
INDUSTRIAL WATER EQUIPMENT

Controller for conductivity measurement



Instruction manual

Software version 2.00

Contents

General description	1
Step "Monitoring"	
Step "Pre Flush"	
Step "Regeneration start"	
Step "Regeneration wait"	
Step "Regeneration"	
Step "Flush"	
Step "Flush alarm"	
Value and function display	7
Info display	8
Alarm	10
CM Min	
CM Max	
Power failure	
Flush alarm	
Input functions	12
Regeneration busy	
Alarm reset	
Output functions	14
Flush valve	
Alarm	
Regeneration start	

Changing and calling up basic parameters	15
1. Language	
2. Mode	
3. Conductivity meter	
4. Temperature	
5. Correction factor	
6. Pre Flush	
7. Flush	
8. Alarm	
Connection diagram	22
Technical specifications	23
Declaration of Conformity	24
Warranty	

General description

The controller CC3020 is used for the fully automatic monitoring of the conductivity and if necessary also the automatic start of the regeneration via an external controller

The base values which are programmed into the controller can be changed at any time; in the event of a power failure the set values will be retained.

Depending on the set mode, the controller recognises 1 or 7 switch steps, which are indicated as follows: "Monitoring", "Pre Flush", "Regeneration start", "Regeneration wait", "Regeneration", "Flush" en "Flush alarm".

Two modes are available inside the controller. From this, a choice can be made as to which programme should be launched by the controller.

Mode "CM"

In this mode, only the conductivity is monitored. The controller will always remain in the step "Monitoring" and alarms can be set in case the conductivity drops below the set minimum limit value and/or the conductivity exceeds the maximum limit value.

Mode "CMR"

In this mode, the conductivity is monitored and in case the conductivity is too high during a set time, a regeneration can be started via an external controller (e.g. FCS3000, ES2030CV,.....). Preceding the regeneration, a flush may take place if necessary. If the conductivity drops below the set minimum limit value during this flush, the monitoring phase will start up again. In the other case, a regeneration will be started. Whether the external controller has indeed started the regeneration will be checked via the input "Regeneration".

If the regeneration is actually started within a certain time, the CC3020 will be switched to the "Regeneration" step.

If the regeneration is blocked for any reason, the CC3020 will eventually arrive at the step "Regeneration wait" and wait until the regeneration actually takes place. The "Regeneration" step will be abandoned in case the regeneration has stopped (via input "regeneration detection") and it can be set whether another flush should be activated. If this is not the case then the conductivity is once again monitored via the "Monitoring" step. In the other case a flush will be done until the conductivity drops beneath the set limit value (step 7.2).

Attention: This is another value than the conductivity to start a regeneration! (step 3.4 / 3.5)

If the conductivity remains above the set value during the flush, than the step "Flush alarm" will be activated and can be chosen to open or close the flush valve. If the conductivity drops below the set limit, then the "Monitoring" step will be automatically activated.

Step "Monitoring"

During "Monitoring" the conductivity of the water is monitored.
The flush valve and the output "regeneration start" are not activated.
The input "regeneration" is monitored if the mode is set at "CMR".

The following values are monitored :

- The minimum conductivity (step 3.2 / 3.3)
- The maximum conductivity (step 3.4 / 3.5)
- Input "regeneration detection" (only in case of mode "CMR")

If the mode "CMR" is selected a flush or a regeneration will be started if a too high level of conductivity occurs. If a regeneration is started via the external controller than the CC3020 will be switched to the step "regeneration" (via input "regeneration detection").

Step "Pre Flush"

During "Pre Flush" the conductivity of the water is monitored.
The flush valve is open and the output "regeneration start" is not activated.

The following values are monitored :

- The minimum conductivity (step 3.2 / 3.3)
- The maximum conductivity (step 3.4 / 3.5)
- Input "regeneration detection"

In case conductivity remains above the set limit value during the flush time, a regeneration will be started. If a regeneration is started via the external controller than the CC3020 will be switched to the step "regeneration" (via input "regeneration detection").

