EC3020

Controller for exchange cylinder systems

Instruction manual

Software version 2.00

Contents

General description

The EC3020 controller is used for the fully automatic monitoring and control of single or duplex cylinders for exchange cylinder systems, whereby the filter cylinders have to be regularly exchanged.

The basic controller parameters can be changed at any time; the programmed values are not lost in the event of a power failure.

The controller operates according to 7 steps, indicated as "Service Filter 1", "Standby Filter 1", "Service Filter 2", "Standby Filter 2", "No Service", "No Service 1+2" and "No Service 2+1".

The controller checks the conductivity of the water and if this exceeds a settable limit value, performs the following actions:
- In case of single filter systems, switches to "No Service".
The Service valve is closed and, once the cylinder is exchanged, the system must be switched on by hand using the external key.
- In case of duplex systems, switches to the other filter cylinder.
If the engaged filter cylinder, within a programmed period, also produces water with too high conductivity, the system is switched off.

After replacing the filter cylinders, these can be switched on by hand, using the key on the outside of the controller.

In single filter systems, the service valves of the cylinder must be connected to "SV1".

Step "Service Filter 1", "Standby filter 1"

Filter cylinder 1 produces demineralised during "Service filter 1".
As an option, it is possible to regulate the Service valve by 1 or 2 level switches.
If 1 level switch is set, the Service valve is opened after a delay, which can be programmed.
If 2 level switches are set, the Service valve is opened after a fixed delay of one second.
If the filter does not need to produce any water, the Service valve is closed and "Standby filter 1" appears in the LCD display.

The following values are monitored
- Conductivity under the minimum limit value (only if the Service valve is opened)
- The maximum conductivity limit value (from version 1.01.02 only if the service valve is opened).
- Inlet tank low level
- Inlet tank high level

Step "Service Filter 2", "Standby filter 2"

Filter cylinder 2 produces demineralised during "Service filter 2".
As an option, it is possible to regulate the service valve by 1 or 2 level switches.
If 1 level switch is set, the service valve is opened after a delay, which can be programmed.
If 2 level switches are set, the service valve is opened after a fixed delay of one second.
If the filter does not need to produce any water, the service valve is closed and "Standby filter 2" appears in the LCD display.

The following values are monitored
- Conductivity under the minimum limit value (only if the service valve is opened)
- The maximum conductivity limit value (from version 1.01.02 only if the service valve is opened).
- Inlet tank low level
- Inlet tank high level

Step "No Service"
This step only appears in single filter systems.
The system is switched off when the filter cylinder is saturated.
Once the filter cylinder is exchanged, it can be switched on by pressing the external key (press 1x).

Step "No Service 1+2"
If both filter cylinders shortly after one another produce water with too high conductivity, the system is switched off. Once the filter cylinders are exchanged, these must be switched on by pressing the external key (press 2x). Filter 1 will in this case be switched on first.

During this step, conductivity is not monitored and the service valves remain closed.

Step "No Service 2+1"
If both filter cylinders shortly after one another produce water with too high conductivity, the system is switched off. Once the filter cylinders are exchanged, these can be switched on by pressing the external key (press 2x). Filter 2 will in this case be switched on first.

During this step, conductivity is not monitored and the service valves remain closed.

Value and function display
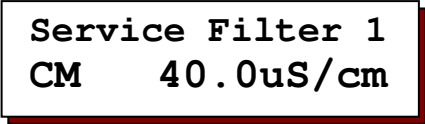
First LCD line
The current status of the system is shown in the first line of the LCD display:
"Service Filter 1", "Standby filter 1", "Service Filter 2", "Standby filter 2",
"No Service 1+2" and "No Service 2+1".
In case of an alarm situation, an alternating message appears.

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 Filter 1
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

```
      Input
   EM- FU-
```
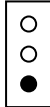
The current switch positions of the input functions are shown here.
EM = low level switch
FU = high level switch

Output positions

```
      Output
   SV1- SV2- AL-
```
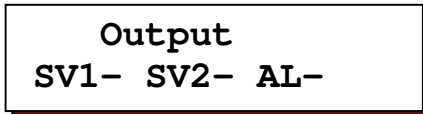
The current switch positions of the outputs SV1, SV2 and AL are shown here.
SV1 = Service valve filter 1
SV2 = Service valve filter 2
AL = Alarm
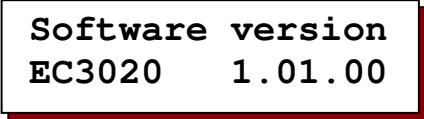
Software version

```
Software version
EC3020    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.
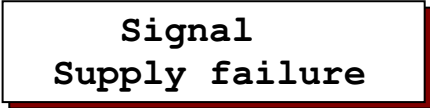
CM MIN

```
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.

