
AS3050

AS3051

Control and monitoring system for cooling towers



Instruction manual

Software version 2.00

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Function description

Control units AS3050 (wall-mounted) and AS3051 (panel-mounted) are designed for the fully automatic monitoring and controlling of cooling tower systems.

By means of an optional second conductivity meter and temperature gauge the measured conductivity values can be automatically compensated for temperature.

By means of an optional recorder card the measured conductivity and temperature can be sent to a recorder (0-20mA or 4-20mA).

If the plug-in card with two conductivity meters has been installed, two flush systems can be controlled.

You can always change the basic values that have been programmed into the control system. A code can be defined to protect the system against unauthorised programming. The control has various phases, as described below.

Phase “Service”

In the “Service” phase the flush valve is closed and any dosing functions can be activated.

The flush valve can be controlled on the basis of conductivity. If the conductivity exceeds the set flush limit, then flushing is started. Flushing is stopped if the conductivity falls below the set flush limit minus an adjustable hysteresis.

The level inside the circulation tank can be monitored by means of a low water level switch.

Furthermore, the water level can be kept up by using a high and/or low level switch and an inlet valve.

Phase “Flushing”

In the “Flushing” phase the flush valve is open. Any dosing functions are disabled.

The level inside the circulation tank can be monitored by means of a low water level switch.

Phase “Low level”

In the “Low level” phase the water level inside the circulation tank is insufficient. However, in program step 8.1 you must set that the flush valve should be closed if the low water input has been activated.

The system waits until the water level has been replenished.

The flush valve is controlled by level switches.

Phase “Dosing”

In the “Dosing” phase the dosing output is activated on the basis of a time interval (for instance biocide dosing).

The dosing output is activated during a programmable period of time.

You can postpone checking the conductivity during a programmable time after the dosing has been switched off, because high concentrations of chemicals may still be present in the tank.

Phase “Blocked”

In the “Blocked” phase at least one input for locking the flushing has been activated (BL1 and/or BL2). These inputs can for instance be used if a separate dosing control is used.

Second flush control

If the second flush control has been activated, the second conductivity meter must be used.

For “Blocked 2” and “Low level” respectively inputs “BL2” and “LL2” must be used. These are then no longer valid for the first flush control.

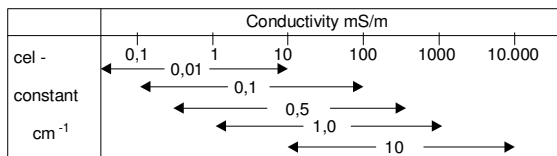


Conductivity measuring

The control system is standard equipped with a conductivity meter. This meter measures and checks the conductivity of the water inside the circulation tank.

The standard plug-in card can be exchanged for a plug-in card with two conductivity meters, with integrated electronics for temperature measurement of the water. The second conductivity meter can be used for determining the thickening value.

The conductivity meter has been designed for two measuring ranges and automatically switches the measuring range. The measuring range depends on the applied measuring cell.



To check whether the conductivity measurement is functioning correctly, you can always program a lower and an upper

threshold limit value with a programmable delay.

When the limit value is exceeded, this can be signalled by an alarm or message relay.

Calculation of the measuring range :

Minimum = cell constant * 1 mS/m

Maximum = cell constant * 1,000 mS/m

Temperature compensation

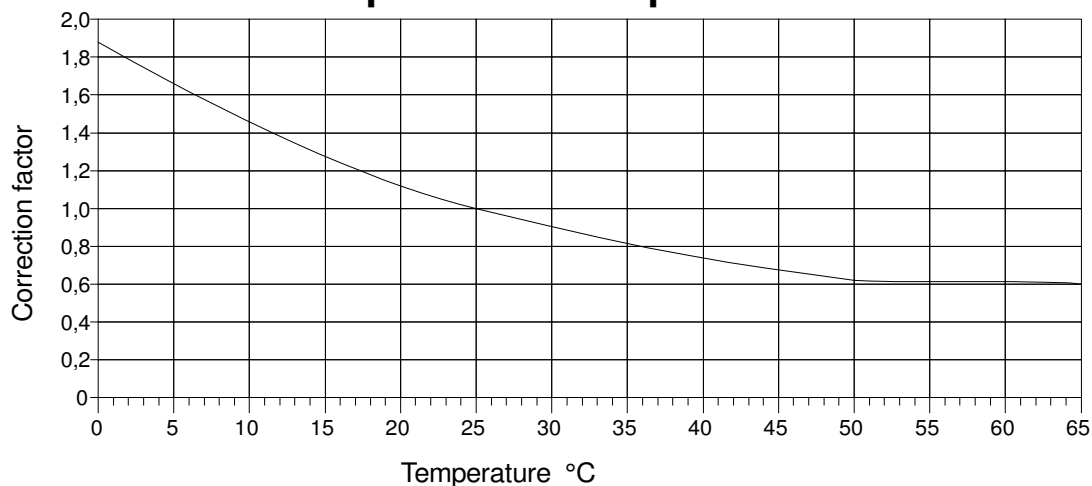
The control can be provided with a temperature measurement.

If the temperature probe has been attached, the measured conductivity value is automatically compensated for temperature.

By entering a temperature value that deviates from the standard reference temperature of 25 °C it is possible to manually compensate the measuring value in accordance with the programmed water temperature.

See the diagram below for the correction factor that is applied for the compensation.

Temperature compensation

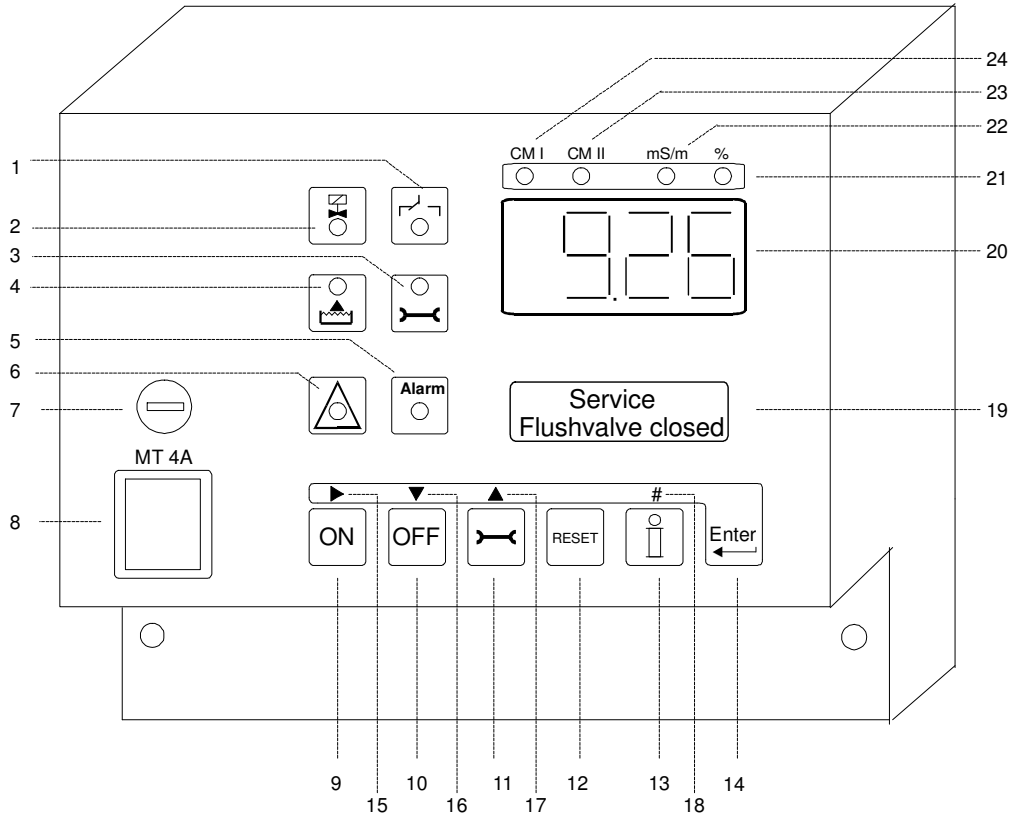


Example :

Set water temperature :	T	= 11 °C
Measured conductivity value	C	= 100 mS/m
Applied correction factor	K	= 1.4
Displayed conductivity	C	= 140 mS/m

