



READ AND SAVE THESE INSTRUCTIONS

SERVICE MANUAL

Steam humidifier Condair **RS II**

For internal use only!



Humidification, Dehumidification and Evaporative Cooling

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The present service manual is meant for the trained Condair service technician and assumes a profound knowledge on the Condair RS. It is also assumed that the Service technician has notice of the installation manual and operation manual of the Condair RS and that he is familiar with the dangers when working on the unit.

The present service manual includes the following information:

- Description of the settings in the factory level of the Condair RS control.
- Information on operational malfunctions
- Notes on unit components and functions

Symbols used in this manual



The catchword "CAUTION" used in conjunction with the general caution symbol designates notes in this service manual that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.



The catchword "WARNING" used in conjunction with the general caution symbol designates safety and danger notes in this service manual that, if neglected, may cause to **injury to persons**.



The catchword "DANGER" used in conjunction with the general caution symbol designates safety and danger notes in this service manual that, if neglected, may lead to **severe injury or even death of persons**.

General

The service technician working with the Condair RS must have read and understood the present service manual as well as the installation manual and the operation manual of the Condair RS before carrying out any work.

Knowing and understanding the contents of the service manual as well as the installation manual and the operation manual of the Condair RS is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

Qualification of personnel

All work described in this service manual **must only be carried out by trained Condair service tech-nicians**.

It is assumed that the service technicians working with the Condair RS are familiar and comply with the appropriate regulations on work safety and the prevention of accidents.

Danger that may arise from the Condair RS steam humidifier



Danger of electric hazard!

The Condair RS is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or danger to life.

Prevention: Before carrying out any work set the Condair RS out of operation (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.

WARNING!

Hot water vapour - Danger of scalding!

The Condair RS produces hot water vapour. There is danger of scalding when coming in contact with hot water vapour.

Prevention: Do not carry out any work on the steam system during operation (steam lines, steam distributor, blower pack, etc.). If the steam system is leaky set the Condair RS immediately out of operation (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up. Correctly seal the steam system before putting the unit into operation again.



During operation the components of the steam system (steam cylinder, steam distributor, etc.) get very hot (up to 100 °C). There is danger of burning when touching the hot components.

Prevention: Before carrying out any work on the steam system set the Condair RS out of operation (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up. Then, wait until the components have cooled down sufficiently thus preventing danger of burning.

3 Service settings

With the service password "**0948**" you may access the service settings in the "General", "Maintenenace", Hardware Options" and "Engineering" submenus.

3.1 Settings in the "Engineering" submenu

Select the "Engineering" submenu as shown below.



Note: If the user password is deactivated or if you want to log in with a password from a different access level, press the menu button for approx. 3 seconds until the password entry window appears.

3.1.1 Settings in the "Operating Mode" submenu



Brand [5116]: With this setting you determine the brand name of the steam humidifier.

Factory setting: Country-specific Options: Condair CE (European version) Condair UL (UL version) Condair Spa (Spa version)

Attention: When you change the brand, the associated passwords are also changed!

RS Type [5167]: With this setting you determine the unit type.

 Factory setting:
 Standard

 Options:
 Standard (Unit with standard control accuracy) or

 Option P (Unit with high control accuracy)

RO Type [5157]: With this setting you determine whether the Condair RS is operated together with a Condair RO-E ("RO-E") or RO-E+ ("RO-E+") pure water system or not ("No").

Factory setting:

Options:

No

Yes

No (Operation without RO-E(+) pure water system), **RO-E** (Operation with Condair RO-E pure water system) or

RO-E+ (Operation with Condair RO-E(+) pure water system)

- **RFI Typ [47]**: With this setting you determine whether the remote operating and fault indication board is installed or not.

Factory setting: Options:

 \mathbf{No} (remote operating and fault indication board is not installed) or

Yes (remote operating and fault indication board is installed)

Nominal Voltage [5123]: With this setting you determine the heating voltage of the of the steam humidifier.

Factory setting:400VOptions:200V,

200V, 208V, 230V, 240V, 380V, 400V, 415V, 440V, 460V, 480V, 500V, 550V, 600V

 Max. Hum. Capacity [5124]: With this setting you determine the maximum steam capacity of the steam humidifier.

Factory setting:	5kg/10lbs
Options:	5kg/10lbs, 8kg/15lbs, 10kg/20lbs, 16kg/30lbs, 20kg/45lbs, 24kg/53lbs, 30kg/65lbs, 40kg/90lbs,
	50kg/110lbs, 60kg/130lbs, 70kg/150lbs,
	80kg/180lbs

- **Flicker Correction** [15046]: With this setting you determine the correction factor for compliance with the flicker regulations.

