 24V in parallel operation

1. Set consists of fan with grille, cable, connectors (yellow) and X12, cable
2. Disconnect the red and black wires of a fan from the connectors .

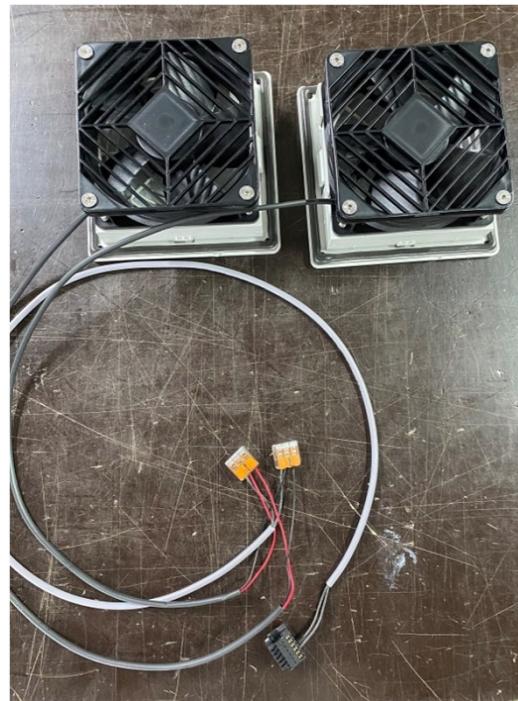
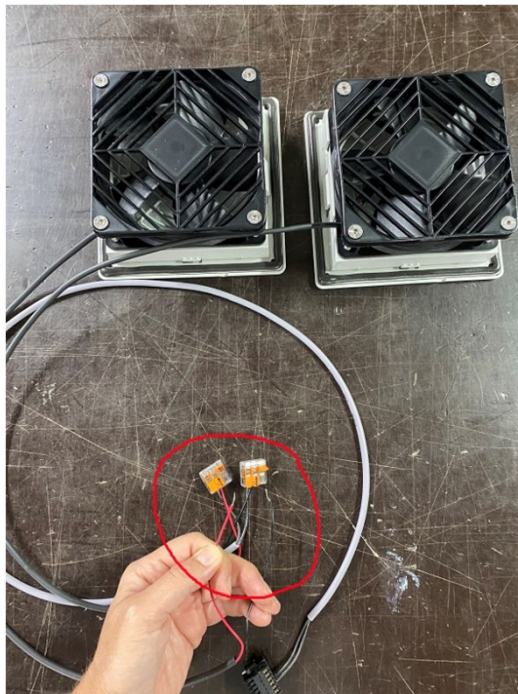


Controls

Application examples

Two cooling fans 24V in parallel operation

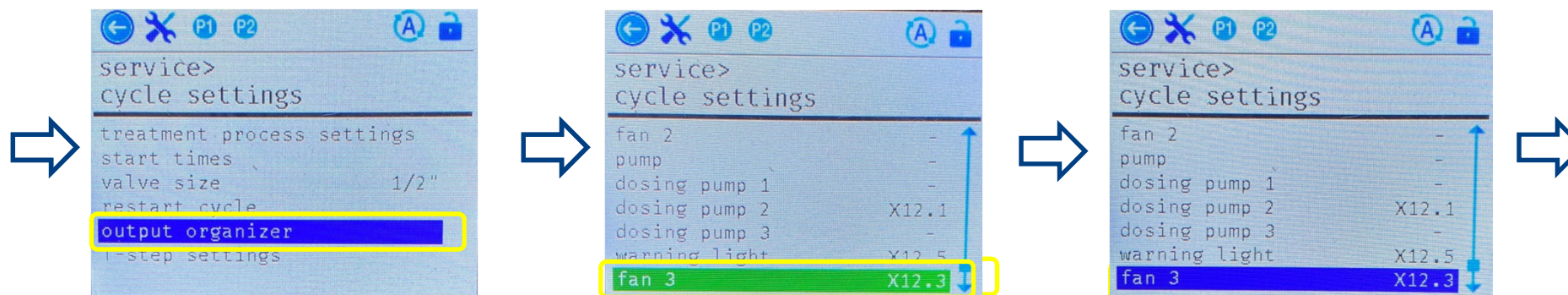
3. Connect the red and black wires together. Plug in connector X12 to the control unit.