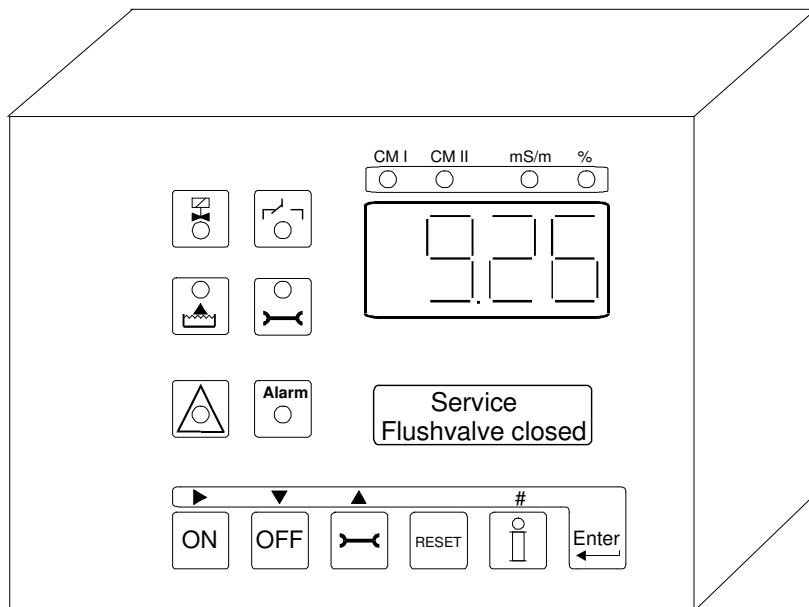
Illustration

Wall-mounted type AS3050



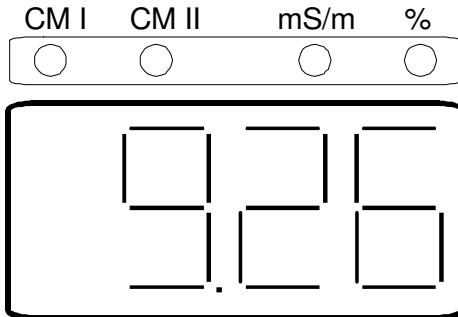
- | | | | |
|--------------------------|---------------------------|--------------------------|---------------------|
| 1 Led : Lock | 7 Main fuse | 13 Key : Info | 19 LCD display |
| 2 Led : Flush | 8 Main switch | 14 Key : Programming | 20 LED display |
| 3 Led : Manual operation | 9 Key : ON | 15 Move cursor | 21 Unit % |
| 4 Led : Low water level | 10 Key : OFF | 16 Next program step | 22 Unit mS/m |
| 5 Led : Alarm | 11 Key : Manual operation | 17 Previous program step | 23 Conductivity CM2 |
| 6 Led : Message | 12 Key : Reset | 18 Enter numbers | 24 Conductivity CM1 |

Panel-mounted type AS3051



Measuring values and display of functions

LED display



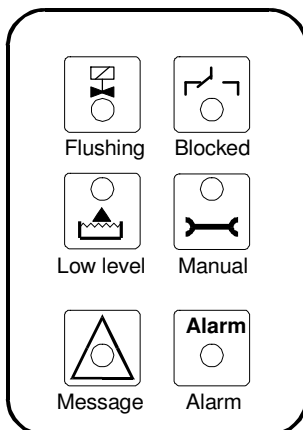
The LED display shows the value of :

Conductivity meter 1 or
 Conductivity meter 2 or the
 Relative conductivity

The values of Conductivity meters 1 and 2 are displayed in the unit mS/m and the relative conductivity is displayed in percentages (according to the formula : $(\text{Conductivity 1} / \text{Conductivity 2}) * 100\%$).
 If the conductivity value lies outside the measuring range, then the "OFL" (overflow) message appears on the display.

The green LED's above the display indicate the actual conductivity meter and its related unit.

LED indicator lights



Coloured lights signal the most important modes.

Flushing	(green)
Blocked	(green)
Low water level	(orange)
Manual operation	(orange)
Message	(red)
Alarm	(red)

The LCD display provides additional information.



LCD display

First line

**Service
FlushValveClosed**

The first line of the LCD display shows the actual situation (phase) of the installation.

The following phases can be distinguished : Service, Flushing, Low level, Blocked and Dosing.

Second line

**Service
FlushValveClosed**

The second line of the LCD display shows measuring and control values, depending on the actual step that the system is in.

If the second flush control has been activated, then its condition will also be shown in the second line of the display.

Second line "Service"

During "Service" the following information can be displayed on the LCD display :

Conductivity 1:	"CM1	20,4mS/m"
Conductivity 2:	"CM2	56,2mS/m"
Relative conductivity	"CM%	40,5%"
Temperature	"Temp	24°C"
Flush valve	"FlushValveClosed"	

Second line "Flushing"

During "Flushing" the following information can be shown on the LCD display :

Conductivity 1:	"CM1	20,4mS/m"
Conductivity 2:	"CM2	56,2mS/m"
Relative conductivity	"CM%	40,5%"
Temperature	"Temp	24°C"
Flush valve	"FlushValve Open"	

Second line "Low level"

During "Low level" the following information can be shown on the LCD display :

Conductivity 1:	"CM1	20,4mS/m"
Conductivity 2:	"CM2	56,2mS/m"
Relative conductivity	"CM%	40,5%"
Temperature	"Temp	24°C"
Flush valve	"FlushValveClosed"	

Second line "Blocked"

During "Blocked" the following information can be shown on the LCD display :

Conductivity 1:	"CM1	20,4mS/m"
Conductivity 2:	"CM2	56,2mS/m"
Relative conductivity	"CM%	40,5%"
Temperature	"Temp	24°C"
Flush valve	"FlushValveClosed"	

Second line "Dosing"

During "Dosing" the following information can be shown on the LCD display :

Conductivity 1:	"CM1	20,4mS/m"
Conductivity 2:	"CM2	56,2mS/m"
Relative conductivity	"CM%	40,5%"
Temperature	"Temp	24°C"
Flush valve	"FlushValveClosed"	
Dosing time	"Dosing	3m"


Second line "Flush control 2"

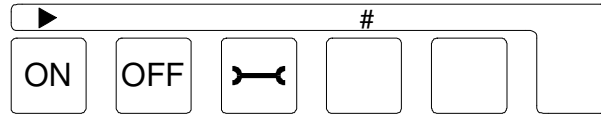
If the plug-in card with the second conductivity meter has been installed, a second flush control can be activated. The information about the second flush control is shown in the second line of the LCD display.

"Flush.2: Service"	: installation in service
"Flush.2: Flushing"	: flush valve activated
"Flush.2: Blocked"	: input BL2 active
"Flush.2: Low level"	: input LL2 active



Manual operation


The outputs can be controlled manually. The manual operation can be activated by pressing key  for about three seconds.



Confirmation

First you are asked whether you indeed want to activate the manual control.



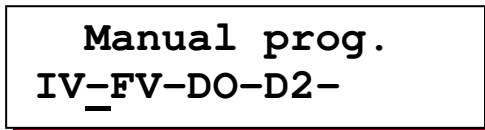
Confirmation must be entered within 30 seconds (remaining time is indicated in right hand top corner). Manual operation can be activated by placing the cursor under the "J" and pressing key .

Programming mode


If the manual control has been activated, you must first program which outputs must be activated.

During the programming mode the manual control LED will flash.


The display shows the following text :

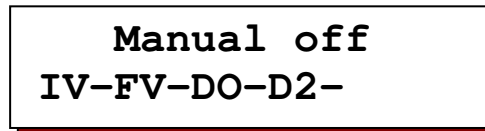


If "Dosing 2" (D2) or "Alarm" (AL) have not been programmed, they will not be displayed.

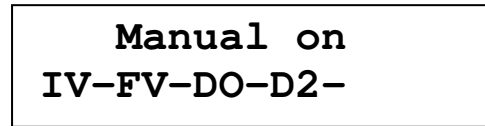
With key  you can select the output to be programmed and by pressing key "#" you can activate or deactivate the output ("|" = active, "-" = not active).


Manual control on/ off

By pressing the key  once more you can activate the manual control. At first, the control is in the "Manual control off" mode.




All outputs are still switched off. You can activate the programmed outputs by pressing the "ON" key.



You can deactivate the outputs again by pressing the "OFF" key. Press the  key to return to the programming mode.

Closing

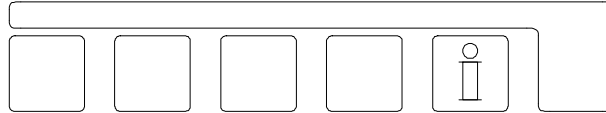
You can close the manual control mode by pressing the  key for about three seconds.




INFO - displays

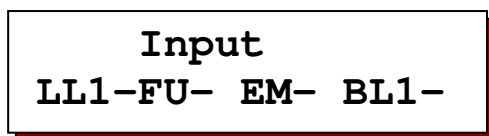
With the Info key you can call up various types of information and values. Changes, in as far as possible, are described in the "Programming" chapter.

By calling up the Info key you can only change the service phone number.



Press the Info key with the  symbol. The first set of information appears. If you then press the key again, the next set of information appears, etc.

Input modes (1)



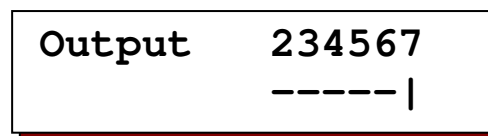
The current switch modes of the inputs are displayed.

LL1 = Low water level 1
FU = High level switch
EM = Low level switch
BL1 = Blocked 1

A horizontal line ' - ' next to the indication means : input not active.

A vertical line ' | ' next to the indication means : input active.

Output modes



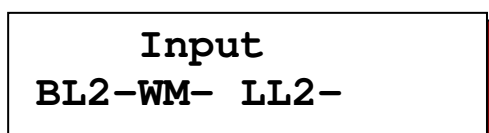
The current switch modes of the outputs are shown.

Each figure is allocated to a relay.

A horizontal line ' - ' underneath a figure means : output not active.

A vertical line ' | ' underneath a figure means : output active.

Inputs modes (2)



The current switch modes of the inputs are displayed.

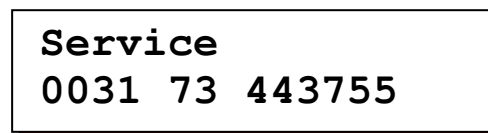
"LL2" is only displayed if the second flush control has been activated.

BL2 = Blocked 2
WM = Water meter
LL2 = Low water level 2

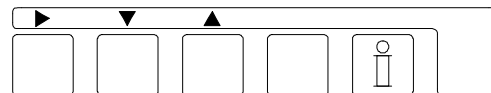
A horizontal line ' - ' next to the indication means : input not active.

A vertical line ' | ' next to the indication means : input active.

Service phone number



A service phone number is displayed. You can also change the number here.



