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# OS3020

Instruction manual for reverse osmosis plants



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**Instruction manual**

Software versie 1.04

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## General description

The OS3020 operating control is used to fully automatically monitor and control very simple water treatment systems, which operate according to the reverse osmosis principle.

The basic values that have been programmed into the operating control can be changed at any moment and are not erased in case of a power failure.

The control has four switching steps, namely "PRODUCTION", "STAND-BY", "RINSE" and "INTERVAL RINSE".

## **"Production" step**

The start of the production depends on the number of programmed level switches and the position of these switches (inputs FU and EM).

In the "Production" step of the reverse osmosis system first the inlet valve is opened. After an adjustable delay time of 1 - 999 seconds the high-pressure pump is activated.

The following values are monitored:

- Conductivity below the minimum limit value
- Conductivity above the maximum limit value
- Low water pressure input
- Exceeded pressure input
- Tank high-level input
- Tank low-level input
- Stop

A built-in working hours counter registers the duration of the "PRODUCTION" step from one minute to 65.000 hours.

## **"Stand by" step**

No water flows during the "Stand by" step. The input valve is closed and the high-pressure pump is switched off.

The following values are monitored:

- Tank high-level input
- Tank low-level input

## **"Rinse" step**

The step "Rinse" will be activated (if programmed in step 10.1) after finishing the step "Production".

The concentrate valve will be opened always. The inlet valve and high pressure pump can be programmed. The high pressure pump can be switched on with a programmable delay.

The following values are monitored:

- Low water pressure input (only when inlet valve is opened)
- Exceeded pressure input
- Tank high-level input
- Tank low-level input
- Stop

## **"Interval Rinse" step**

The step "Interval Rinse" will be activated (if programmed in step 11.1) when there is no water production for a programmable time.

The concentrate valve will be opened always. The inlet valve and high pressure pump can be programmed. The high pressure pump can be switched on with a programmable delay.

The following values are monitored:

- Low water pressure input (only when inlet valve is opened)
- Exceeded pressure input
- Tank high-level input
- Tank low-level input
- Stop

## Measuring and function display

### First LCD line

The first line of the LCD display shows the actual phase of the system: "Production", "Stand-by", "Rinse" and "Int.Rinse".

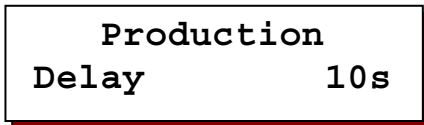
If the system has been switched off on account of an alarm situation during one of the above phases, then this is indicated by the additional text "Alarm" (eg "Rinse Alarm").

### Second LCD line

Depending on the current phase of the system, the second line of the LCD display shows measuring and operating values.

ATTENTION! If for a measuring value in the second line the message "OFL" appears, then the value to be measured lies outside the measuring range.

### Second LCD line for the "Production" step

A rectangular LCD display with a black border. The top line shows the word "Production" in a bold, monospace font. The bottom line shows the text "Delay" on the left and "10s" on the right, also in a bold, monospace font.

**Production**  
**Delay 10s**

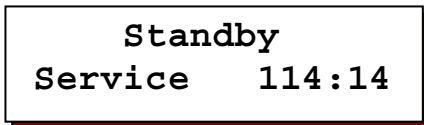
The second line of the LCD display shows the following information during the "Production" step:

At the beginning, the delay time is displayed in seconds, until the high-pressure pump is enabled, for instance "Delay 10s".

Also the value of conductivity 1 and the production hours are displayed alternately.

Conductivity	8.0 $\mu\text{S}/\text{cm}$
Service	114:14 (hours:minutes)

## Second LCD line for the "Standby" step



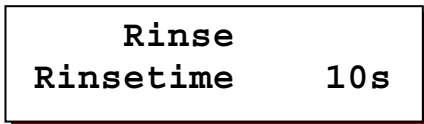
```
Standby
Service 114:14
```

The second line of the LCD display shows the following information during the "Standby" step:

Also the value of conductivity 1 and the working hours are displayed.