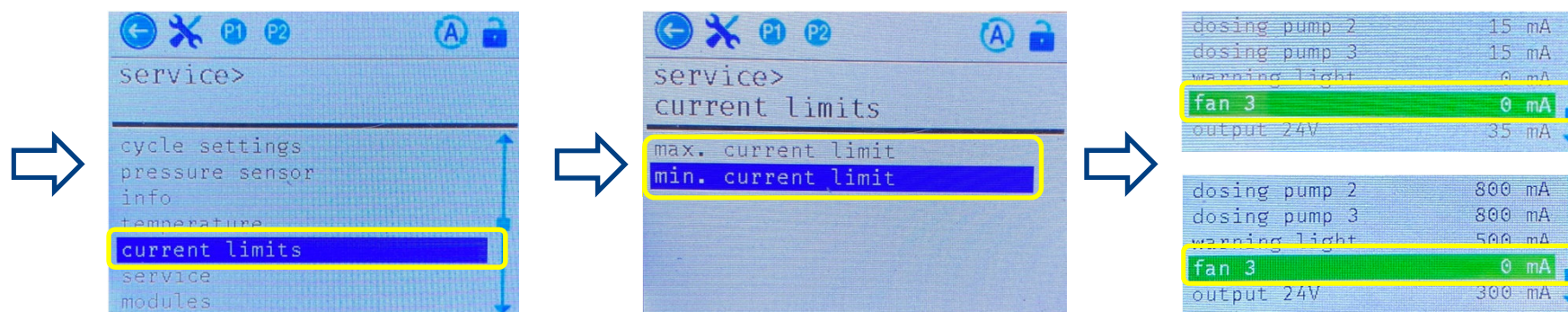
One cable with connector X12
two yellow connectors remains

Two cooling fans 24V in parallel operation

4. Assign outputs:



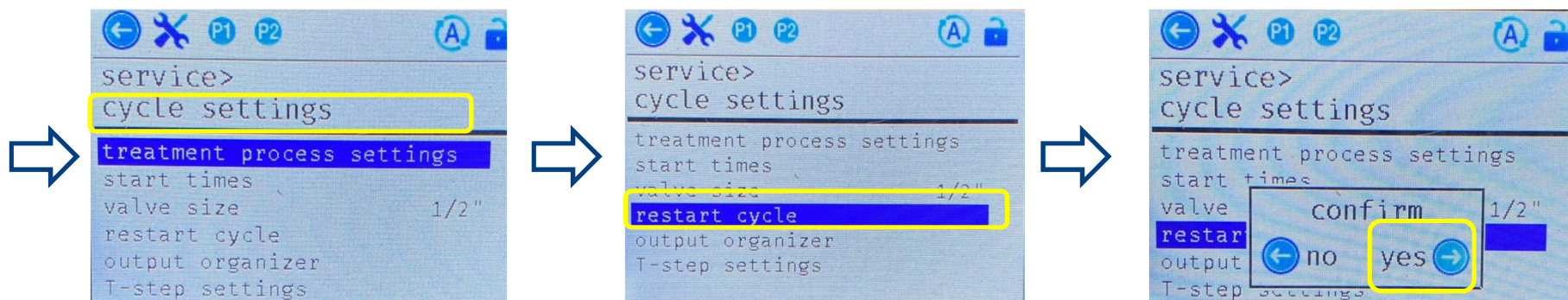
5. Adjust current limits: Set current limit max. and min. to 0 mA



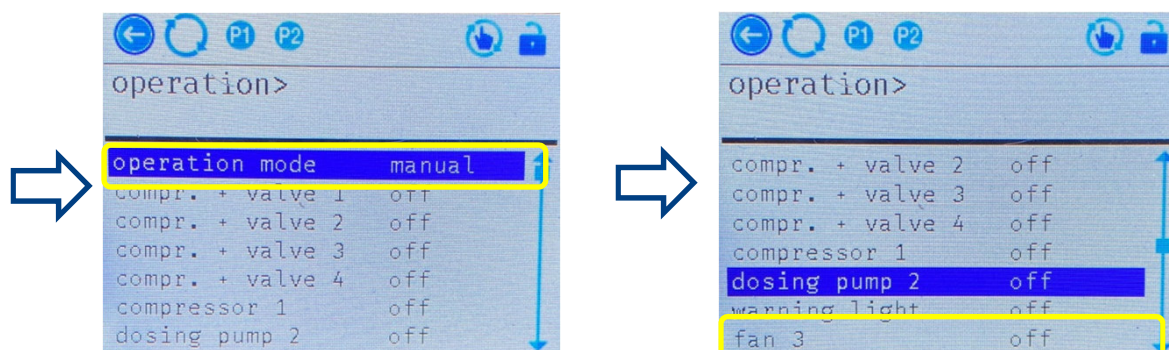
Note: In parallel operation, accurate current monitoring is not possible. In order not to receive false fault messages, the monitoring must be switched off.