Step "Regeneration start"

In case the conductivity remains too high, eventually the regeneration will be started via an external controller. The CC3020 controller will emit a signal via the output "Regeneration start" (AL) to indicate that a regeneration needs to be started.

The flush valve is closed

Via the input "Regeneration" (LP) it is monitored whether the external controller has actually switched to regeneration. For as long as this is not the case, the controller will activate the output "regeneration" during a maximum amount of time of 960 seconds. If no regeneration is started after this time has expired, the controller will switch to the step "Regeneration wait".

If a regeneration was in fact started the controller will switch to the step "Regeneration".

The step "Regeneration start" can also be interrupted manually by pressing the external key for about 2 seconds.

The following values are monitored :

- Input "regeneration detection"

Step "Regeneration wait"

This step only appears in case the external controller has not started a regeneration within 960 seconds. The controller will wait for a signal that regeneration has been started by the external controller.

The flush valve is closed.

The step "Regeneration start" can also be manually interrupted by pressing the external key for about 2 seconds.

The following values are monitored :

- Input "regeneration detection"

Step "Regeneration"

In case the external controller has started the regeneration and also indicates this via the input "regeneration detection", the step "Regeneration" will be active. The flush valve and the output "regeneration start" are not activated.

The controller will remain in this step as long as the input "regeneration detection" is on.

As soon as the input is no longer active, it will monitor whether another flush is necessary or that it can be returned to the step "Monitoring". The flush function can be activated in step 7.1.

The following values are monitored :

- Input "regeneration detection"

Step "Flush"

During step 7.1 it can be set whether after the regeneration, another flush needs to take place. During "Flush" the conductivity of the water is monitored. The flush valve is open and the output "regeneration start" is not activated.

The following values are monitored :

- The minimum conductivity (step 3.2 / 3.3)
- The maximum conductivity (step 7.2 / 7.3)
- Input "regeneration detection"

In case conductivity remains above the set limit value during flush time, the step "Flush alarm" will be returned to.

Step "Flush alarm"

During step 7.4 it can be set whether the flush valve should remain open and/or should be closed during this step.

The following values are monitored:

- The Maximum conductivity (step 7.2 / 7.3)
- Input "regeneration detection"

In case the conductivity drops below the set limit value the step "Monitoring" will be returned to.

The step "Flush alarm" can also be manually interrupted by pressing the external key for about 2 seconds.

The alarm output can be activated in case of a flush alarm. During step 8.1 a vertical line should be programmed behind "FL".

Value and function display

First LCD line

The current status of the system is shown in the first line of the LCD display:

"Monitoring", "Pre flush", "Regeneration start", "Regeneration wait", "Regeneration", "Flush" and "Flush alarm".

In case of an alarm situation, an alternating message appears.

Second LCD line

The measured conductivity is shown in the second line of the LCD display.

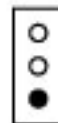
ATTENTION! If the message "OFL" appears in the second line, the value falls outside the measurement range.

Example:

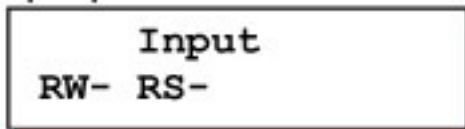
Monitoring
CM 40.0uS/cm

Info display

Various information can be called up by pressing the information key. Pressing the key again changes the information shown.



Input positions

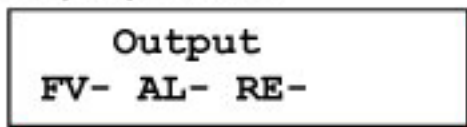


The current switch positions of the input functions are shown here.

RW = Regeneration busy

RS = Reset alarm

Output positions



The current switch positions of the outputs FV, AL and RE are shown here.

FV = Flush valve

AL = Alarm

RE = Regeneration start

Software version

Software version CC3020 1.00.00
--

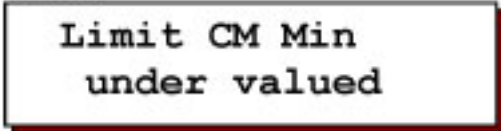
The software is regularly updated to ensure that the product complies with the latest insights and needs.

The number of the operational version is indicated.