Conductivity	8.0 $\mu\text{S/cm}$
Service	114:14 (hours:minutes)

## Second LCD line for the "Rinse" step



```
Rinse
Rinsetime 10s
```

The second line of the LCD display shows the following information during the "Rinse" step:

At the beginning, the delay time is displayed in seconds, until the high-pressure pump is enabled, for instance "Delay 10s".

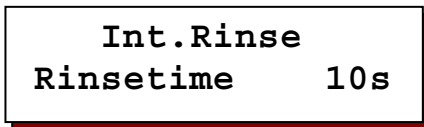
During the rinse, the remaining rinse time will be displayed.

Also the value of conductivity 1 and the production hours are displayed alternately.

Conductivity	8.0 $\mu\text{S/cm}$
Service	114:14 (hours:minutes)



## Second LCD line for the "Interval rinse" step



```
Int.Rinse
Rinsetime 10s
```

The second line of the LCD display shows the following information during the "Interval Rinse" step:

At the beginning, the delay time is displayed in seconds, until the high-pressure pump is enabled, for instance "Delay 10s".

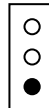
During the rinse, the remaining rinse time will be displayed.

Also the value of conductivity 1 and the production hours are displayed alternately.

Conductivity	8.0 $\mu\text{S}/\text{cm}$
Service	114:14 (hours:minutes)

## Info display

The information key can be used to retrieve various information. When you press the information key, the first information is displayed. You can obtain further information by pressing the key again.



### Input switch positions

**Input**  
**LP- FU- EM-**

Here the current switch positions of the input functions are displayed.

LP = low water pressure    FU = high-level switch

EP = exceeded pressure    EM = low-level switch

ST = stop

### Output switch positions

**Output**  
**IV- PU- AL-**

Here the current switch positions for the IV, PU and AL / CV outputs are displayed.

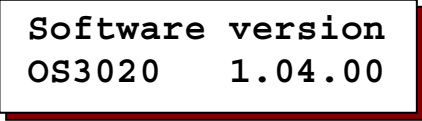
IV = Inlet valve

PU = High pressure pump

AL = Alarm

CV = Concentrate valve

## Software version

A rectangular box with a black border and a dark red shadow on the right and bottom sides. Inside the box, the text "Software version" is on the top line, and "OS3020 1.04.00" is on the bottom line.

Software version  
OS3020 1.04.00

The factory regularly updates the software. Changes are made as necessary to adapt the product to the latest insights and requirements. Displayed is the number of the built-in version.

## Alarms

Here you will find an overview of the alarm messages that can appear in the display. When a service number is programmed (step 9.3 and 9.4) then the right display will appear otherwise the left display will appear.

### CD MIN

**Limit CM Min  
under valued**

**CM to low  
0031 73 443755**

The conductivity value on the conductivity meter has fallen below the set minimum limit value. The system remains switched on. The message disappears as soon as the minimum limit value is again exceeded. The alarm relay can be activated.

### CD MAX

**Limit CD Max  
exceeded**

**CM to high  
0031 73 443755**

The conductivity value on the conductivity meter has exceeded the set maximum limit value. The system remains switched on. The message disappears as soon as the maximum limit value again falls below the set limit value. The alarm relay can be activated.

**CM Max                    19s**  
**exceeded**

**CM to high    19s**  
**0031 73 443755**

This message will appear when the plant has to be switch off when the conductivity is too high. In the right upper corner the remaining time will be shown until the plant will be stopped. When the conductivity is correct within this time the plant will not be stopped and the message will disappear automatically.

**Stop**  
**CM Max**

**CM to high STOP**  
**0031 73 443755**

When the plant is stopped you will find this message in the display. The plant can be start again by switching off and on again the controller.

### **Exceeded pressure**

**Signal**  
**Overpressure**

The "excess pressure" input has been activated. The system is switched off and automatically switched on again after a programmed delay time.  
Possible cause: set value for the system was changed, soiled membrane.