Two cooling fans 24V in parallel operation

6. Restart cycle



7. Test in manual mode



Exchange KL40plus for KLAROcontrol.M

Connection principle

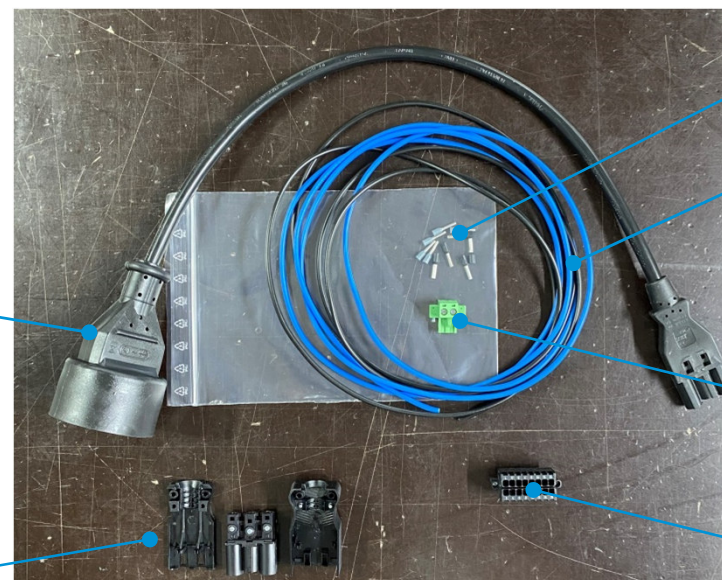


Parts needed:

- Control KLAROcontrol.M
- Cable set 970606
- Optional: Connector X12, for warning lamp 24V
- Optional: Connector XN3, for dosing pump 230V, submersible pump, UV module
- Wiring diagram, list of controller settings (optional)

Coupling
for compressor

Connector XN3
for fan



Various wire end
ferrules

Blue and black
cable for
contactor
monitoring

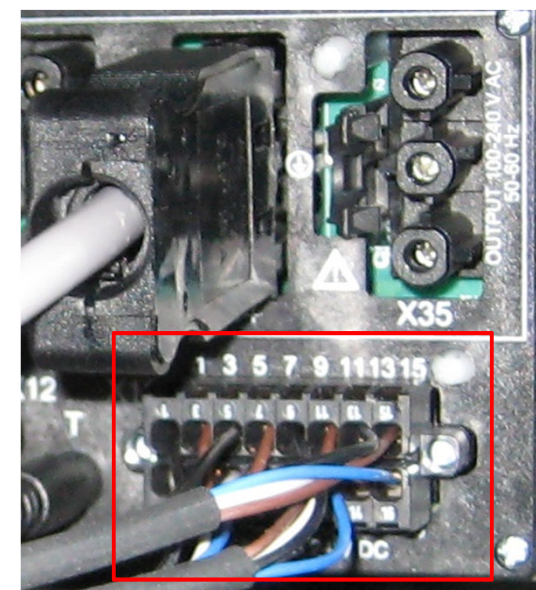
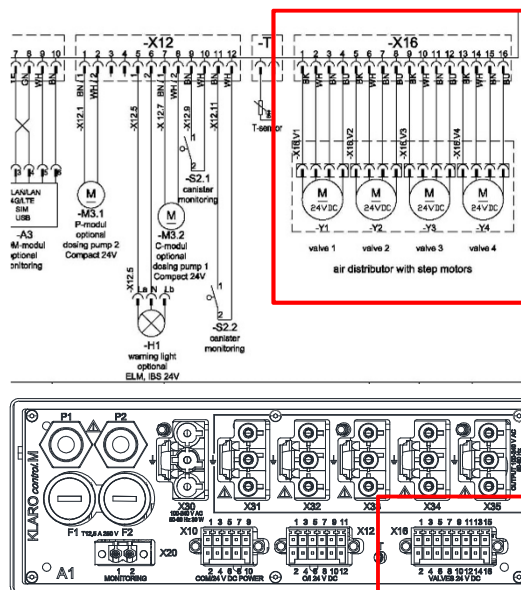
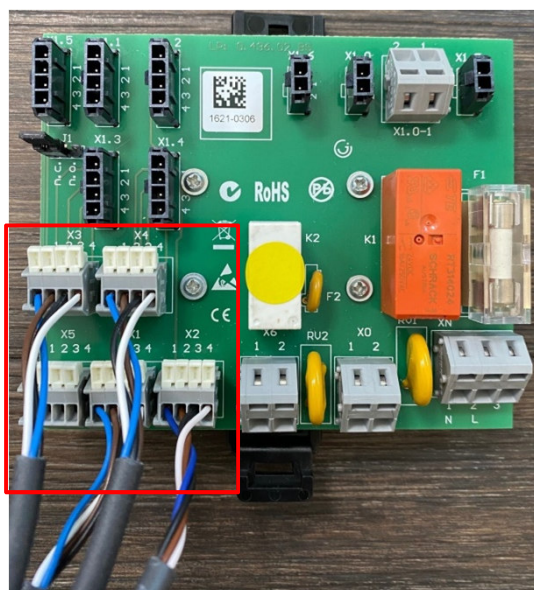
Connector X20
for contactor
monitoring