Change the phone number :

Select number : ►

Lower number : ▼

Higher number : ▲



Software version

Softwareversion
AS3050 2.00.00

The software version is continuously updated in the factory. The software is changed to adapt the product to new insights and requirements.

Displayed is the version number of the currently installed release.

Cell constant

Celconstant
C1=0.10 C2=0.50

The display shows the cell constant for conductivity meter 1 (C1) entered in program step 1.2 and if the plug-in card with the second conductivity meter has been installed, the cell constant (C2) entered in program step 2.2 is shown.

Temperature

Watertemperature
Autom. 15°C/80°C

Here the measured water temperature as well as any programmed max. threshold limit value are displayed, in as far as a plug-in expansion card has been installed and the temperature probe has been connected. In the other case the temperature entered in program step 4.1 is displayed ("Man. 25°C")

Dosing

DO1: WM x 2
DO2: 1h 14m

Dosing 1 (DO1) :

In program step 9.1 you can set the parameter that "Dosing 1" will be dependent on.

IV = Dosing parallel with inlet valve
WM = Dosing dependent on incoming impulses

The selected setting is shown here. If the dosing depends on the water meter impulses, then also the selected dosing factor (step 9.2) is displayed.

Dosing 2 (DO2) :


In step 11.1 you can activate "Dosing 2". If this option has not been activated, "No" will be shown.


In the other case the programmed interval time (in hours) and the remaining time (in minutes) until the next surge dosing is displayed.



Messages

For certain situations a message can be programmed to appear on the LCD display and an alarm relay and/or buzzer can be activated.

If an alarm relay and/or buzzer has been programmed, these can be switched off by pressing the  key.

Once the cause of the message has been cleared, the message on the LCD display can be cleared by once again pressing the  key.

Conductivity 1 MIN

**Limit CM1 Min
under valued**

Conductivity 1 has been below the minimum threshold limit value for longer than the set delay.

Possible causes :

Air at the measuring probe, electric interruption of the measuring probe.

Conductivity 2 MAX

**Limit CM2 Max
exceeded**

Conductivity 2 has been above the maximum threshold limit value for longer than the set delay.

Possible causes :

Set value of the installation has been changed, measuring probe short-circuited, thickening too high.

Conductivity 1 MAX

**Limit CM1 Max
exceeded**

Conductivity 1 has been above the maximum threshold limit value for longer than the set delay.

Possible causes :

Set value of the installation has been changed, measuring probe short-circuited, thickening too high.

Relative conductivity MIN

**Limit CM% Min
under valued**

The relative conductivity has been below the minimum threshold limit value for longer than the set delay.

Possible causes :

Air or electric interruption of measuring probe 1 or short-circuit in measuring probe 2.

Conductivity 2 MIN

**Limit CM2 Min
under valued**

Conductivity 2 has been below the minimum threshold limit value for longer than the set delay.

Possible causes :

Air at the measuring probe, electric interruption of the measuring probe.

Relative conductivity MAX

**Limit CM% Max
exceeded**

The relative conductivity has been above the maximum threshold limit value for longer than the set delay.

Possible causes :

Air or electric interruption of measuring probe 2 or short-circuit in measuring probe 1.



Temperature MAX

**Limit Temp. Max
exceeded**

In step 4.3 you can select whether a maximum temperature value must be monitored.

Tank full

**Tank
Full**

This text appears if in program step 11.4 or 12.4 the activation of the message or alarm relay has been activated and the high level switch inside the circulation tank has been activated.

Circulation tank empty

**Tank
Empty**

This text appears if in program step 11.3 or 12.3 the activation of the message or alarm relay has been activated and the low level switch inside the circulation tank has been activated.

Signal "Blocked 1"

**Signal
Blocked 1**

This text appears if in program step 11.5 or 12.5 the activation of the message or alarm relay has been activated and input "Blocked 1" has been activated.
Flushing is blocked until the input is no longer active.

Signal "Blocked 2"

**Signal
Blocked 2**

This text appears if in program step 11.6 or 12.6 the activation of the message or alarm relay has been activated and input "Blocked 2" has been activated.
Flushing is blocked until the input is no longer active.

Signal "Low level 1"

**Signal
Low level 1**

This text appears if in program step 11.7 or 12.7 the activation of the message or alarm relay has been activated and the water level in circulation tank 1 is too low. Flushing is blocked until the level is once again sufficiently high.

Signal "Low level 2"

**Signal
Low level 2**

This text appears if in program step 11.13 or 12.13 the activation of the message or alarm relay has been activated and the water level in circulation tank 2 is too low.
Flushing is blocked until the level is once again sufficiently high.

Signal "Power failure"

**Signal
Supply fail.**

The supply voltage for the control failed or was switched off.

ATTENTION ! In case of a power failure all programmed values are saved.
However, the clock settings are not saved and must always be checked.



Inputs

The inputs “Low level 1”, “Tank full”, “Tank empty”, “Blocked 1”, “Blocked 2” and “Water meter” are standard available.

The input “Low level 2” is only monitored if the second flush control has been activated.

Low level 1 and 2

The connectors for low water level 1 and 2 are respectively indicated by “ST” and “CO”.

Circulation tanks 1 and 2 can be secured against emptying by blocking the flushing during an active input signal. In respectively steps 8.1 and 8.3 you can select that the flush valve must be closed.

In respectively program steps 8.2 and 8.4 you can set whether the inputs are activated in the open or closed condition.

Tank full / Tank empty

The connectors for the high and low level switches are respectively indicated by “FU” and “EM”.

By means of these inputs the water level in the circulation tank can be kept up by controlling an flush valve.

In program step 10.1 you can set whether the control is dependent on 1 (only input “FU”) or 2 level switches.

In program step 10.2 you can set whether the inputs are activated in the open or closed condition.

Blocked 1 and 2

The connectors for Blocked 1 and 2 are respectively indicated by “EP” and “LP”.

Via these inputs the flushing can be blocked during an active input signal.

In program step 7.1 you can set whether the inputs are activated in the open or closed condition.

Water meter

The connector for the water meter is indicated by “PS”.

Impulse water meters give off an impulse after each flow, for instance of 100 litres.

The impulses can also be used for controlling dosing output 1 and dosing output 2.

Conductivity probe 1 and 2

The connectors for the measuring cell are respectively indicated by “CC1” and “CC2”.

Don't forget to enter the correct cell constants in program steps 1.2 and 2.2.

Temperature

For the temperature gauge a PT1000 must be used.

The connector is indicated by “TC”. This probe can be built into the measuring cell or installed as a separate temperature probe next to the measuring cell.

If no temperature probe is connected, calculations are automatically based on the temperature set in program step 4.1. The same applies in case of short-circuiting or interruption.



Outputs

The outputs “Inlet valve”, “Flush valve1”, “Dosing 1” and “Alarm” are standard available.

The output functions “Dosing 2” and “Message” are programmable for the “AN” connector.

The output function “Flush valve 2” is only present (connector “PV”) if the second flush control has been activated. If it has not been activated, this connector is controlled parallel with the function “Flush valve 1”.

The relays are activated when live, except for the “Alarm” function (connector “MF”).

Flush valve 1

The flush valve is connected to the “CV” connector.

If the second flush control is not activated, the flush valve can also be connected to the “PV” connector. This connector is suitable for a three-way motor.

The flush valve is controlled depending on the measured conductivity 1.

If the conductivity exceeds the set flush limit (program step 6.1) then the flush valve will be opened. If the conductivity then falls below this flush limit minus the set hysteresis (step 6.2), then the flush valve will be closed again.

Dosing 1

“Dosing 1” is connected to the “DO” connector.

In step 9 you can set whether the dosing is dependent on the flush valve or on the incoming water meter impulses.

If the dosing depends on the flush valve, then the dosing is controlled parallel with the flush valve.

If the dosing depends on the incoming water meter impulses, then in step 9 you can set the length of each impulse, as well as the dosing factor.

By means of the dosing factor you can set the number of outgoing dosing impulses.

Example :

dosing factor = x2 : every incoming impulse creates 2 outgoing.

dosing factor = :2 : after 2 incoming impulses 1 outgoing is created.

Alarm

With the potential-free contact of the relay, monitoring consoles or signalling devices can be activated.

The events that must cause a relay action are programmable in step 12.

The output function is programmable on output “MF” and is activated in the current less condition.

Dosing 2

The output function “Dosing 2” can be programmed as a surge dosing (for instance biocide) on connector “AN”.

The surge dosing is activated after a set time interval (in hours) in step 11.15.

The surge dosing is activated during a programmable time (in minutes).

The impact time (in minutes) of the chemicals can be entered in step 11.17.

As long as the impact time is running, the installation will not flush on the basis of the measured conductivity.

Inlet valve

The inlet valve is controlled dependent on the number of level switches set in step 10.1 and on the position of the level switches.



Message

The output function "Message" can be programmed on the "AN" connector.

With the potential-free contact of the relay, monitoring consoles or signalling devices can be activated.

The events that must cause a relay action are programmable in step 11.

The output function is not activated in the current less condition.

Flush valve 2

If the second flush control has been activated, the flush valve for this second control must be connected to the "PV" connector.

The flush valve is controlled depending on the measured Conductivity 2. If the conductivity exceeds the set flush limit (program step 6.4), then the flush valve will be opened. If the conductivity then falls below this flush limit minus the set hysteresis (step 6.5), the flush valve will once again be closed.

Recorder output

To use this connector, an optional plug-in card with a recorder output has to be installed.

Then you can connect a recorder with a power input of 0-20mA or 4-20mA.

The following signals can be switched on the recorder output :

Conductivity 1
Conductivity 2
Relative conductivity
Temperature

The allocation of the measuring range for the power range can be programmed for each individual parameter.