## Low water pressure

**Signal**  
**Low pressure**

The "Low pre-pressure" input has been activated.

The system is switched off and automatically switched on again after a programmed delay time.

The message disappears as soon as the "low pre-pressure" signal has been cancelled.

Possible cause: no water pressure

## Stop

**Signal**  
**Stop**

The "Stop" input has been activated.

The system is switched off and switched on again when the signal at the input has been cancelled.

The message disappears as soon as the "low pre-pressure" signal is cancelled.

## Input functions

The 'Low water pressure' (LP) and 'Tank full' (FU) inputs are standard available.

The third IN input depends on the programming :

- 'Tank empty'                   for two level switches
- 'Exceeded pressure'       for one level switch
- 'Stop'                         for one level switch

### Low water pressure

The 'Low water pressure' (LP) input is used to prevent the pump from running dry.

In step 6.1 you can program the delay before the system is switched off. The LCD display shows the message 'Low water pressure' and in step 7.1 you can set whether the alarm relay must be activated for this message.

The system switches on again automatically after the delay programmed in step 6.3.

The input function is active when the contact is open.

### Tank full / Tank empty

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

In step 5.1 you can select whether one or two level switches are used.

If you only use one level switch, then the 'IN' input is used for excess pressure safety.

Replenishing takes place after a programmable delay.

You can program if the level switch inputs are activated on open or close contact.

## **Exceeded pressure**

The 'Exceeded pressure' (EP) input function can only be used if only one level switch is used.

In step 6.2 you can program the delay before the system is switched off. The LCD display shows the message 'Exceeded pressure' and in step 7.1 you can set whether the alarm relay must be activated for this message.

The system switches on again automatically after the delay programmed in step 6.3.

## **Stop**

The 'Stop' (ST) input function can only be used if only one level switch is used.

In step 6.3 you can program the delay before the system is switched off. The LCD display shows the message 'Stop' and in step 7.1 you can set whether the alarm relay must be activated for this message.

In step 6.6 you can program whether the function is activated when the contact is closed or opened.

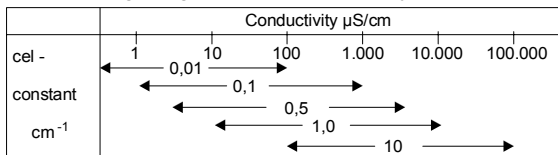
The system switches on again automatically when the input is no longer active.



## Conductivity probe

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

The measuring range for the conductivity probe depends on the cell constant.

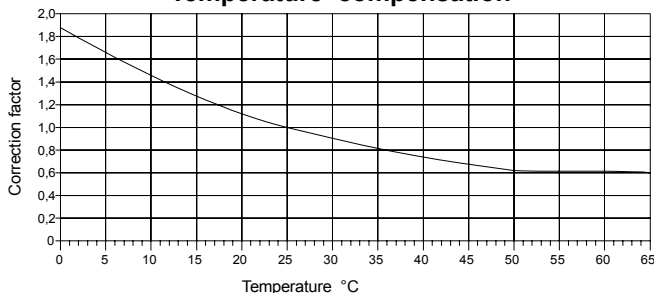


The cell constant must be programmed in step 2.1. You can also set the minimum and maximum limit value with a programmable delay time.

In step 7.1 you can set whether the alarm relay must be activated for the message.

You can compensate the conductivity measurement for temperature. The water temperature must be programmed in step 3.

### Temperature compensation



Example:

Set, respectively measured water temperature:

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

Measured conductivity values:

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

Applied correction factor:

$$K = 1,4$$

Displayed conductivity value:

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

## Output functions

The output functions 'Inlet valve' (IV) and 'High-pressure pump' (PU) are standard available.

The output functions 'Alarm' (AL) and 'Concentrate valve' (CV) can be selected for the third relay output (terminals 9,10 and 11).

### **Inlet valve**

The input valve is opened as soon as the 'Production' step, "Rinse" step (if programmed) or "Int.Rinse" step (if programmed) is activated.