Power failure

```
    Signal
 Supply failure
```

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

Exchange cylinder 1

```
Exchange
Cylinder 1
```

This message appears if filter 1 has produced water with too high conductivity and the filter cylinder needs to be exchanged.
The message is not programmable and is always transmitted to the alarm relay.

Exchange cylinder 2

```
Exchange
Cylinder 2
```

This message appears if filter 2 has produced water with too high conductivity and this filter cylinder needs to be exchanged.
The message is not programmable and is always transmitted to the alarm relay.

Exchange cylinder 1 +2

```
    Exchange
    Cylinder 1+2
```

This message appears if both filters shortly after one another produce water with
too high conductivity and the cylinders of these filters need to be exchanged. When
switching on the system by hand, filter 1 will be engaged first.
The message is not programmable and is always transmitted to the alarm relay.

Exchange cylinder 2+1

```
    Exchange
    Cylinder 2+1
```

This message appears if both filters shortly after one another produce water with
too high conductivity and the cylinders of these filters need to be exchanged. When
switching on the system by hand, filter 2 will be engaged first.
The message is not programmable and is always transmitted to the alarm relay.

Input functions

The inputs 'storage tank empty' (EM), 'storage tank full' (FU) and 'Alarm reset' (IN) are included as standard.

Tank full / Tank empty

The input functions 'Tank full' (FU) and 'Tank empty' (EM) are used for the automatic filling of a storage tank.

The use of 0, 1 or 2 level switches can be set in step 5.1.

Filling up takes place:
- always if no level switch is connected.
- subject to a programmable delay if one level switch is set.
- subject to a fixed delay of one second if two level switches are set.

The input function FU is active when the contact is open.
The input function EM is active when the contact is closed.

If the storage tank is empty, the contact of both level switches should be closed.

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.

	Conductivity µS/cm					
cel -constant cm^{-1}	1 10 100 1.000 10.000 100.000
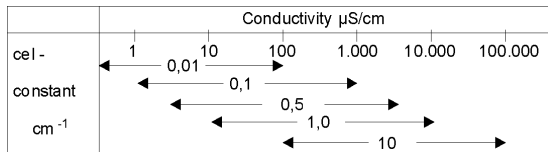
The cell constant can be programmed in step 2.1.
Also, it is possible to set the minimum and maximum limit values with a programmable delay time. Whether the alarm relay should be activated in the case of a specific message can be set in step 9.1.
It is also possible to compensate for the temperature factor in the conductivity measurement. The water temperature can be programmed in step 3.

Temperature compensation
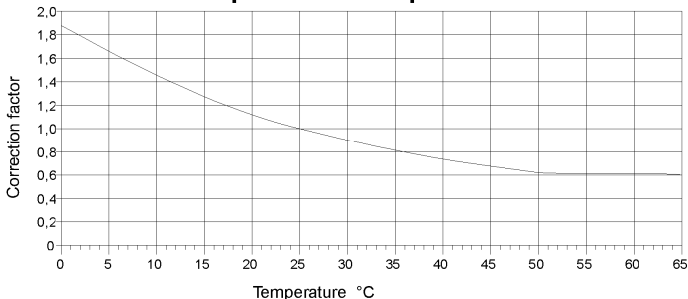
Example:
Set/measured water temperature: T = 11 °C
Measured conductivity value: C_{11} = 100 µS/cm
Applicable correction factor: K = 1.4
Shown conductivity value: C_{25} = 140 µS/cm

Output functions

The outputs 'Service valve 1' (IV), 'Service valve 2' (PU) and 'Alarm' (AL) are
included as standard.

Service valve 1
Service valve 1 is opened if the first filter is activated and, possibly dependent on
one or more level switches, demineralised water must be produced.
The maximum current load on this output is 8A (fused).

Service valve 2
Service valve 1 is opened if the second filter is activated and, possibly dependent
on one or more level switches, demineralised water must be produced.
The maximum current load on this output is 8A (fused).

Alarm
The alarm relay can be activated under certain conditions, such as:
- minimum conductivity value exceeded
- power failure
- switch to filter 1
- switch to filter 2
- system switch off

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

Changing and calling up the basic parameters

On taking the controller into operation, the operating values of the reverse osmosis system 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.
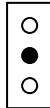
The programming mode is automatically exited approx. 2 minutes after
the last key operation or by entering the indicated key combination.

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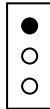
Use the bottom key to change numerical values, which you have
selected with the cursor, within the available range.
Also use this key to switch between '-' and '|' in case of option questions.
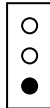
1. Language

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

The language can be set in the step.

2. Number of filters

```
Step no.:      2.1
No. of filters 2
```

Enter the number of filters installed in the system.

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    1.0
```
                                        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 µS/cm can be entered.

```
Step no.:      3.3
Delay          60s
```

After a programmed delay time of 1 to 9999 seconds, a drop below the limit value will result in the error message 'Value CD Min below the limit value' being shown in the LCD display.