Important: The flicker regulations are only complied with if the "Consider Flicker Rule" function has been activated ("On") in the "Features > Operation" submenu in the user level is set to "On" and the "Flicker Correction" is set to ≥ 2.0 .

Factory setting:2.0Setting range:0.1 ... 4.0

 Evaporation Correction [15109]: With this setting you determine a factor to multiply the minimal demand threshold of the evaporation monitoring. See also fault description "E121" in <u>Section 4.35</u>.

Factory setting:2.0Setting range:1.0 ... 5.0

Off

 Unit stop: Fill time E38 [5134]: With this setting you determine whether the steam humidifier should be blocked after the max. filling time is exceeded ("On") or if it should keep trying to recover ("Off").

Factory setting:

Setting range:

On (Unit stop activated when filling time is exceeded)

Off (Unit stop deactivated when filling time is exceeded)

3.1.2 Settings in the "Countdown" submenu



 Time [10062]: With this setting you determine the countdown time in days. Note: After this time has elapsed the humidifier is stopped when the countdown is activated and can only be unlocked by the assigned code. Factory setting 30 d

Options: 1 ...120 d

 Activate: With this setting you can activate the countdown function. If the countdown function is activated, you have to enter a four digits code. With that code you can unlock the Condair RS after the countdown has elapsed and the error message "E15 - Program Fault" is shown.



Note the entered code. If the code gets lost you are not able to unlock the Condair RS anymore.

3.1.3 Settings in the "Reset Configuration" submenu



Save Settings [30023]: With this function you save the current parameter setting in the internal memory. The saved parameter settings can be restored under "Menu > Password: 0948 > Maintenance > Reset > Reset Settings".

Note: This function should be carried out after the initial commissioning so that the parameter settings can be restored again if necessary.

3.1.4 Settings in the "Serial Number" submenu



 Serial Number [10046]: With this function you can enter the serial number (seven-digit number) if it has been deleted due to a controller crash. Note: The serial number of the Condair RS can be found on the rating plate on the left side of the unit.

3.2 Settings in the "Hardware Options" submenu

Select the "Hardware Options" submenu as shown below.



Note: If the user password is deactivated or if you want to log in with a password from a different access level, press the menu button for approx. 3 seconds until the password entry window appears.

Note: Additional installation instructions are available separately for all options!

3.2.1 Settings in the "Drain Options" submenu



 Option Drain Cool [5162]: With this setting you can activate ("On") or deactivate ("Off") the software function for the optional drain cooling if the Condair RS is equipped with the optional drain cooling.

Factory setting: Off Options: On (drain cooling activated) or Off (drain cooling deactivated)

Off

 Option Complete Drain [5163]: With this setting you can activate ("On") or deactivate ("Off") the software function for the optional scale collector tank drain valve for draining the scale collector tank.

Factory setting: Options:

On (optional scale collector tank drain valve activated) or **Off** (optional scale collector tank drain valve activated

Off (optional scale collector tank drain valve activated)

3.2.2 Settings in the "Ext. Pipe Flush" submenu



 Option [5135]: With this setting you activate ("On") or deactivate ("Off") the software function for the external pipe flush if the Condair RS is equipped with the external pipe flush option.

Off

Factory setting: Options:

On (Ext. pipe flush activated) or **Off** (Ext. pipe flush deactivated)

3.2.3 Settings in the "Digital Input J8" submenu



 Digital Input J8 [5130]: With this setting you determine whether the digital signal input J8 is deactivated ("Off) or whether it shall be used for leakage monitoring ("Leakage Sensor") or for the external triggering of a drain cycle ("External Drain").

Note: if the digital signal input J8 is set to "Leakage Sensor" a leakage alarm is triggered, if the contact opens. If the digital signal input J8 is set to "External Drain" a drain cycle is triggered, if the contact is closed.

Factory setting:

Off

Options:

Off (the digital signal input J8 deactivated) or **Leakage Sensor** (the digital signal input J8 is used for leakage monitoring) or

External Drain (the digital signal input J8 is used for external triggering of a drain cycle)

3.2.4 Settings in the "Remote Display" submenu



Remote Display [149]: With this setting you determine whether your system is equipped with a Condair remote control unit or not ("Off"). If your system is equipped with a Condair remote control unit, the setting "Peripheral" must be selected in the control software of the Condair remote control unit and the setting "Host" must be selected in the control software of the control software of the main unit.

Factory setting: Options: Off

Off (System without Condair remote control unit), **Peripheral** (Setting in the control software of the Condair remote control unit) or

Host (Setting in the control software of the main device)

3.3 Functions and settings in the "General" submenu

Select the "General" submenu as shown below.