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

### **High-pressure pump**

The high-pressure pump is activated after the input valve has been opened with a delay time programmed in step 8.1.

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

### **Alarm**

The alarm relay can be activated for certain events like:

- minimum conductivity value exceeded
- maximum conductivity value exceeded
- low water pressure
- exceeded pressure
- stop

You can program whether or not the alarm relay must be energised in case of malfunction.

### **Concentrate valve**

The concentrate valve is only opened during the rinse functions.

## Display and modification of set points

When the system is put into operation, the operational data of the reverse osmosis system can be controlled by entering basic values.

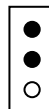
You can change these values at any time and they are not erased in case of a power failure.

To prevent unwanted changes in the programme, you must keep the key depressed for four seconds before the system allows you to make changes

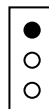
With the same key you can then browse through the programming.



You leave the programming mode automatically about two minutes after the last keystroke or by pressing the key combination as shown.

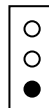


With the upper key you can move the cursor.



By pressing the lower key you can change numeric values within the given range that you have first marked with the cursor.

For questions with a choice, you can also use this key to switch between ‘-’ en ‘|’.



## 1. Language

Step no.:	1.1
D N1 <u>E</u> F	

In this step you can set the language.

## 2. Conductivity meter

Step no.:	2.1
Constant	0,1 <u>0</u>

You must select a measuring cell with an adjusted cell constant in accordance with the conductivity of the water. Here you can program a cell constant between 0.01 and 10.00  $\text{cm}^{-1}$  for the conductivity meter.

Step no.:	2.2
Value Min	1, <u>0</u>

An electrical interruption of the measuring cell, electrical errors in the system or air in the measuring cell can produce a seemingly very low conductivity. For monitoring purposes you can enter a limit value between 0.0 and 999  $\mu\text{S}/\text{cm}$ .

<b>Step no.:</b>	<b>2.3</b>
<b>Delay</b>	<b>6<u>0</u>s</b>

If after a programmed delay time between 1 and 9999 seconds the lower limit of the limit value is exceeded the LCD display shows the error message 'Limit CD Min below limit value'.

<b>Step no.:</b>	<b>2.4</b>
<b>Value Max</b>	<b>100,<u>0</u></b>

A change in the quality of the water supply may change the water conductivity. For monitoring purposes you can enter a limit value between 0.2 and 6500.0  $\mu\text{S/cm}$ .

<b>Step no.:</b>	<b>2.5</b>
<b>Delay</b>	<b>18<u>0</u>s</b>

If after a programmed delay time between 1 and 9999 seconds the value of the upper limit is exceeded, the LCD display shows the error message 'Limit CD Max exceeded'.

<b>Step no.:</b>	<b>2.6</b>
<b>Switch off</b>	<b>Y/<u>N</u></b>

Here you can program if the plant has to be switched off when the conductivity is too high for the programmed delay. You can switch on the plant by switching off and on the controller.

### 3. Temperature

Step no.:	3.1
Temperature	2 <u>5</u> °C

By entering the water temperature you can compensate the displayed conductivity value in accordance with the current temperature.

The conductivity measurement relates to a water temperature of 25 °C.

Deviating temperatures can be compensated for manually.

### 4. Conductivity correction factor

Step no.:	4.1
Factor	1, <u>00</u> *

Other measuring errors, for instance as a result of polarisation or cable capacities, can be compensated for here by entering a correction factor - at least for a certain range.

Here you can enter a correction factor for conductivity between 0.10 and 5.0.

Take a water sample and measure the conductivity with an accurate conductivity meter: calibration value. As a measuring value, note the read-out of the control.

You can then calculate the correction factor that must be entered as follows:

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

## 5. Level switches

<b>Step no.:</b>	<b>5.1</b>
<b>Level switch</b>	<b><u>1</u></b>

The storage tank is replenished via level switches.

### Level switch = 1 :

The storage tank is replenished immediately when the water level falls below the full level. There is always a maximum volume available.

The 'IN' input can then be used for an excess pressure safety.