```
Step no.:      3.4
Value Max   100.0
```

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 µS/cm can be entered.

```
Step no.:      3.5
Delay         180s
```

If, after a programmed delay time of 1 to 9999 seconds, the maximum conductivity value is exceeded, the system will switch to the other filter cylinder.

```
Step no.:      3.6
Delay2        180s
```

If, after switching to the other filter cylinder, the maximum conductivity is exceeded within the second programmed delay time, the system will be switched off and can only be switched on again by hand.

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:

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

6. Level switches

```
Step no.:      6.1
Level switch    1
```

Refilling of the storage tank is controlled with the aid of level switches.

Level switch = 1 :
The storage tank is immediately refilled if the level of the water drops below full. A maximum quantity is always available.

The 'IN" input can in that case be used as overpressure safeguard.

Level switch = 2 :
An alternative is to use two level switches for refill control. Here, the system is switched on and when the low level is reached and switched off when the high level is reached.
Advantage: the system is not switched on and off as often.

The 'IN" input is used for connecting the low level switch.

```
Step no.:      6.2
Delay FU       4s
```

The refill delay on the high level switch can be programmed between 1 and 99 seconds.
This step can only be programmed if 1 level switch is set.

7. Alarm

```
Step no.:      7.1
MI‾PF‾
```

In this step, you can program the events that will activate the alarm relay ("-" = not activated, "|"= activated).
MI   = minimum conductivity
PF   = power failure

```
Step no.:      7.2
Rel.energ.    Y/N
```

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

Connection terminals EC3020

Terminal	Label	Function
18 19	IN	Alarm reset
16 17	FU	Tank full
14 15	LP	Tank empty
12 13	CC	Conductivity probe
9 10 11	AL	Alarm
6 7 8	PU	Service valve 2
3 4 5	IV	Service valve 1
1 2	N L1	Power supply
20-22		Protective earth

Electronics

Relays

K3

K2   8A mT

K1   8A mT

160mA mT
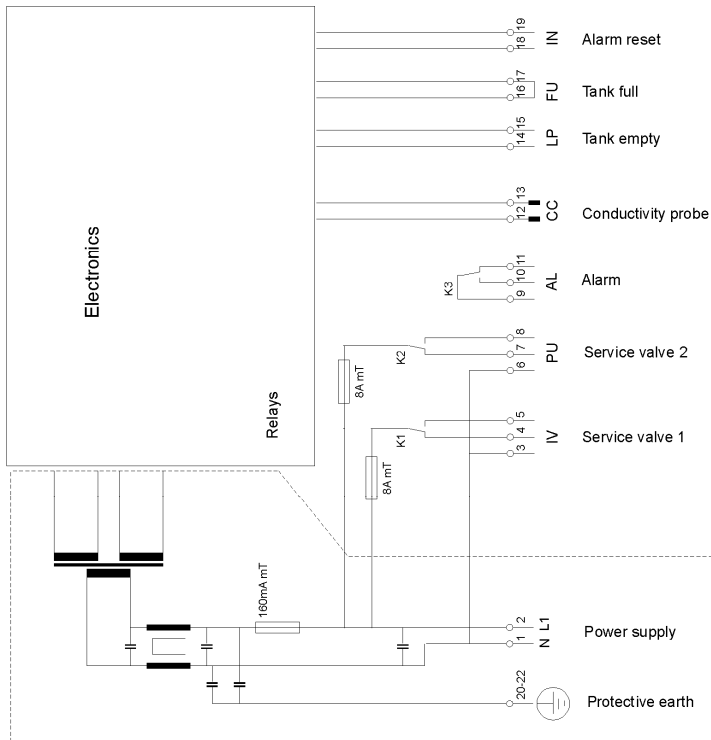
Installation and commissioning

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.
-   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.
- 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

After installation and commissioning the control system may only be switched on if
it is completely closed and all connections have been made correctly.

Technical specifications

Power connection:	230VAC, 50-60 Hz, fuse 160 mAT 115VAC, 50-60 Hz, fuse 315 mAT 24VAC, 50-60 Hz, fuse 1AT 24VDC,　　　　　　fuse 200 mAT
Power consumption:	4 VA
Service valve 1:	Voltage is equal to supply voltage, 8AT fuse
Service valve 1:	Voltage is equal to supply voltage, 8AT fuse
Alarm output:	max. current load 250V, 8A
Inputs:	loaded with 9V, 8mA
Protection class:	IP 65
Ambient temperature:	0 – 40 °C
Weight:	0,65 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 exchange cylinder systems
Product type   : EC3020
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
Immunity standard   : EN 61000-6-2
Low voltage directive : 2006/95/EG

Report

Report number   : EWS_OS3020_02

This declaration was issued by :

                   Date   : 12-03-2020
                   Name   : V. Naeber

                   Signature :

EWS

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.

EWS

FINANCIAL CONSEQUENTES

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).

EWS

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