Connector X16
for valves

Cable set 970606

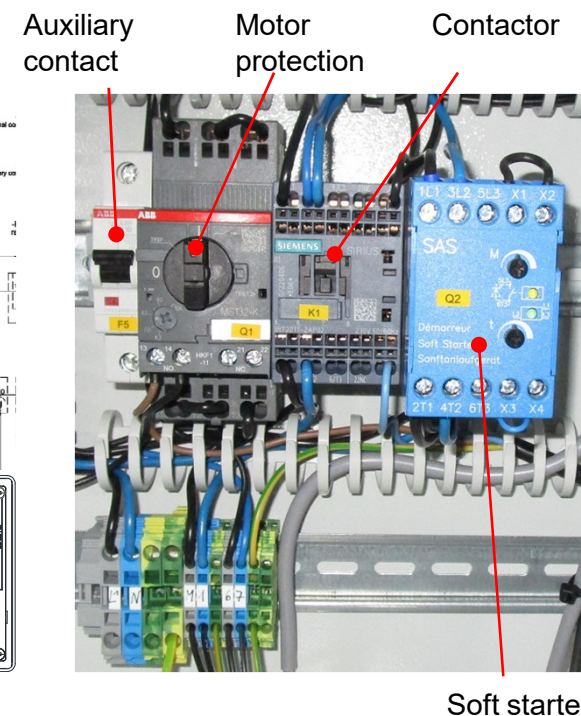
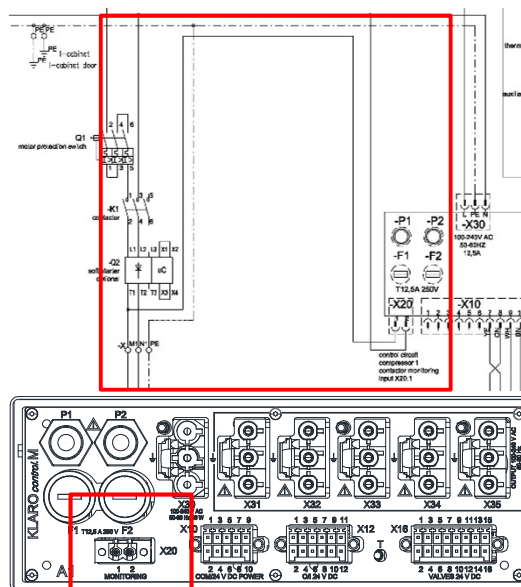
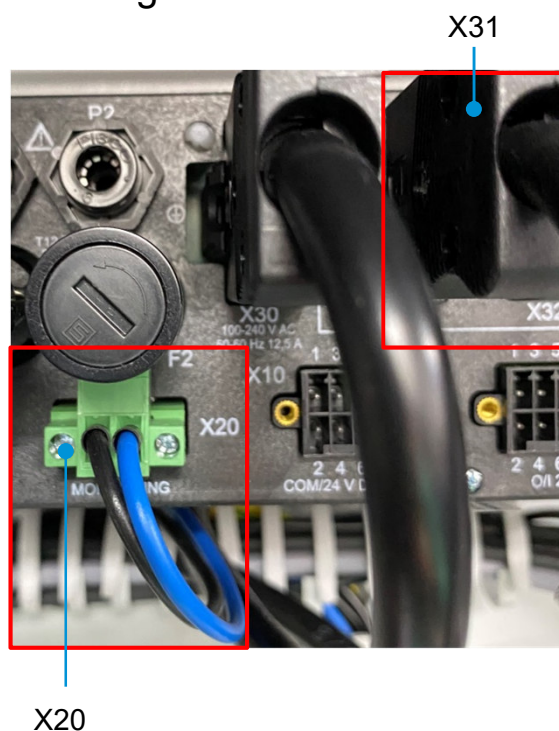
Exchange KL40plus for KLAROcontrol.M