### Level switch = 2 :

Alternatively, the system can be filled via two level switches. In that case the system is switched on when the low level is reached and switched off again when the high level is reached. Advantage: the system is switched on and off less frequently.

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

<b>Step no.:</b>	<b>5.2</b>
<b>Delay FU</b>	<b><u>4s</u></b>

The switch-on delay for the high level switch can be programmed from 1 to 99 seconds. This step is only available when programmed for one level switch.

<b>Step no.:</b>	<b>5.3</b>
<b>FU-EM  </b>	

“|” Function is activated when contact is closed (NO).

“-“ Function is activated when contact is open (NC).

## 6. Input functions

### Delay for the 'Low water pressure' input function

Step no.:	6.1
Delay LP	<u>10</u> s

The delay for the low water pressure message can be programmed between 0 and 999 seconds.

### Selecting the input function for input IN

Step nr.:	6.2
<u>EP</u> ST	

Select your choice of input function for input IN. (EP= Exceeded pressure, ST=Stop)  
Not programmable if two level switches are programmed.

### Delay for the 'Exceeded pressure' input function

Step no.:	6.3
Delay EP	<u>2</u> s

The delay for the exceeded pressure message can be programmed between 0 and 999 seconds.

This step is skipped if two level switches have been programmed.



**Delay for the 'Stop' input function**

<b>Step no.:</b>	<b>6.4</b>
<b>Delay ST</b>	<b><u>4</u>s</b>

The delay for the stop message can be programmed between 0 and 999 seconds. This step is skipped if two level switches have been programmed.

**Automatic switch-on**

<b>Step no.:</b>	<b>6.5</b>
<b>Switch on</b>	<b><u>60</u>s</b>

Here you can program a delay between 1 and 999 seconds for the automatic switching on of the system after failure as a result of low water pressure or exceeded pressure.

<b>Step no.:</b>	<b>6.6</b>
<b>ST-</b>	

“|” Function is activated when contact is closed (NO).

“-” Function is activated when contact is open (NC).

## 7. Selection of output functions

Step no.:	7.1
<u>A</u> L	CV

Select the output function for relay output 3 (terminals 9, 10 and 11).

AL = Alarm

CV = Concentrate valve

When the function 'CV' is selected, the alarm function will not be available.

## 8. High-pressure pump delay

Step no.:	8.1
Pump delay	1 <u>5</u> s

To prevent water shock on switching on, in the 'Decrease' step first the input valve is opened and after the delay time (0-999 sec.) the high-pressure pump is activated.

## 9. Alarm

**Step no.:** 9.1  
**MI-MA-LP-EP-ST-**

In this step you can program for which events the alarm relay must be activated.  
 (" = not activated, "I" = activated).

*MI* = Minimum conductivity

*MA* = Maximum conductivity

*LP* = Low water pressure

*EP* = Exceeded pressure

*ST* = Stop

**Step no.:** 9.2  
**Rel.energ.** Y/N

Here you can program whether the alarm relay must be enabled (Yes) or not (No) in case of malfunction.

**Step no.:** 9.3  
**Service Nr.** Y/N

Here you can program if you want to display a service number together with an alarm message.

**Step no.:** 9.4  
0031 73 443755

Program the service number.

## 10. Rinse after production

```
Step no.: 10.1  
Rinse-StandbyY/N
```

Program whether the function “rinse after production” has to be activated.

```
Step no.: 10.2  
Rinsetime 300s
```

Set a rinse time of 1 – 9999 seconds.

```
Step no.: 10.3  
IV|PU|
```

Program whether inlet valve has to be opened (“|”) or closed (“-”) and high pressure pump has to be activated (“|”) or not activated (“-”) during the rinse cycle.

IV = Inlet valve

PU| = High pressure pump

## 11. Interval rinse

<b>Step no.:</b>	<b>11.1</b>
<b>Interval</b>	<b>Y/<u>N</u></b>

Program whether the function “rinse after production” has to be activated.