If more than one parameter is switched on a recorder output, they alternate every two seconds.



Language

Keep the “Enter” key depressed for five seconds.
The display now reads :

Attention!
Programmechange

and after five seconds :

Start
Programmechange

After these five seconds also press the “#” key to activate the language setting.
Then release both keys.
The display reads :

English
D N1 E F

You can change the language with the ► key.

You can leave the language setting by pressing the “Enter” key again.
If you do not press any key for approx. two minutes, the settings menu is closed automatically.

Choose from the following languages : German, Dutch, English or French.

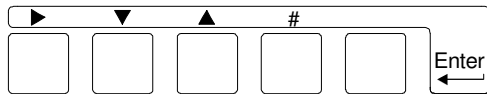


Programming

General

By entering the basic values when the system is put into operation, the control system is set to the operational data of the installation. These values can be changed and are not lost in case of a power failure.

- The basic values should only be changed by an authorised expert.
- Note the basic values in the empty fields of the following flow charts and carefully keep this manual for use by the operational and maintenance staff.
- The basic values can be changed at all times. Some of the changed values only become active after the programming mode has been left.
- For the programming mode, the following symbols ▶, ▼, ▲ and # are used.



Activate

Keep the "Enter" key depressed for about five seconds.

The LCD display first shows :

Attention!
Programmechange

and after about 5 seconds :

Start
Programmechange

Then press the ▼ key to activate the programming.

Change settings

Yes/No setting

Change the setting by means of the ▶ key.

Set numeric value

Select the figure that needs to be changed by means of the ▶ key.

Change the value with the # key.

Set factor

Change the value with the # key.

Select from more than one function

Select the function by means of the ▶ key.

Switch functions on / off

Select the function by means of the ▶ key.

With the # key, toggle the value between " | " and " - ".

1. Conductivity meter 1

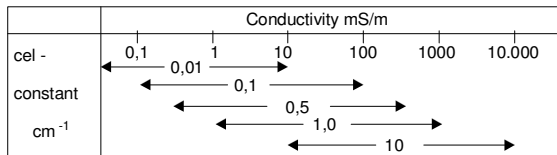
Step no.:	1.1
Display	LCD <u>LED</u>

Conductivity 1 can be shown on the LCD display or on the LED display.

Attention ! If the display of Conductivity 2 and/or the relative conductivity and/or the temperature are activated for the same display, then the messages will alternate every two seconds.

Step no.:	1.2
Constant	0.1<u>0</u>

In accordance with the conductivity of the water that has to be measured, a probe with an adapted cell constant must be selected. You can program a cell constant between 0.01 cm⁻¹ and 10.00 cm⁻¹ for the conductivity meter.



Step no.:	1.3
Limit Min	Y/<u>N</u>

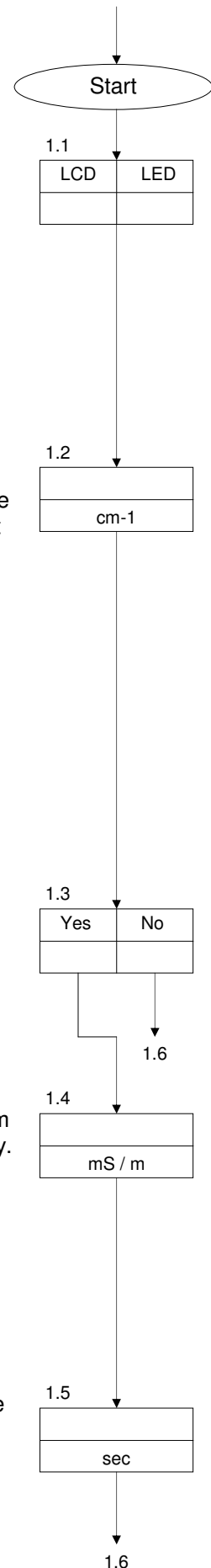
The conductivity value can be checked for a minimum value.

Step no.:	1.4
Value Min	1.0<u>0</u>

An electrical interruption to the conductivity probe, electrical failures in the system or air at the probe can lead to the incorrect display of a much too low conductivity. For control purposes a threshold limit value between 0.1 – 999.9 mS/m can be entered.

Step no.:	1.5
Delay	6<u>0</u>s

After a programmable delay time of 1 – 999 seconds and if the conductivity value is below the set minimum value, the LCD display shows the message "Limit CM1 Min under valued".





Step no.:	1.6
Limit Max	<u>Y</u>/N

The conductivity value can be checked for a maximum value.

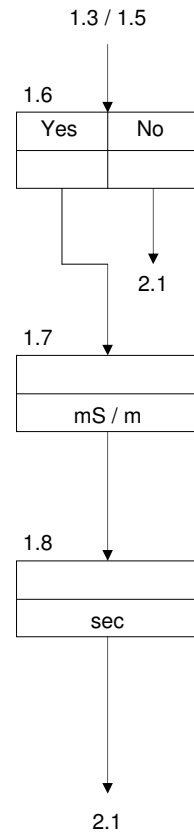
Step no.:	1.7
Value Max	165.<u>0</u>

For control purposes a threshold limit value between 0.1 – 9999.9 mS/m can be entered.

Step no.:	1.8
Delay	<u>5</u>s

After a programmable delay time of 5 – 999 seconds and if the conductivity value is above the set maximum value, the LCD display shows the message “Limit CM1 Max. exceeded”.

In program steps 11 and 12 you can set whether a message relay or an alarm relay must be activated.



2. Conductivity meter 2

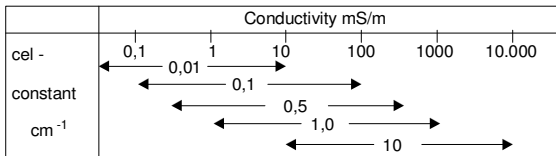
Step no. : 2.1
Display LCD LED

Conductivity 2 can be shown on the LCD display or on the LED display or can be suppressed if the cursor is not shown.

Attention ! If Conductivity 1 and/or the relative conductivity and/or the temperature are activated for the same display, then the messages subsequently appear after two seconds.

Step no. : 2.2
Constant 0.10

In accordance with the conductivity of the water that has to be measured, a probe with an adapted cell constant must be selected. You can program a cell constant between 0.01 cm⁻¹ and 10.00 cm⁻¹ for the conductivity meter.



Step no. : 2.3
Limit Min Y/N

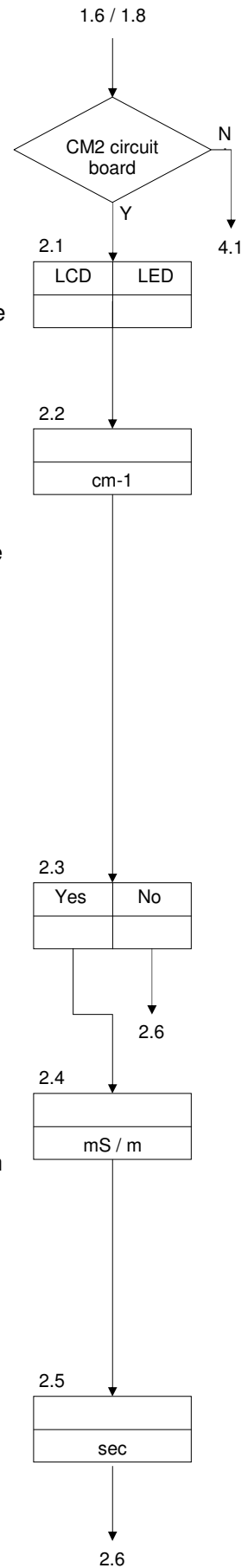
The conductivity value can be checked for a minimum value.

Step no. : 2.4
Value Min 5.00

An electrical interruption to the conductivity probe, electrical failures in the system or air at the probe can lead to an incorrect display of a much too low conductivity. For control purposes a threshold limit value between 0.1 – 999.9 mS/m can be entered.

Step no. : 2.5
Delay 60s

After a programmable delay time of 1 – 999 seconds and if the conductivity value is below the set minimum value, the LCD display shows the message “Limit CM2 Min under valued”.





Step no.:	2.6
Limit Max	Y/<u>N</u>

The conductivity value can be checked for a maximum value.

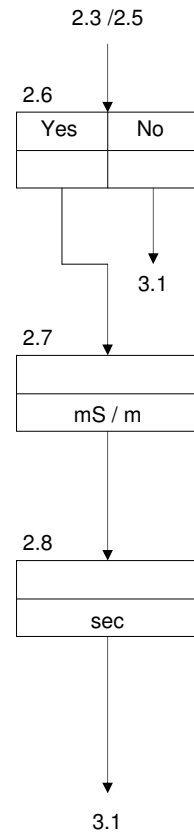
Step no.:	2.7
Value Max	165.<u>0</u>

For control purposes a threshold limit value of 0.1 – 9999.9 mS/m can be entered.

Step no.:	2.8
Delay	180<u>s</u>

After a programmable delay time of 5 – 999 seconds and if the conductivity value is above the set maximum value, the LCD display shows the message “Limit CM2 Max. exceeded”.

In program steps 11 and 12 you can set whether a message relay or an alarm relay must be activated.



3. Relative conductivity

Step no.:	3.1
Display	LCD LED

The relative conductivity can be shown on the LCD display or on the LED display or can be suppressed if the cursor is not shown.

Attention ! If Conductivity 1 and/or Conductivity 2 and/or the temperature are activated for the same display, then the messages subsequently appear after two seconds.

Step no.:	3.2
Limit Min	Y/<u>N</u>

The relative conductivity can be checked for a minimum value.