1. Remove the old KL40plus control unit. To do this, disconnect all plug connections on the green circuit board and the coupling for compressor.
2. Connect the valves to connector X16 by disconnecting the wires of X1, X2, X3 and X4 from the circuit board and connecting them to X16. Ensure correct assignment/colours (see wiring diagram).



Exchange KL40plus for KLAROcontrol.M

3. Connect compressor via coupling and socket X31
4. Establish contactor monitoring. To do this, plug in connector X20. Connect the black cable (L) to PIN1 and the blue cable (N) to PIN2. Connect the cable ends according to the wiring diagram.

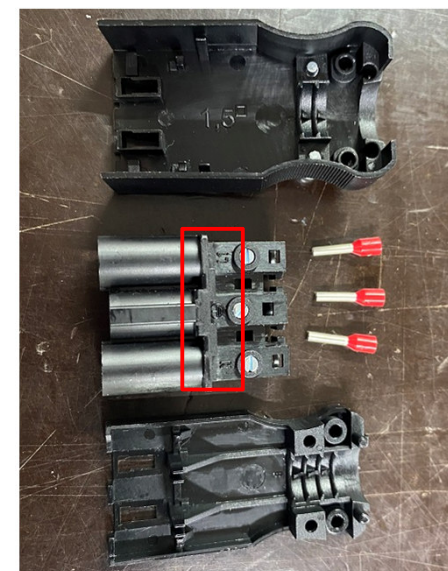
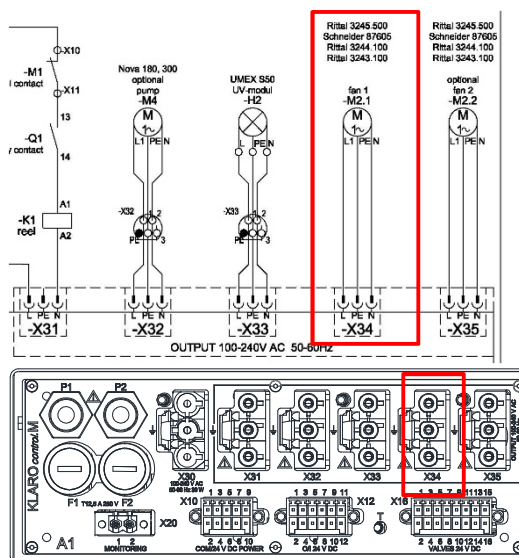
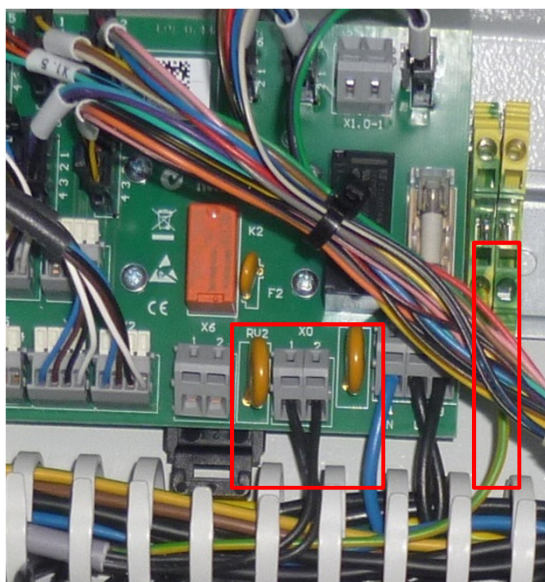


Example

Exchange KL40plus for KLAROcontrol.M

5. Connect the 230V cooling fan. To do this, disconnect wires L, N and PE from the green circuit board. Connect both wires to the new connector XN3. Connect the plug to socket X34.