<b>Step no.:</b>	<b>11.2</b>
<b>Distance</b>	<b>2<u>4</u>h</b>

Set the time lapse between the last production or rinse phase and switch over to this rinse function. A distance of between 1 and 999 hours can be programmed.

<b>Step no.:</b>	<b>11.3</b>
<b>Rinsetime</b>	<b>3<u>0</u>0s</b>

Set a rinse time of 1 – 9999 seconds.

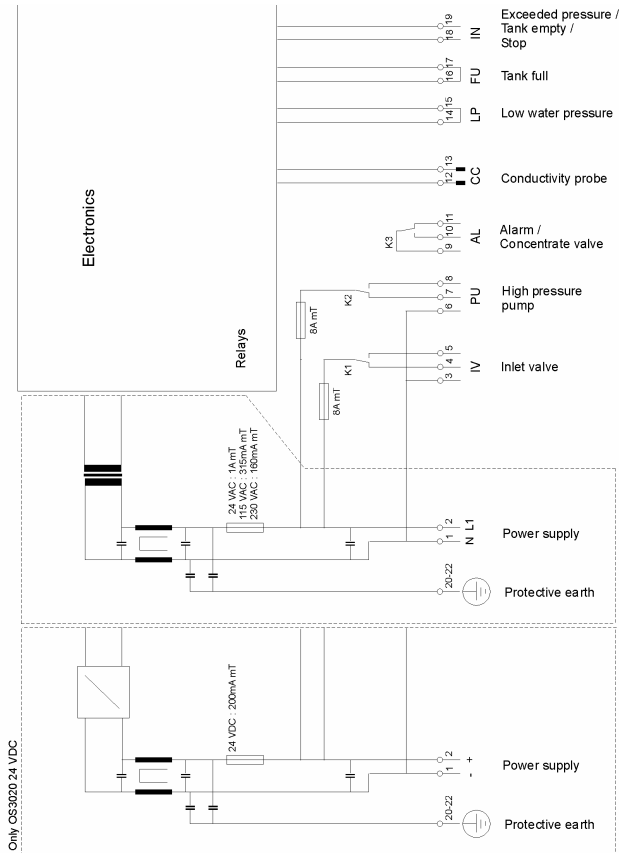
<b>Step no.:</b>	<b>11.4</b>
<b>IV <u>P</u>U </b>	

Program whether inlet valve has to be opened (“|”) or closed (“-”) and high pressure pump has to be activated (“|”) or not activated (“-”) during the rinse cycle.

IV = Inlet valve

PU| = High pressure pump

# Connection terminals OS3020



## Technical data

<b>Mains connection :</b>	230VAC, 50-60 Hz, 160 mA fuse 115VAC, 50-60 Hz, 315 mA fuse 24VAC, 50-60 Hz, 1AT fuse 24VDC, , 200 mA fuse
<b>Power consumption :</b>	4 VA
<b>Inlet valve :</b>	Voltage is equal to supply voltage, 8AT fuse
<b>High-pressure pump :</b>	Voltage is equal to supply voltage, 8AT fuse
<b>Alarm output:</b>	max. load 250V, 8A
<b>Inputs :</b>	loaded with 9V, 8mA
<b>Protection class :</b>	IP 65
<b>Ambient temperature:</b>	0 – 50 °C
<b>Weight :</b>	2 kg
<b>Dimensions :</b>	122 x 120 x 57 mm
<b>Particulars :</b>	Device 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 reverse osmosis systems  
Product type : OS3020  
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 50081-1  
Immunity standard : EN 50082-1

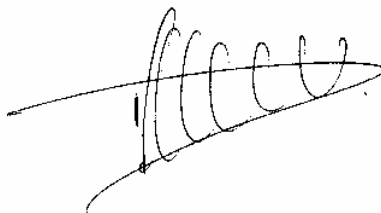
### Report

Report number : EWS / EMC0307

### This declaration was issued by :

Date : 09-07-2003  
Name : D.H. Naeber

Signature

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke, positioned to the right of the 'Signature' label.





## **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 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).



## **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.