Step no.:	3.3
Value Min	5.<u>0</u>

An electrical interruption to the conductivity probe, electrical failures in the system or air at the probe can lead to an incorrect display of a much too low conductivity. For control purposes a threshold limit value between 0.1 – 99.9 % can be entered.

Step no.:	3.4
Delay	6<u>0</u>s

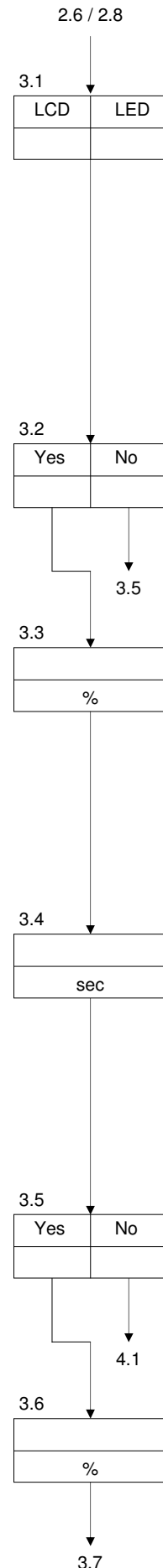
After a programmable delay time of 1 – 999 seconds and if the relative conductivity value is below the set minimum value, the LCD display shows the message “Limit CM% Min under valued”. In program steps 11 and 12 you can set whether a message relay or an alarm relay must be activated.

Step no.:	3.5
Limit Max	Y/<u>N</u>

The conductivity value can be checked for a maximum value.

Step no.:	3.6
Value Max	50.<u>0</u>

For control purposes a threshold limit value between 0.1 – 99.9 % can be entered.



Step no.:	3.7
Delay	18<u>0</u>s

After a programmable delay time of 1 – 999 seconds and if the relative conductivity value is above the set maximum value, the LCD display shows the message “Limit CM% Max. exceeded”.
In program steps 11 and 12 you can set whether a message relay or an alarm relay must be activated.

4. Temperature measurement

Step no.:	4.1
Temperature	25<u>°</u>C

If the standard plug-in card has been installed, temperatures are not measured. However, for the manual temperature compensation of the conductivity value a temperature deviating from 25°C can be entered from the range between 1 and 99°C.

If the plug-in card for two conductivity meters has been installed, but no temperature probe has been connected, this step is displayed as well.

Step no.:	4.2
Display	Y/<u>N</u>

If an extended plug-in card with two conductivity meters and temperature measurement is used, you can set whether the actual temperature value is displayed on the LCD display.

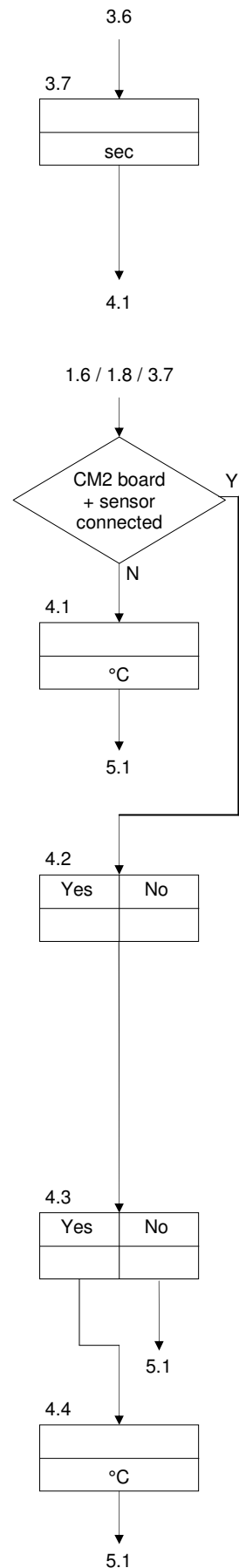
Attention ! If the display of Conductivity 1 and/of Conductivity 2 and/or the temperature are activated for the same display, then the messages will alternate every two seconds.

Step no.:	4.3
Limit Temp.	Y/<u>N</u>

Here you can set the monitoring of the maximum water temperature.

Step no.:	4.4
Value Max	80<u>°</u>C

For monitoring purposes you can here enter a threshold limit value between 1°C and 99°C.



5. Conductivity – correction factor

Step no. :	5.1
Factor	1.00*

The conductivity measurement relates to a water temperature of 25°C. For deviating temperatures the displayed value can be compensated manually. Other measuring errors, for instance as a result of polarisation, line impedance or cable capacities, can be compensated, at least for a certain range, by entering a correction factor.

You can enter a correction factor between 0.1 – 5.00. How to determine the conductivity – correction factor :

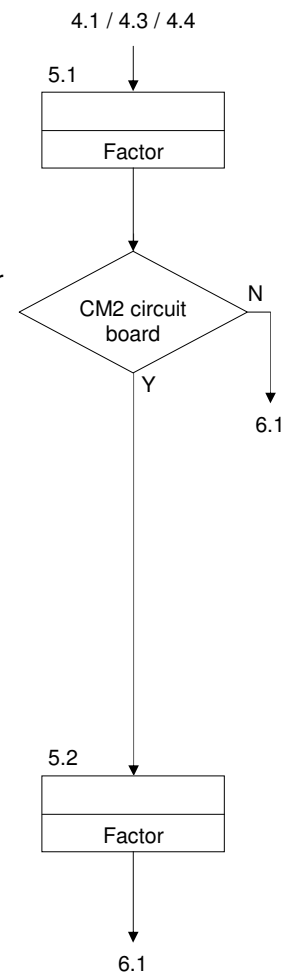
Take a water sample and measure the **setting value** of the conductivity by means of an accurate measuring device.

As the **actual value** note the value that is displayed on the control system. Then calculate the **correction factor** to be entered as follows :

$$\frac{\text{Setting value}}{\text{Actual value}} = \text{Correction factor}$$

Step no. :	5.2
Factor	1.00*

Here you can enter a correction factor for Conductivity 2 between 0.10 and 5.00.



6. Flushing

Step no.:	6.1
Flushvalue	150.0

Enter the flush limit, between 1.0 – 6.500.0 mS/m, for Flush control 1.
If Conductivity 1 exceeds this value, then the flush valve will be opened.

Step no.:	6.2
Hysteresis	3.0

By means of the hysteresis you can set how far Conductivity 1, after flushing, has to fall below the flush limit before flushing is ended.

Step no.:	6.3
Flush 2 On	Y/N

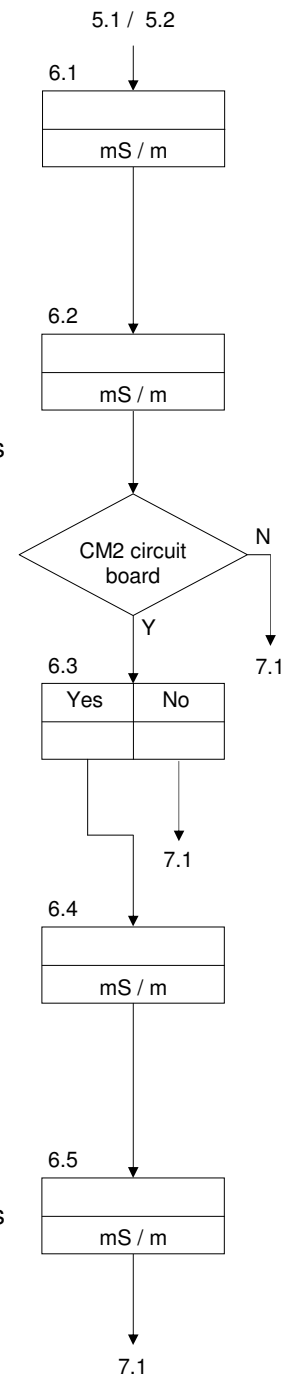
Here you can activate a second flush control, if necessary. For this option the plug-in card for two conductivity meters has to be installed.

Step no.:	6.4
Flushvalue	150.0

Enter the flush limit, between 1.0 – 6.500.0 mS/m, for Flush control 2.
If Conductivity 2 rises above this value, then the flush valve will be opened.

Step no.:	6.5
Hysteresis	3.0

By means of the hysteresis you can set how far Conductivity 2, after flushing, has to fall below the flush limit before flushing is ended.



7. Blocking

Step no.: 7.1

B1 | B2 |

Select the activation of the input functions for the locking inputs.

" | " Activate function for closed contact (NO contact).

" - " Activate function for open contact (NC contact).

B1 = Blocked 1

B2 = Blocked 2

8. Low level

Step no.: 8.1

Valve closed Y/N

Determine whether the flush valve of the flush control must be closed if input "Low level" has been activated.

Step no.: 8.2

LL1-

Select the activation of the function for input "Low level 1".

" | " Activate function for closed contact (NO contact).

" - " Activate function for open contact (NC contact).

Step no.: 8.3

Valve closed Y/N

Determine whether the flush valve of flush control 2 must be closed if input "Low level 2" has been activated.

This step can only be reached if the second flush control has been activated.

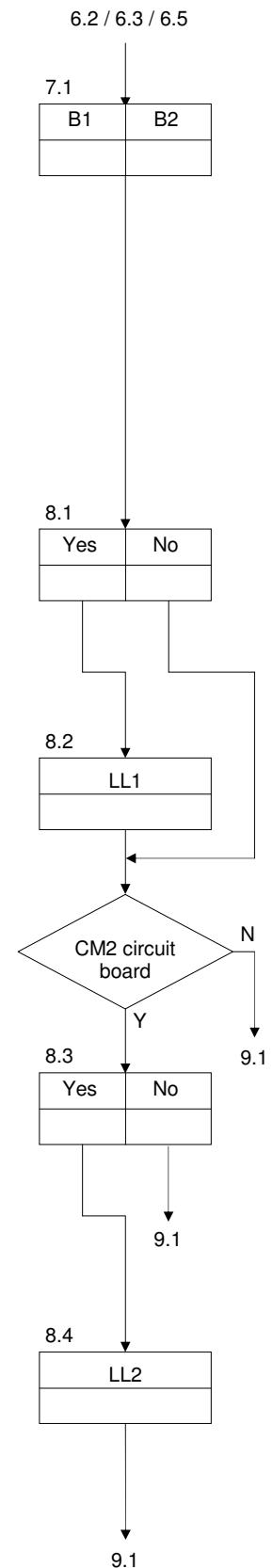
Step no.: 8.4

LL1-

Select the activation of the function for input "Low level 2".