If necessary, connect other 230V consumers (e.g. dosing pump) in the same way as shown in the terminal diagram.



Connector XN3: Note marking L, N, PE

Controls

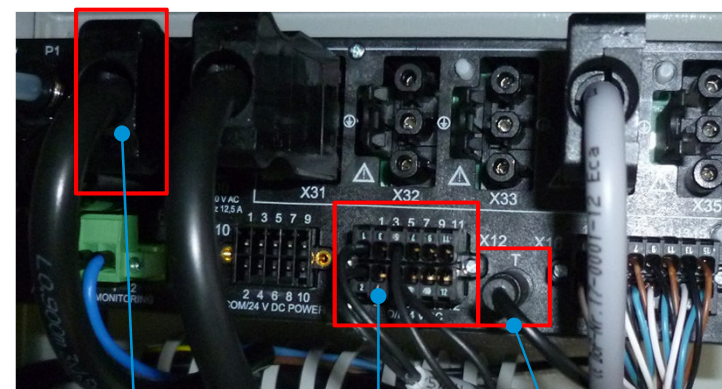
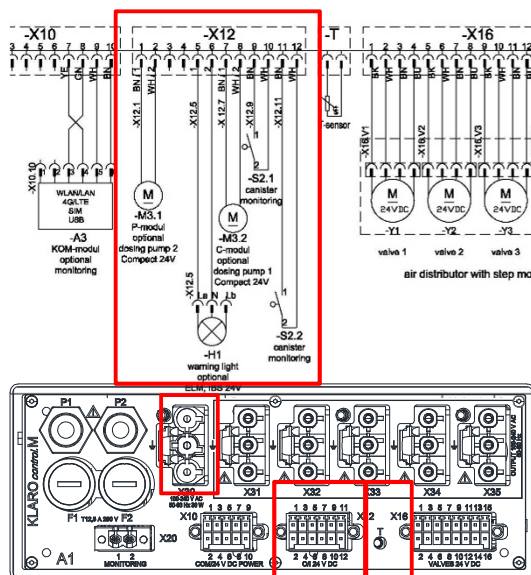
Application examples

Exchange KL40plus for KLAROcontrol.M

6. If required, connect further 24V consumers (e.g. warning lamp, dosing pump, canister monitoring). Use connector X12 for this purpose. Ensure correct assignment and polarity (see terminal diagram)!
7. Connect existing temperature sensor
8. Connect existing mains cable to X30



Examples for 24V consumers



X30
Mains
connection

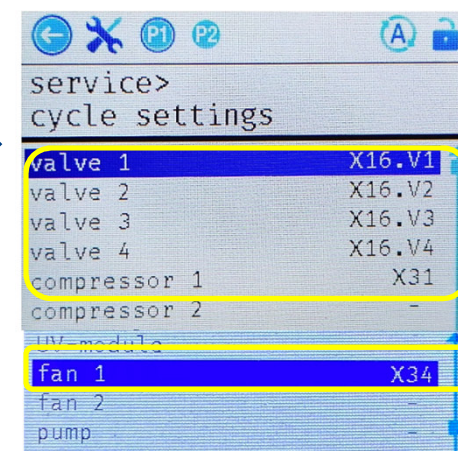
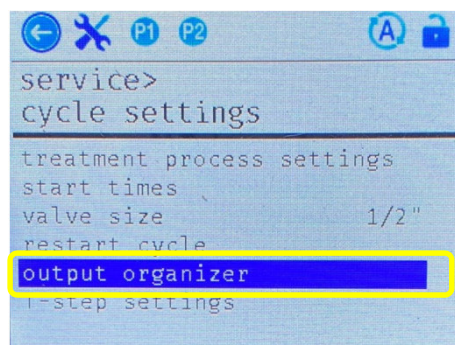
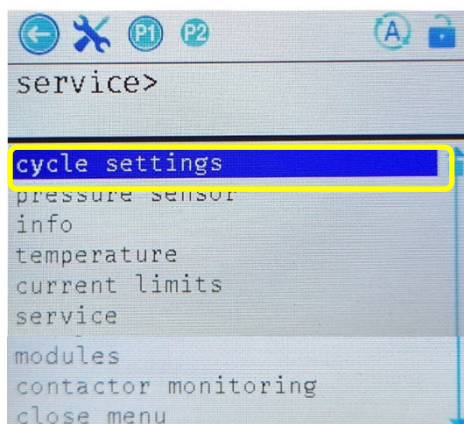
X12
Connections
24V