Alarm

If the alarm relay is activated, it can be deactivated by pressing the external key. Although this deactivates the relay, the message is still shown in the LCD display. Press the key again to remove the message.

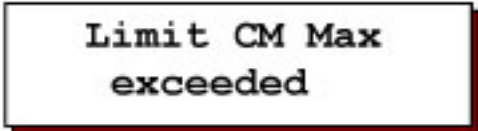
CM MIN



Limit CM Min
under valued

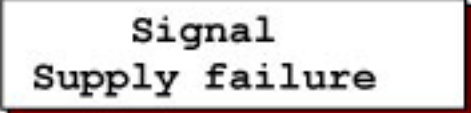
The conductivity value of the conductivity meter has dropped below the set minimum limit value. The system remains operational. The message in the LCD display can be switched off as soon as the minimum limit value is again exceeded. The alarm relay can be activated.

CM MAX



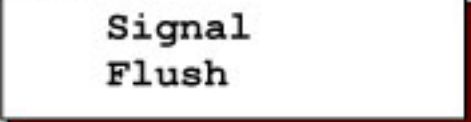
Limit CM Max
exceeded

The conductivity value of the conductivity meter has exceeded the set maximum limit value. The system remains operational. The message in the LCD display can be switched off as soon as the conductivity drops below the maximum limit. The alarm relay can be activated. This message can only appear in the LCD display if the "CM" mode is selected.

Power failure

Signal
Supply failure

It is possible to program an alarm in case a power failure occurs while the controller is operational.

Flush Alarm

Signal
Flush

This message appears in case the conductivity is still above the set limit value after the set flush time (flush). This message only appears if the "CMR" mode is selected and in case the alarm output for this situation is activated .

Input functions

The inputs 'Regeneration busy' (EM) and 'Alarm reset' (IN) are included as standard.

Regeneration busy

The input function "Regeneration detection" is used to verify whether the external controller has activated the installation in "Regeneration".

The input function is only monitored in case the mode is set to "CMR". If the input is activated the controller will always switch to the step "Regeneration".

The input function is active in a closed circuit.

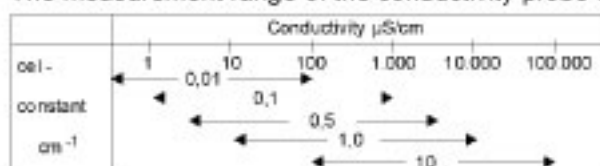
Alarm reset

No further programming possible. The input is connected to the built-in switch on delivery.

Conductivity probe

The connection for the conductivity probe is indicated by 'CC'.

The measurement range of the conductivity probe depends on the cell constant.

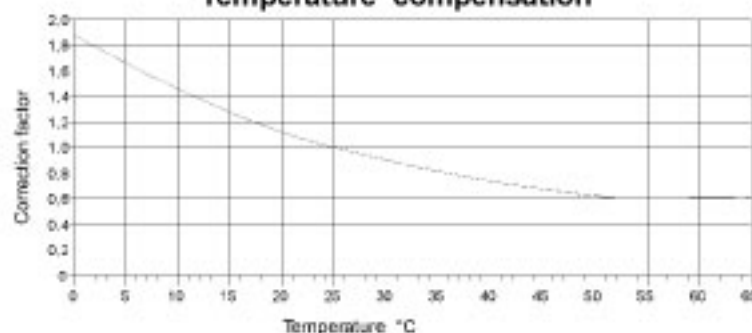


The cell constant can be programmed in step 2.1.

Also, it is possible to set the minimum and maximum limit values with a programmable delay time. Whether the alarm relay should be activated in the case of a specific message can be set in step 9.1.

It is also possible to compensate for the temperature factor in the conductivity measurement. The water temperature can be programmed in step 3.

Temperature compensation



Example:

Set/measured water temperature:

$T = 11\text{ °C}$

Measured conductivity value:

$C_{11} = 100\ \mu\text{S/cm}$

Applicable correction factor:

$K = 1.4$

Shown conductivity value:

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

Output functions

The outputs 'Flush valve (FV on terminal IV), 'Alarm' (AL on terminal PU) and 'Regeneration start' (RE on terminal AL) are included as standard.