" | " Activate function for closed contact (NO contact).

" - " Activate function for open contact (NC contact).



9. Dosing output 1

Step no.:	9.1
<u>IV</u> WM	

Determine from which parameter dosing function 1 depends.

IV = inlet valve

WM = water meter impulses

If the dosing function depends on the flush valve, then the dosing function is controlled parallel with the flush valve. If the flush valve is opened, then the dosing is active. In the other case the dosing output is not active.

If the dosing function depends on the incoming water meter impulses, then the dosing factor as well as the duration of the dosing impulses must be set.

Step no.:	9.2
Factor	x<u>1</u>

Enter a dosing factor between ":10" – "x10".

By means of this dosing factor the number of incoming water meter impulses can be converted into more or less outgoing dosing impulses.

Example :

Dosing factor = x3 : Every incoming impulse creates three outgoing dosing impulses

Dosing factor = :2 : After two incoming impulses one outgoing dosing impulse is created.

Step no.:	9.3
Time low	0.<u>5</u>s

Enter a time between 0.2 – 999.9 seconds when the output is not short-circuited.

Step no.:	9.4
Time high	1.<u>0</u>s

Enter a time between 0.2 – 999.9 seconds when the output is short-circuited.

10. Level switch

Step no.:	10.1
Level switch	<u>2</u>

Enter the number of level switches (1 or 2) used for the automatic filling of the circulation tank.

Step no.:	10.2
FU- EM 	

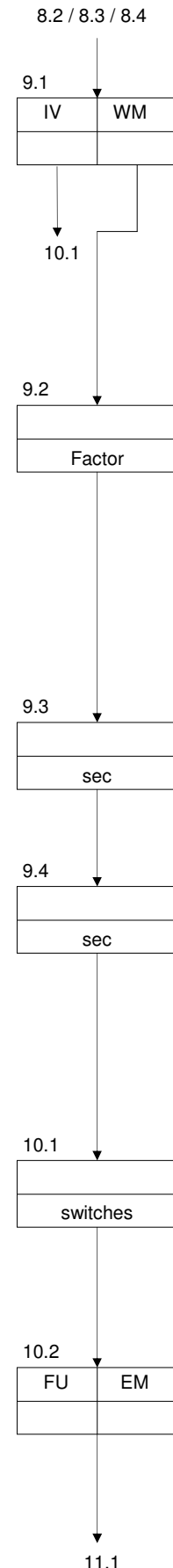
Select the activation of the input functions for the "FU" and "EM" inputs.

"|" Activate function for closed contact (NO contact).

"-" Activate function for open contact (NC contact).

FU = High level switch

EM = Low level switch



11. Message / Dosing output 2

Step no.:	11.0
<u>AL</u> D2	

Select the desired output function for output "AN".

AL = message function
D2 = dosing 2

Message

Various situations can be signalled by means of the message and/or alarm relay. In this step you can program which events must activate the message relay.

Step no.:	11.1
CM 1 Min	Y/ <u>N</u>

Conductivity 1 below the threshold limit value entered in step 1.4.

Step no.:	11.2
CM 1 Max	<u>Y</u> /N

Conductivity 1 above the threshold limit value entered in step 1.7.

Step no.:	11.3
Empty	Y/ <u>N</u>

The low level switch was activated.

Step no.:	11.4
Full	Y/ <u>N</u>

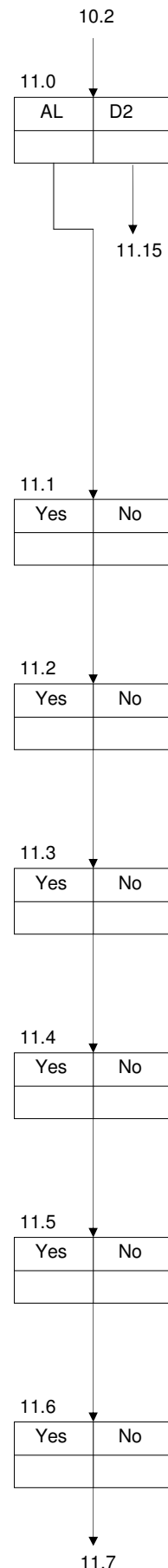
The high level switch was activated.

Step no.:	11.5
Blocked 1	Y/ <u>N</u>

The "Blocked 1" input was activated.

Step no.:	11.6
Blocked 1	Y/ <u>N</u>

The "Blocked 2" input was activated.



Step no.:	11.7
Low level 1	Y/N

The "Low level 1" input was activated.

Step no.:	11.8
Supplyfail.	Y/N

The power for the control failed.

Step no.:	11.9
CM 2 Min	Y/N

Conductivity 2 below the threshold limit value entered in step 2.4.

Step no.:	11.10
CM 2 Max	Y/N

Conductivity 2 above the threshold limit value entered in step 2.7.

Step no.:	11.11
CM % Min	Y/N

Relative conductivity below the threshold limit value entered in step 3.3.

Step no.:	11.12
CM % Max	Y/N

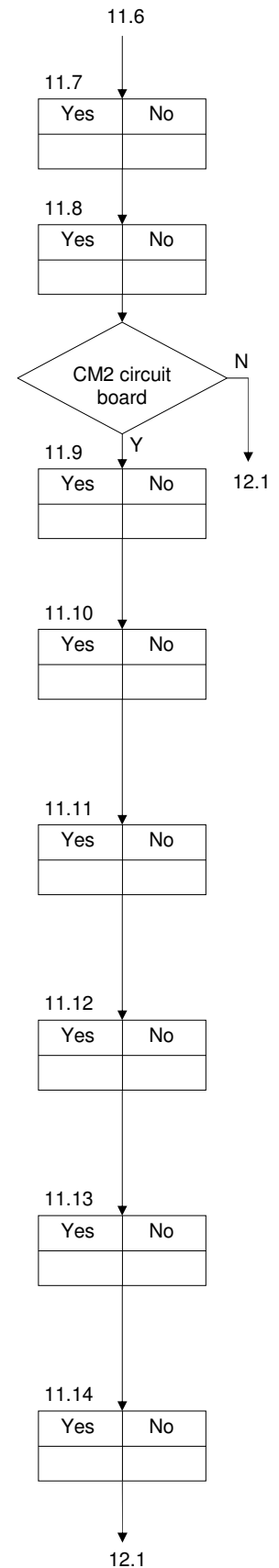
Relative conductivity above the threshold limit value entered in step 3.6.

Step no.:	11.13
Low level 2	Y/N

The "Low level 2" input was activated.

Step no.:	11.14
Limit Temp.	Y/N

Temperature above the threshold limit value entered in step 4.4.



Surge dosing

Step no.:	11.15
Interval	2<u>4</u>h

Enter an interval time between 1 – 999 hours after which a surge dosing is activated during a period of time programmable in step 11.16.

Step no.:	11.16
Dosingtime	1<u>5</u>m

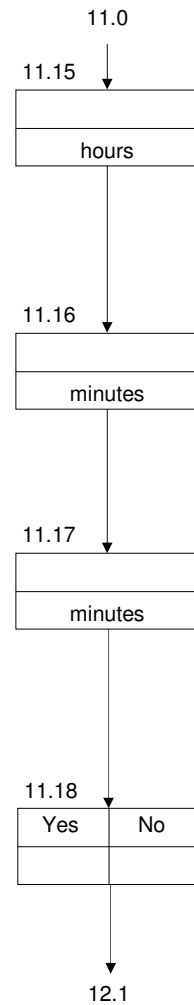
Enter the dosing time for the surge dosing, between 1-999 minutes.

Step no.:	11.17
Waittime	<u>0</u>m

Here you can enter a time between 0 – 999 minutes, during which flushing is blocked, immediately after surge dosing has been deactivated. This in connection with the impact time of the added chemicals.

Step no.:	11.18
Flush->Dos.	Y/<u>N</u>

Here you enter if a flush can be interfered by a shot dosing.



12. Alarm

Various events can be signalled by means of the message and/or alarm relay. In this step you can enter which events much activate the alarm relay.

Step no.:	12.1
CM 1 Min	Y/<u>N</u>

Conductivity 1 below the threshold limit value entered in step 1.4.

Step no.:	12.2
CM 1 Max	<u>Y</u>/N

Conductivity 1 above the threshold limit value entered in step 1.7.

Step no.:	12.3
Empty	Y/<u>N</u>

The low level switch was activated.

Step no.:	12.4
Full	Y/<u>N</u>

The high level switch was activated.