Temperature
sensor

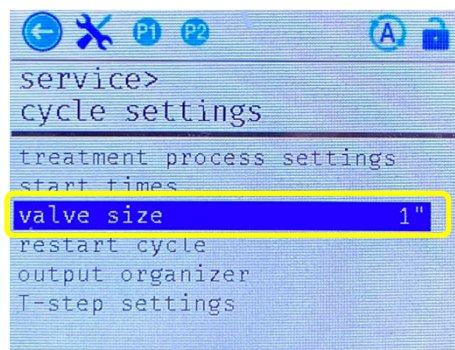
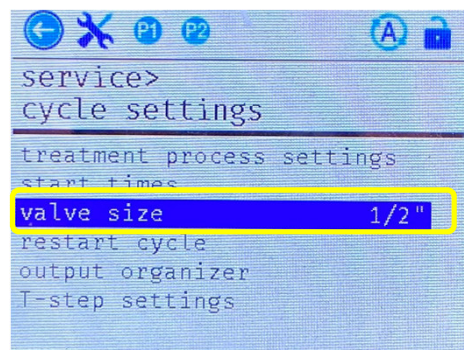
Exchange KL40plus for KLAROcontrol.M

9. Check settings:

... Assign outputs



... Valve size

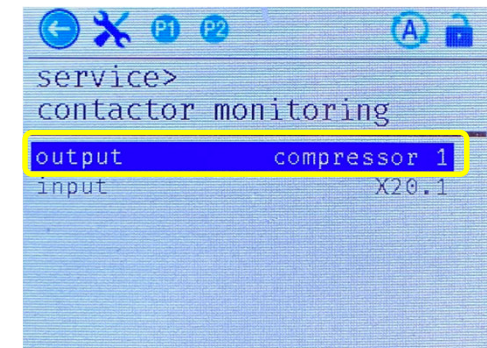
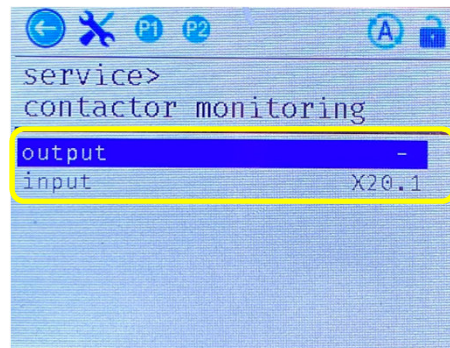
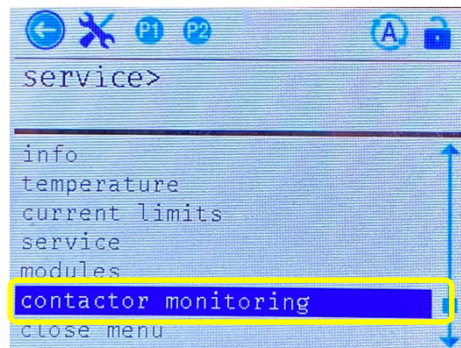


Controls

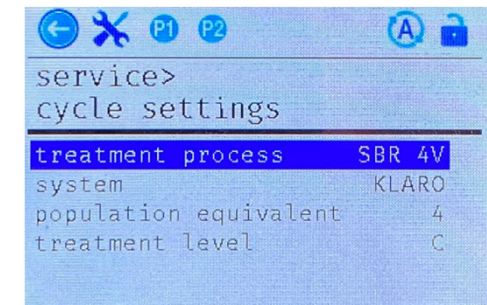
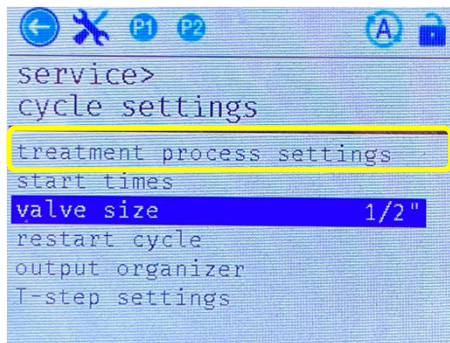
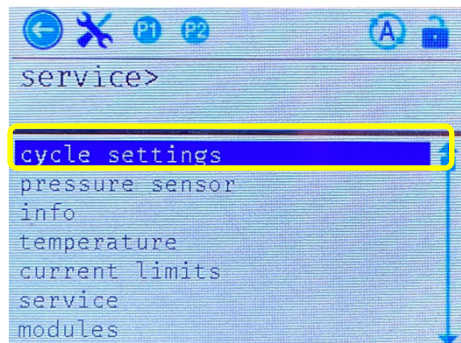
Application examples