Flush valve

The flush valve is opened in case conductivity is above the set limit value, during a set time. For this purpose both the "CMR" mode and the flush function (step 6.1 = Yes) must be activated

The maximum power consumption on this output is 8A (secured).

Alarm

The alarm relay can be activated under certain conditions, such as:

- minimum conductivity value
- maximum conductivity value exceeded
- power failure
- flush alarm
- switch to filter 2
- system switch off

Energizing of the alarm relay in case of a failure can also be programmed.

Attention : This output is powered !

Regeneration start

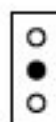
Via this output, it can be indicated that an external controller has to activate a regeneration.

Changing and calling up the basic parameters

On taking the controller into operation, the operating values of the conductivity measurement are set by entering the basic parameters.

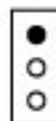
These values can be changed at any time, but will not be lost in the event of a power failure.

To prevent accidental program changes, the key must be pressed for four seconds before gaining access to the programming mode.
Simply press the same key to navigate the programming mode.

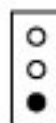


The programming mode is automatically exited approx. 2 minutes after the last key operation or by entering the indicated key combination.

Press the top key to move the cursor.



Use the bottom key to change numerical values, which you have selected with the cursor, within the available range.
Also use this key to switch between '-' and '|' in case of option questions.



1. Language

```
Step no.:    1.1
D  Nl E  F
```

The language can be set in the step.

2. Mode

```
Step no.:    2.1
CM CMR
```

Enter the program mode :

CM = Only conductivity monitoring

CMR = Conductivity monitoring + Regeneration start

3. Conductivity meter

```
Step no.:    3.1
Constant     0.10
```

A measurement cell with a specific cell constant must be selected depending on the required conductivity of the water. Here, a cell constant of 0.01 to 10.00 cm^{-1} can be programmed for the conductivity meter.

Step no.:	3.2
Value Min	1.<u>0</u>

An electronic interruption of the measurement cell, electronic defects in the system or air in the measurement cell can erroneously result in very low conductivity values. For monitoring purposes, a limit value of 0.0 to 999,9 $\mu\text{S}/\text{cm}$ can be entered.

Step no.:	3.3
Delay	6<u>0</u>s

After a programmed delay time of 1 to 999 seconds, a drop below the limit value will result in the error message 'Limit CM Min under valued' being shown in the LCD display.

Step no.:	3.4
Value Max	100.<u>0</u>

A change in the quality of the supply water can lead to change in conductivity. For monitoring purposes, a limit value of 0,2 to 6500,0 $\mu\text{S}/\text{cm}$ can be entered.

Step no.:	3.5
Delay	18<u>0</u>s

If, after a programmed delay time of 1 to 999 seconds, the maximum conductivity value is exceeded, there will be an alarm (mode = CM) or a regeneration will be started.

4. Temperature

Step no. :	4.1
Temperature	25°C

By entering the water temperature, the indicated conductivity value can be compensated to allow for the current temperature.

The conductivity measurement is based on a water temperature of 25 °C. In case of a higher or lower temperature, this can be compensated by hand.

5. Compensation correction factor

Step no. :	5.1
Factor	1.00*

Other measuring errors, which may arise through valorisation or cable capacities, for example, can be compensated here by entering a correction factor, varying from 0.10 to 5.0.

Take a water sample and measure the conductivity using an accurate conductivity meter: this results in the calibration value. Record the controller reading as the measurement value.

Use the formula below to calculate the correction factor:

$$\frac{\textit{Reference value}}{\textit{Measured value}} = \textit{Correction factor}$$

6. Pre flush

Step no.:	6.1
Flush before	<u>Y</u>/N

Enter whether the flush before function needs to be activated
These steps are only programmable in case the mode "CMR" has been selected.

Step no.:	6.2
Delay	<u>30</u>s

Enter the maximum pre flush time (1-999 sec.).