Step no.:	12.5
Blocked 1	Y/<u>N</u>

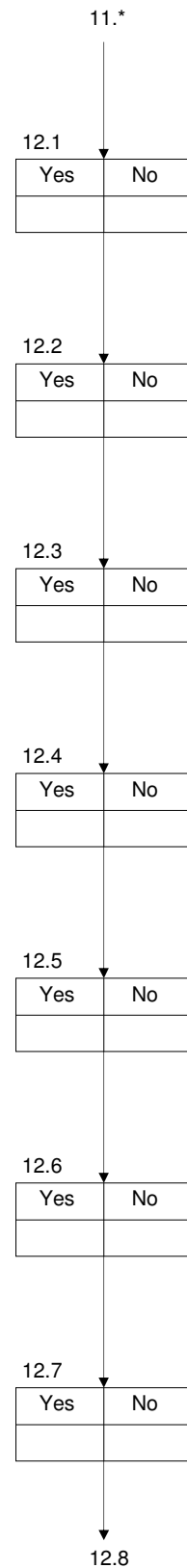
The "Blocked 1" input was activated.

Step no.:	12.6
Blocked 2	Y/<u>N</u>

The "Blocked 2" input was activated.

Step no.:	12.7
Low level 1	Y/<u>N</u>

The "Low level 1" was activated.



Step no.: 12.8
Supplyfail. Y/N

The power for the control failed.

Step no.: 12.9
CM 2 Min Y/N

Conductivity 2 below the threshold limit value entered in step 2.4.

Step no.: 12.10
CM 2 Max Y/N

Conductivity 2 above the threshold limit value entered in step 2.7.

Step no.: 12.11
CM % Min Y/N

Relative conductivity below the threshold limit value entered in step 3.3.

Step no.: 12.12
CM % Max Y/N

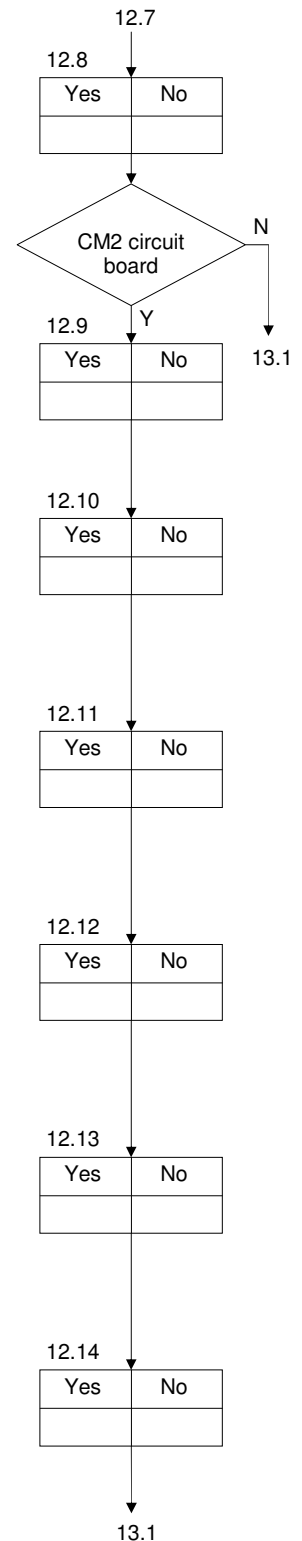
Relative conductivity above the threshold limit value entered in step 3.6.

Step no.: 12.13
Low level 2 Y/N

The "Low level 2" input was activated.

Step no.: 12.14
Limit Temp. Y/N

Temperature above the threshold limit value entered in step 4.4.



13. Recorder output

The following program steps can only be selected if the control system has been provided with a recorder output.

Step no. :	13.1
0-20 mA	<u>4</u>-20 mA

Both power outlets can be used for 0-20mA or for 4-20mA.

In the following program steps you can determine which value is controlled on output 1 and/or output 2. If more than one value is selected for an output, then these are subsequently displayed with an interval of two seconds. In that case a dot recorder must be used, so as not to create a connecting line between the measuring values.

For an optimal display of the analogue values you can enter the maximum for the measuring value to be converted in the following steps.

Formulas :

$$I_{out} = I_{min} + ((CM_{measure} / CM_{range}) * (I_{max} - I_{min}))$$

$$CM_{measure} = CM_{range} * ((I_{out} - I_{min}) / (I_{max} - I_{min}))$$

I_{out} = output current

I_{min} = 0 or 4 mA (step 15.1)

I_{max} = 20 mA

$CM_{measure}$ = measured conductivity

CM_{range} = programmed range (e.g. step 15.3)

For example: you have programmed 4 - 20 mA and 0 - 100 μ S/cm and the measured conductivity is 60 μ S/cm. In this case the output current will be :

$$I_{out} = 4 \text{ mA} + ((60 \mu\text{S} / 100 \mu\text{S}) * (20 \text{ mA} - 4 \text{ mA})) = 13,6 \text{ mA}$$

Step no. :	13.2
MeasuremCM1	<u>1</u>-<u>2</u>-

You can select on which output the value of Conductivity meter 1 must be displayed.

Step no. :	13.3
Range	0- <u>20</u>

You can allocate the power range 0(4)-20mA to a range of Conductivity meter 1 between 1 – 6.500 mS/m.

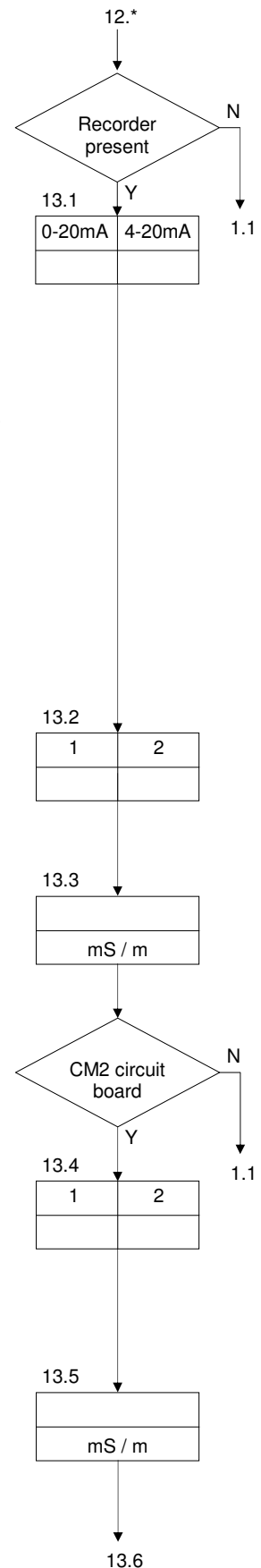
Step no. :	13.4
MeasuremCM2	<u>1</u>-<u>2</u>-

You can select on which output the value of Conductivity meter 2 must be displayed.

Step no. :	13.5
Range	0- <u>200</u>

Conductivity meter 2 between 1 – 65.000 mS/m.

You can allocate the power range 0(4)-20mA to a range of



Step no.: 13.6
MeasuremCM% 1-2-

You can select on which output the value of the relative conductivity must be displayed.

Step no.: 13.7
Range 0- 100

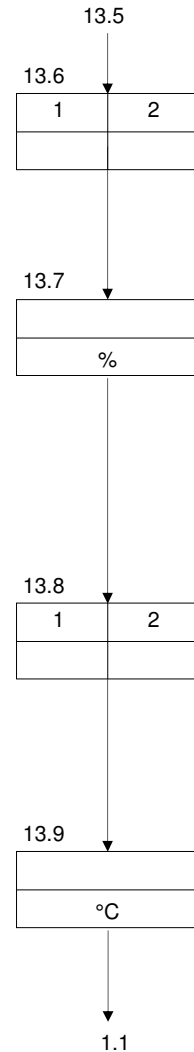
You can allocate the power range 0(4)-20mA to a range of the relative conductivity between 1 – 100%.

Step no.: 13.8
Measurem°C 1-2-

You can select on which output the value of Conductivity meter 2 must be displayed.

Step no.: 13.9
Range 0- 100

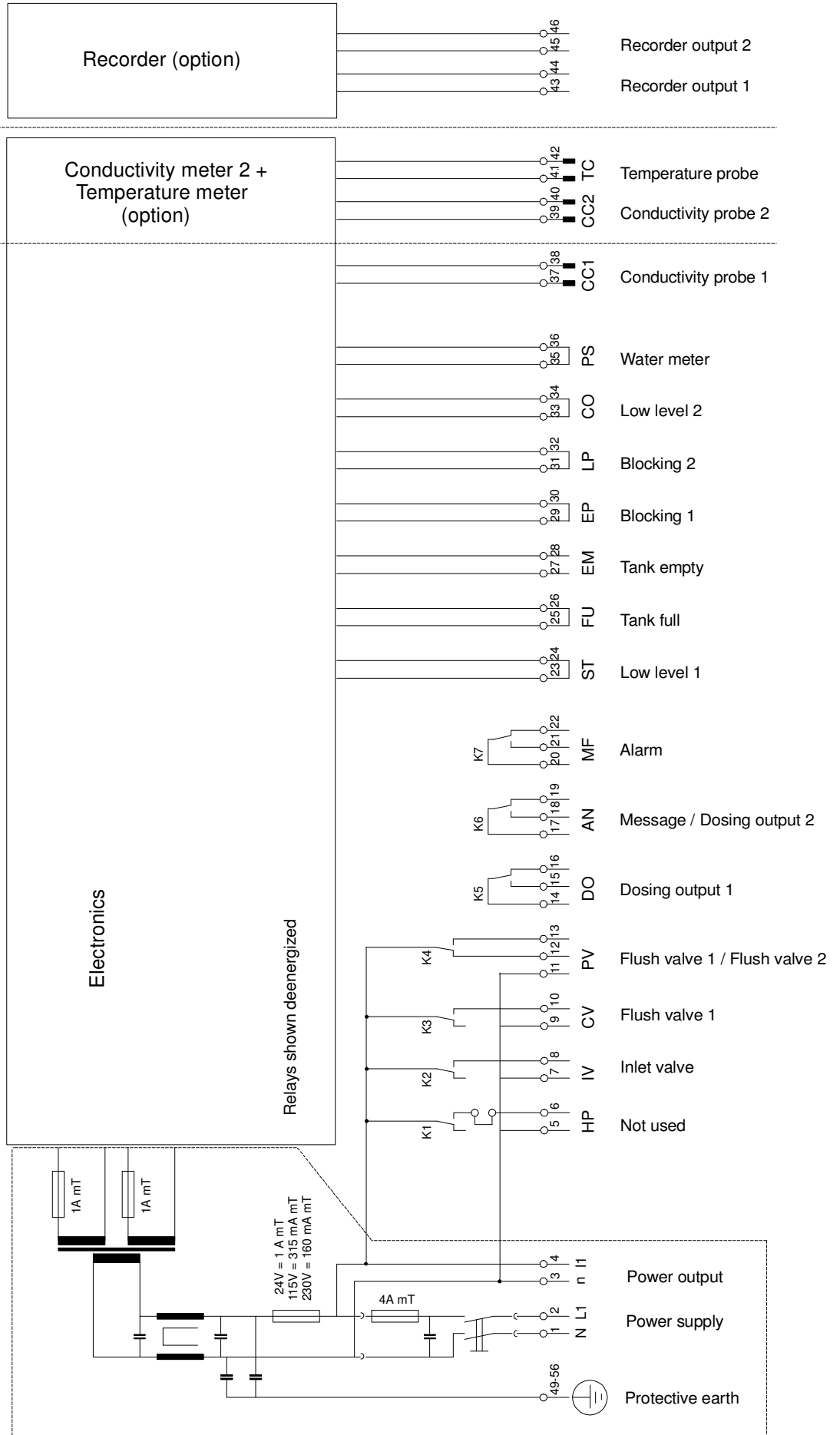
You can allocate the power range 0(4)-20mA to a range of Conductivity meter 2 between 1 – 100°C.



