
AS3020

Controller for cooling tower



Instruction manual

Software version 2.00

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General Description

The AS3020 Control System is used for the fully automatic monitoring of simple cooling tower systems.

The set values for the control system can be changed at any time; during a power cut they remain set.

The controller has four stages: "Service", "Refill ", "Flush" and "Waiting for Flush ".

The control unit monitors the conductivity of the water, and if during a given set time it should exceed a predetermined sediment level, then the flush valve will be opened.

Alarm signals can be sent if the conductivity falls below a minimum set level and / or the conductivity exceeds a maximum set level. The alarm switch will then be activated.

The alarm switch must then be reset manually.

Two level-switches can also be connected to the control unit. These control an inlet valve. This inlet valve opens when the tank is empty. Depending upon the programming (step 5.6) the flush valve can be closed or it can stay open until the tank is full again. If this happens, the system will switch to the refill stage. When the tank is full, then the inlet valve will be closed off and the conductivity will once again be controlled.

Service Stage

During "Service" the conductivity of the water is controlled.

The flush valve is closed. Depending on the level-switch, the inlet valve is either open or closed.

The following values are monitored:

- the minimum conductivity (Step 2.2 / 2.3)
- the maximum conductivity (2.4 / 2.5)
- input "tank empty"
- input "tank full"

If conductivity persists at a certain level during the set delay time, this triggers a flush, or the refill stage will be triggered if the inlet valve is open and step 5.6 is programmed to "Y".

Refill Stage

The "Refill" stage is switched to if the flush valve is blocked because the inlet valve is open.

The following values are monitored:

- the minimum conductivity (Step 2.2 / 2.3)
- the maximum conductivity (2.4 / 2.5)
- input "tank empty"
- input "tank full"

The flush valve is closed. The inlet valve is open. As soon as the inlet valve closes, depending on the conductivity level, it will switch to the "Service" or the "Flush" stage.

"Flush" Stage

During flush the conductivity of the water is controlled. The flush valve is open and the inlet valve is closed.

The following values are monitored:

- the minimum conductivity (Step 2.2 / 2.3)
- the maximum conductivity (2.4 / 2.5)
- input "tank empty"
- input "tank full"

If during the flushing stage the conductivity remains above the set limit, then it switches to "Wait for Flush" stage. As soon as the conductivity falls below the set limits, then it switches to the "Service" stage.

"Wait for Flush" Stage

During the "Wait for Flush" stage, the conductivity of the water is controlled. The flush valve and the inlet valve are closed.

The following values are monitored:

- the minimum conductivity (Step 2.2 / 2.3)
- the maximum conductivity (2.4 / 2.5)
- input "tank empty"
- input "tank full"

This stage will be switched to if the conductivity is still too high at the end of the flush stage. It will be kept at this stage until the next flush time. If the interval time runs out, then it switches to the "Flush" stage. As soon as the conductivity falls below the set limit it switches to the "Service" stage.

Value and function display

First LCD line

The current status of the system is shown in the first line of the LCD display: "Service", "Refill", "Flush" and "Waiting for Flush". A "*" at the end of the line means that the inlet valve is open. If there is an alarm situation, this will be indicated by a change in the display. 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 :

Service	
CD	40,0uS/cm

During "Service" the conductivity will be shown.

Refill	
CD	40,0uS/cm

During "Refill" the conductivity will be shown.

Flush	
Flushtime	60s

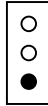
During "Flush" the remaining flush time will be shown.

Flush wait	
Interval	2m

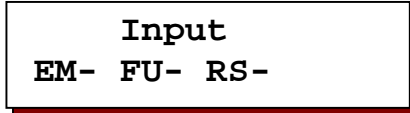
During "Waiting for Flush" the interval until the next flush will be shown.

Info display

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



Input positions



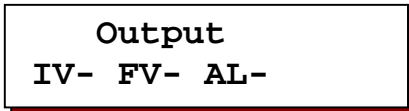
The current switch positions of the input functions are shown here.

EM = Tank empty

FU = Tank full

RS = Reset alarm

Output positions



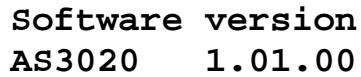
The current switch positions of the outputs IV, FV and AL are shown here.

IV = Inlet valve

FV = Flush valve

AL = Alarm

Software version

A rectangular box with a white background and a dark red border. The text inside is in a monospaced font. The first line reads "Software version" and the second line reads "AS3020 1.01.00".

Software version
AS3020 1.01.00

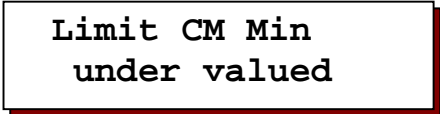
The software is regularly updated to ensure that the product complies with the latest insights and needs.

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.

Input functions

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

Tank empty / Tank full

The inlet valve can be opened and closed with the input functions "Tank Empty" and "Tank Full" .

The input function "Tank Empty" is active when the contact is closed.
The input function "Tank Full" is active when the contact is open.

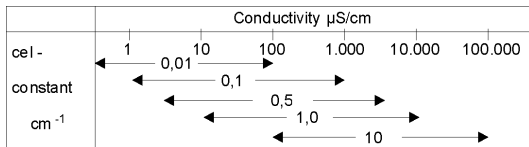
Alarm reset

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.

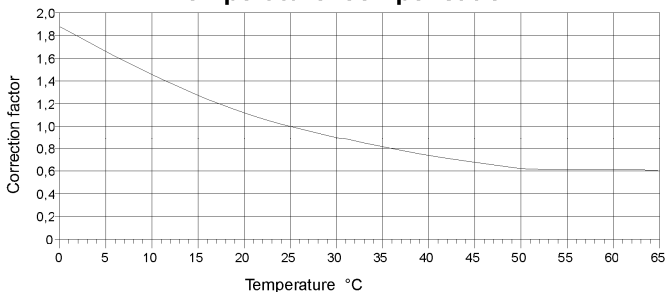


The cell constant can be programmed in step 2.1.