Exchange KL40plus for KLAROcontrol.M

... Contactor monitoring



... Tables Selection



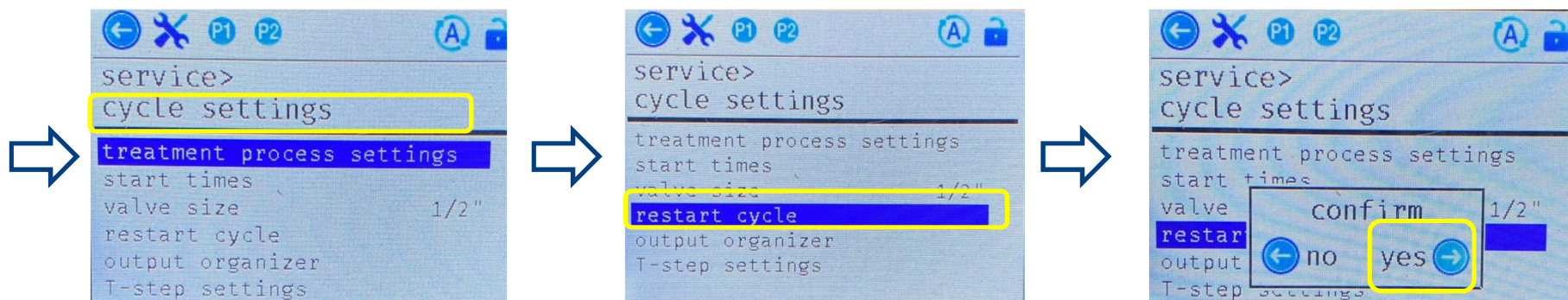
Example

Controls

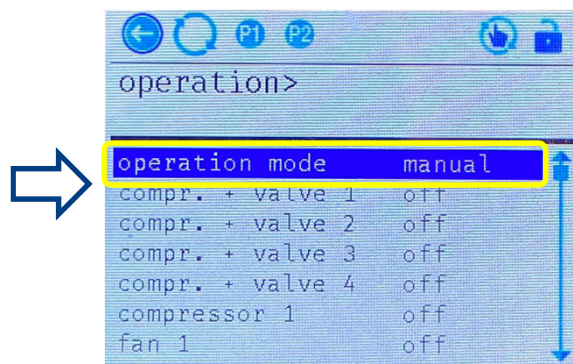
Application examples

Exchange KL40plus for KLAROcontrol.M

10. Restart cycle



11. Test in manual mode



Datum: 11.10.2022

Hier eine kurze Beschreibung zur Vorgehensweise beim Firmware Update. Wichtig während des Updates USB-Stick nicht entfernen und Strom nicht ausschalten!

1. USB-Stick einstecken, wenn der Stick erfolgreich sich mit der Steuerung verbunden hat, erscheint oben rechts im Display ein USB-Symbol. Wenn nicht, dann das Ganze noch mal wiederholen.
2. Im Hauptmenü „USB“ → „Software Update“ ausgewählt und mit OK-Taste bestätigen.
3. Die Steuerung geht aus und die Kontroll-LED beginnt nach kurzer Zeit zu blinken.
4. Nach ca. 1 Minute fährt die Steuerung automatisch wieder hoch. Im Display erscheinen die Seriennummer der Steuerung und der neue Softwarestand.
5. Den USB-Stick im Hauptmenü „USB“ → „Sicher entfernen“.
6. Update ist jetzt abgeschlossen.

Here is a brief description of how to proceed with the firmware update. Important: Do not remove the USB stick or switch off the power during the update!

1. Insert the USB stick, when the stick has successfully connected to the controller, a USB symbol appears in the top right of the display. If not, then repeat the whole thing again
2. Select "USB" → "Software Update" in the main menu and confirm with the OK button.
3. The controller switches off and the control LED starts flashing after a short time.
4. After approx. 1 minute the controller starts up again automatically. The serial number of the controller and the new software version appear in the display.
5. Select in the main menu "USB" → "Remove safely."
6. Now remove the stick. Update is now complete.