Connection terminals AS3050 / AS3051

AS3050 - 24 V :
Only earth terminal 49
no control lamp in the main switch

AS3051:
Only earth terminal 49





Installation and commissioning

General

Installation and commissioning of the control system may only be carried out by trained specialists who are familiar with these operating instructions and the applicable regulations on safe working practices and accident prevention. The instructions given in this manual must always be observed and followed.

To guarantee functional operation and safety, the instructions in this manual must be followed. The manufacturer accepts no liability for damage resulting from failure to follow the instructions.

Assembly

- Do not install under damp pipes. Fit shielding if necessary.
- Insert the flush-fit unit into the 186x138 panel opening and secure using the corresponding clamps and sealing ring.
- Install device at eye level and easily accessible to the user.

Connection

- Before carrying out connection work, always ensure the control unit is first disconnected from the power supply. Make sure that the power supply remains disconnected during connection work.
- Make electrical connections. Observe local regulations.
Connect supply voltage and ground to the terminals shown in the wiring diagram.
- Make sure that the ground connection is faultless.
- The front panel is connected to ground via a plug connection which must not become disconnected during operation.
- If possible, keep all extra low voltage cabling (digital inputs, measurements) separate from the power supply cable.
- It is not permitted to connect the potential-free relays with a combination of 230 VAC and extra low voltage.
- The flush-fit unit is supplied without main switch. Install this main switch in the switch cabinet yourself.
- Some external relays, magnetic switches, solenoid valves, etc. can cause unwanted interference pulses when switched off.
For this reason, it is recommended that the components mentioned should be equipped with a so-called RC network in advance.
Ask the supplier of the mentioned components for the correct type of RC network.

Maintenance

The control system does not contain any user-serviceable parts. Unauthorised modifications and/or repairs to the control unit will void all warranty claims and the manufacturer's liability.

Commissioning

- Keep front lid closed at all times
- The control system may only be switched on if it is completely closed and all connections have been made correctly.



Technical data



Mains connection :

24V	± 10%	50-60 Hz	fuse 4AT
115V	± 10%	50-60 Hz	fuse 4AT
230V	± 10%	50-60 Hz	fuse 4AT

Power consumption : 11VA

Voltage-carrying outputs : Output voltage is equal to supply voltage.
Max. total load capacity 4A

Potential-free outputs : Max. load capacity 250V, 4A

Inputs : Load capacity 9V, 8 mA

Protection class :

IP65	(AS3050)
IP42	(AS3051)

Environmental temperature : 0 – 40 °C

Weight :

Approx. 2.1 kg	(AS3050)
Approx. 1,7 kg	(AS3051)

Dimensions AS3050: W x H x D = 263 x 216 x 142 mm

Dimensions AS3051:

DIN 43 700	
Front	: 192 mm x 144 mm
Overall depth	: 122 mm
Panel opening	: 186 mm x 138 mm

Particulars : Device is protected against zero voltage



Declaration of conformity

Declaration of conformity of the product with the essential requirement of the EMC directive 89 / 336 / EEC.

Product description

Product name : Controller for cooling tower
Product type : AS3050, AS3051
Manufacturer : EWS Equipment for Water treatment Systems International B.V.
Australiëlaan 12
NL-5232 BB 's-Hertogenbosch
The Netherlands

Product environment

This product is intended for use in residential en light industrial environments.

Emission standard : EN 61000-6-3, EN 55022
Immunity standard : EN 61000-6-1, EN 61000-6-2
Low voltage directive : 2006/95/EG

Report

Report numbers : EWS / EMC / OS3050_02 (AS3050)
EWS / EMC / OS3051_02 (AS3051)

This declaration was issued by :

Date : 10-03-2020

Name : V. Naeber

Signature :



FIVE-YEAR CONTROLLER LIMITED WARRANTY

LIMITED WARRANTY

EWS International (hereafter EWS) warrants her products free from defects in material and workmanship under the following terms.

In this warranty, "Products" shall be taken to mean all devices that are supplied pursuant to the contract with exception of software.

VALIDITY OF THE WARRANTY

Labour and parts are warranted for five years from the date of the first customer purchase. This warranty is only valid for the first purchase customer.

Notwithstanding the warranty period of five years as mentioned above - while upholding the remaining provisions – a warranty period of three months applies to the supply of software.

COVER OF THE WARRANTY

Subject to the exceptions as laid down below, this warranty covers all defects in material or workmanship in the EWS products. The following are not covered by the warranty:

- 1) Any product or part not manufactured nor distributed by EWS. EWS will pass on warranty given by the actual manufacturer of products or parts that EWS uses in the product.
- 2) Any product, on which the serial number has been defaced, modified or removed.
- 3) Damage, deterioration or malfunction resulting from:
 - a) Accident, misuse, neglect, fire, water, lightning or other acts of nature.
 - b) Product modification or failure to follow instructions supplied by the products.
 - c) Repair or attempted repair by anyone not authorized by EWS.
 - d) Any shipment of the product (claims must be presented to the carrier)
 - e) Removal or installation of the product
 - f) Any other cause, which does not relate to a product defect.
 - g) Cartons, equipment enclosures, cables or accessories uses in conjunction with the product.

FINANCIAL CONSEQUENCES

EWS will only pay for labour and material expenses for covered items, proceed from repairs and updates done by EWS at the EWS location. EWS will not pay for the following:

- 1) Removal or installations charges at customers and/or end user location.
- 2) Costs for initial technical adjustments (set-up), including adjustment of user controls or programming.
- 3) Shipping charges proceed from returning goods by the customer. (Shipping charges for returning goods to the customer are for the account of EWS).

All the costs which exceed the obligations of EWS under this Warranty, such as, but not limited to, travel and accommodation costs and costs for assembly and dismantling are for the account and risk of the customer.

WARRANTY SERVICE

In order to retain the right to have a defect remedied under this warranty, the customer is obliged to:

- 1) Submit complaints about immediately obvious errors related to the products delivered, in writing within eight days of the delivery of the products and submit complaints about shortcomings relating to the products delivered, which are not visible, within eight days of their being discovered.
- 2) Return defected products for account and risk of the customer. Costs for this shipment will not be reimbursed by EWS. The products may only be returned following express, written permission from EWS. Returning the products does not affect the obligation to pay the invoiced amounts.



- 3) Present the original dated invoice (or a copy) as proof of warranty coverage, which must be included in any [of the] return shipment of the product. Please include also in any mailing a contact name, company, address and a description of the problem(s).

LIMITATION OF IMPLIED WARRANTIES

Except where such disclaimers and exclusions are specifically prohibited by applicable law, the foregoing sets forth the only warranty applicable to the product, and such warranty is given expressly and in lieu of all other warranties, express or implied, or merchantability and fitness for a particular purpose and all such implied warranties which exceed or differ from the warranty set forth herein are hereby disclaimed by EWS.

EXCLUSION OF DAMAGES

EWS' liability for any defective products is limited to the repair or replacement of the product at our option. Except where such limitations and exclusions are specifically prohibited by applicable law EWS shall not be liable for:

- 1) Damage to other property caused by defects in the EWS product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss or:
- 2) Any damages, whether incidental, [consequential or otherwise] special, indirect or consequential damages, injury to persons or property, or any other loss.

Under no circumstances whatsoever shall EWS be obliged to provide compensation beyond the direct damage incurred by customer up to an amount not exceeding the payment receivable from the insurer of EWS in connection with the damage.

APPLICABLE LAW AND DISPUTES

- 1) Dutch law shall govern all offers made by EWS and all agreements concluded between EWS and customer. This warranty explicitly excludes application of the Vienna Sales Convention (CISG).
- 2) All disputes which may arise between the parties shall be dealt with exclusively by the competent court of law in the Netherlands under whose jurisdiction EWS falls. However, EWS reserves the right to submit any disputes to the competent court in the customer's location.