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:

Measured conductivity value:

Applicable correction factor:

Shown conductivity value:

$$T = 11 \text{ } ^\circ\text{C}$$

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

$$K = 1.4$$

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

Outlet Functions

The outlets' "Inlet valve" (IV on Terminal IV), "Flush Valve" (FV on Terminal PU), and Alarm (AL on Terminal AL) are usually available.

Inlet Valve

The inlet valve opens when the tank is empty. The valve closes again when the tank is full again. The valve remains closed if the water level controller is turned to between "full" and "empty".

The maximum current output of this output is 8 A (fused).

Flush Valve

The flush valve will be open if the conductivity remains above the set level for a set time.

The maximum current output of this output is 8 A (fused).

Alarm

The alarm switch can be activated by specific events, like:

- below minimum conductivity value
- above maximum conductivity value

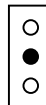
The alarm can be programmed to react to faults or not to.

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.

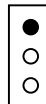
These values can be changed at any time, but will not be lost in the event of a power failure.

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.



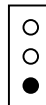
The programming mode is automatically exited approx. 2 minutes after the last key operation or by entering the indicated key combination.

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 N1 <u>E</u> F	

The language can be set in the step.

2. Conductivity meter

Step no.:	2.1
Constant	0.1 <u>0</u>

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.:	2.2
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.:	2.3
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.:	2.4
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.:	2.5
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.

3. Temperature

Step no.:	3.1
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.

4. Compensation correction factor

Step no.:	4.1
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:

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

5. Flush

Step No:	5.1
Flush	1500.0

The limits of the flush are presented here. They lie between 1.0 and 65,000,0 $\mu\text{S}/\text{cm}$. If the conductivity exceeds the set limits, the flush valves will be prompted to open.

Step No:	5.2
Hysteresis	300.0

How far the conductivity should decrease below the limit after the flush is determined by hysteresis, before the flush finishes.

Step No:	5.3
Delay	<u>30</u>s

If the conductivity level is above the programmed limit, the flush valve, in accordance with a programmed time delay of 1 – 999 seconds opens.

Step No:	5.4
Flush Time	<u>60</u>s

This shows the duration of the flush, between 0 and 999 seconds

When a value of 0 is set flushing continues until the conductivity lies below the flush limit minus the hysteresis.

Step No:	5.5
Interval	<u>1</u>m

If the flush is limited to a particular timeframe, the process may optionally be repeated automatically after a given period of delay, if the conductivity, minus hysteresis, remains above the limit after the flush. These settings must be pre-programmed.

The duration of the required time interval can be entered in programming step 5.5, and be from 1 to 99 minutes.

Step No:	5.6
Depending IV	<u>Y</u>/N

Here you can program whether the flush valve is to operate independently of the inlet valve.

If “yes“ then the flush valve must open or remain open when the inlet valve is open. If “no“ then both valves operate completely independently from each other.

6. Alarm

Step no.:	6.1
MI-MA-	

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

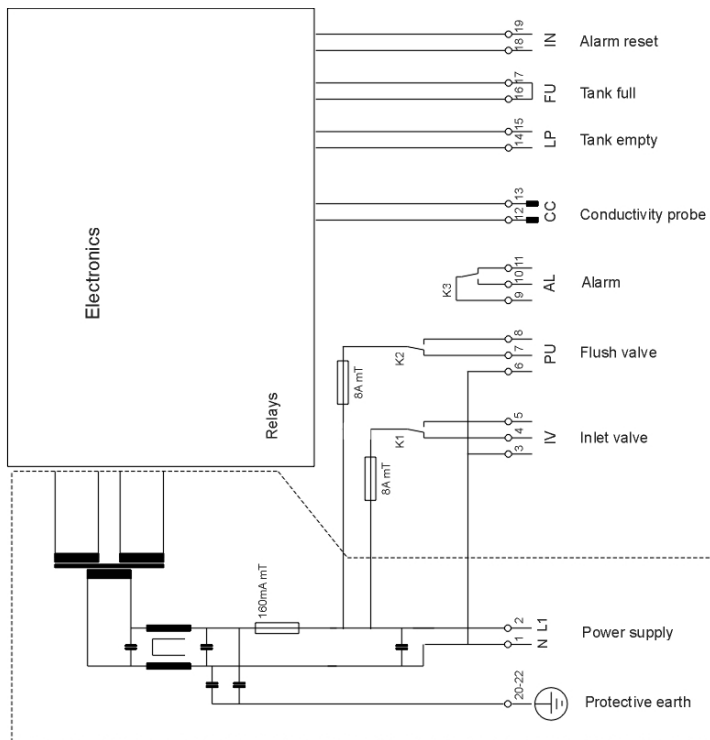
MI = minimum conductivity

MA = maximum conductivity

Step no.:	6.2
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 AS3020



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
Inlet valve:	Voltage is equal to supply voltage, 8A fuse max. current load 250V, Ohm = 8A, Inductive = 3A
Flush valve :	Voltage is equal to supply voltage, 8A fuse max. current load 250V, Ohm = 8A, Inductive = 3A
Alarm:	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

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 : AS3020
Manufacturer : EWS Equipment for Water Treatment Systems International
B.V.

Product environment

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

Emission standard : EN 55011
Immunity standard : EN 61000-6-2
Electrical Safety : EN 60204
Low voltage directive : 2006/95/EG

Report

Report number : EWS / EMC / OS3020

This declaration was issued by :

Date : 13-10-2015

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