7. Flush

Step no.:	7.1
Flush after	<u>Y</u>/N

Enter whether the flush after function needs to be activated
These steps are only programmable in case the mode "CMR" has been selected

Step no.:	7.2
Limit	20.<u>0</u>

Enter the limit value of the conductivity whereupon the flush after is interrupted and is returned to the monitoring step (0,5 - 6500,0 $\mu\text{S/cm}$).

Step no.:	7.3
Delay	30<u>s</u>

Enter the maximum flush after time (1-999 sec.).

Step no.:	7.4
Valve open	<u>Y</u>/N

Enter whether the flush valve will remain open or closed during the step "Flush alarm".

8. Alarm

Step no. :	8.1
MI-MA-PF-FL-	

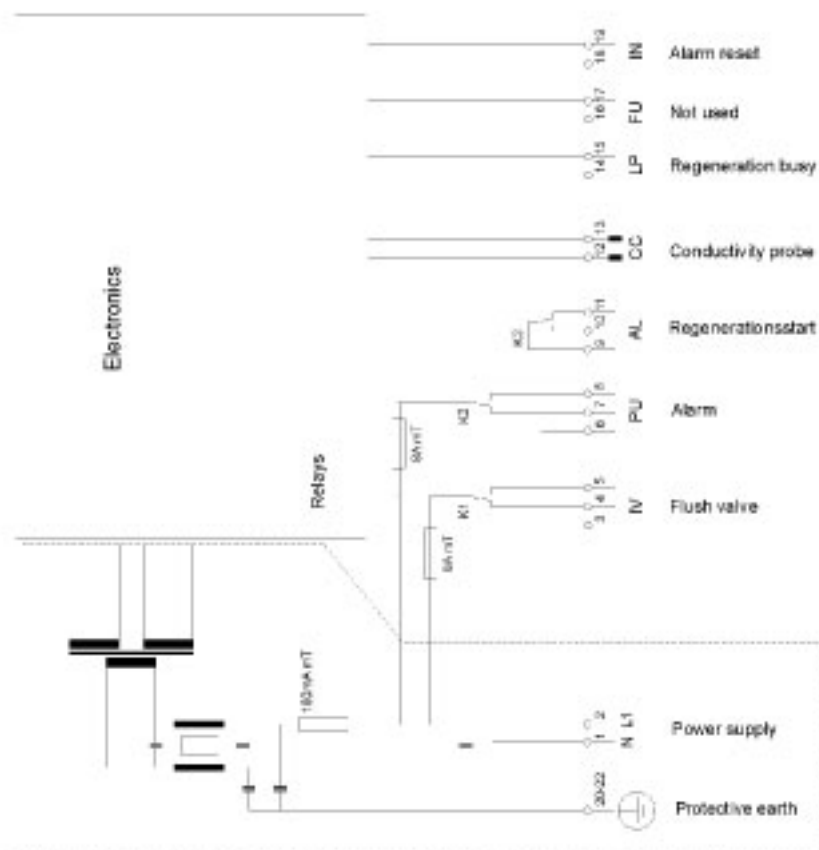
In this step, you can program the events that will activate the alarm relay ("-" = not activated, "=" = activated).

MI = minimum conductivity
MA = maximum conductivity
PF = power failure
FL = flush alarm

Step no. :	8.2
Rel. energ.	<u>Y</u>/N

Here, you can program whether the alarm relay should be energized (Yes) or not (No) in case of a failure.

Connection terminals CC3020



Technical specifications

Power connection:	230V, 50-60 Hz, fuse 160 mA 115V, 50-60 Hz, fuse 315 mA 24V, 50-60 Hz, fuse 1A
Power consumption:	4 VA
Flush valve:	Voltage is equal to supply voltage, 8AT fuse max. current load 250V, Ohm = 8A, Inductive = 3A
Alarm :	Voltage is equal to supply voltage, 8AT fuse max. current load 250V, Ohm = 8A, Inductive = 3A
Regeneration start:	max. current load 250V, Ohm = 8A, Inductive = 3A
Inputs:	loaded with 9V, 8mA
Protection class:	IP 65
Ambient temperature:	0 – 50 °C
Weight:	2 kg
Dimensions:	122 x 120 x 57 mm
Special features:	protected against zero voltage