Note: If the user password is deactivated or if you want to log in with a password from a different access level, press the menu button for approx. 3 seconds until the password entry window appears.

3.3.1 Functions in the "Backup" submenu



 Export Parameters to USB [30001]: With this function you can export the parameter settings to a USB memory stick.
 Note: Before you carry out this function, you must insert a FAT32 format-

Note: The description of the other parameters in the "Backup" submenu can be found in the Condair RS operating instructions.

ted USB stick into the USB interface on the control board.

3.3.2 Functions and settings in the "Contact Data" submenu

In this submenu you define the contact data that is displayed in the help menu.



- Company Name [20003]: With this setting you determine the company name.
- Address [20001]: With this setting you determine the first address line (e.g. street).
- Address [20002]: With this setting you determine the second address line (e.g. postal code and city).
- **Telephone Number [20005]**: With this setting you determine the phone number (recommendation use international format).
- Email [20004]: With this setting you determine the e-mail address.
- **Website** *[20006]*: With this setting you determine the website address of the company home page.
- Load Contact Data [30013]: With this function you can load a "contact data file" (ContactInfo.json) from a USB stick.

Before you run this function:

 Open the "ContactInfo.json" file in a text editor (see below) and enter the appropriate contact information between the quotes.
 Important: Don't delete quotes and commas in the file. This makes it unusable.

{		
	"Content":	"IC2 Contact-Info",
	"Company":	"Condair Group AG",
	"Address1":	"Gwattstrasse 17",
	"Address2":	"",
	"Telephone":	"+41 55 416 61 11" ,
	"Email":	"Info@condair.com",
	"WebSite":	"www.condair.com"
}		

- Then save the "ContactInfo.json" file on a FAT32 formatted USB stick at the top level (no subfolder).
- Insert the USB stick with the "ContactInfo.json" file into the USB interface on the control board and start the "Load Contact Data" function. You will then be guided through the loading process.

3.4 Functions and settings in the "Maintenance" submenu

Select the "Maintenance" submenu as shown below.



Note: If the user password is deactivated or if you want to log in with a password from a different access level, press the menu button for approx. 3 seconds until the password entry window appears.

3.4.1 Settings in the "Water Management" submenu



Inlet Correction [15024]: With this setting you determine the cycle ratio of the inlet valve in % of the standard setting value to balance out water pressure variations.
 Note: This menu item appears only with option "P" units with high control accuracy.

Factory setting:	100 %
Setting range:	50 150 %

Note: The description of the other parameters in the "Water Management" submenu can be found in the Condair RS operating instructions.

3.4.2 Functions in the "Histories" submenu



- Clear Error/Warning History [30003]: With this function, you can clear the error and warning history list. After pressing the selection field, a confirmation dialog appears in which you have to confirm the deletion again.
- Clear Maintenance History [30004]: With this function, you can clear the maintenance history list. After pressing the selection field, a confirmation dialog appears in which you have to confirm the deletion again.
- Export Settings History [30009]: With this function you can export the settings history list as a .csv file on a FAT32 formatted USB memory stick connected to the USB interface on the control board.

Note: The description of the other parameters in the "Histories" submenu can be found in the Condair RS operating instructions.

3.4.3 Functions in the "Diagnostics" submenu



- Manual Demand: A manual demand can be generated.
- Input Diagnostics Cyl. A: Values of the input parameters for steam cylinder A can be checked.

Note: The description of the parameters in the "Input Diagnostics Cyl. A" submenu can be found in the Condair RS operating instructions.

- Input Diagnostics Cyl. B: Values of the input parameters for steam cylinder B can be checked.
 Note: The menu item "Output Diagnostics Cyl. B" only appears on large units and double units with two steam cylinders.
 Note: The description of the parameters in the "Input Diagnostics Cyl. B" submenu can be found in the Condair RS operating instructions.
- Output Diagnostics Cyl. A: Signal outputs of steam cylinder A can be controlled manually.
- Output Diagnostics Cyl. B: Signal outputs of steam cylinder B can be controlled manually.

Note: The menu item "Output Diagnostics Cyl. B" only appears on large units and double units with two steam cylinders.

 RFI Diagnostics: The relays of the remote operating and fault indication board can be controlled manually.
 Note: This menu item is only visible if the remote operating and fault indication board has been installed and activated under "Menu > Password: 0948 > Engineering > Operating Mode> RFI Type".

3.4.3.1 Setting and display values in the "Manual Demand" submenu



Demand [15107]: With this setting you generate a demand to the system for test purposes.

Note: The system starts humidification as if a corresponding analog demand signal were applied to the "IN" and "GND" terminals of the terminal block "X8" on the Condair RS driver board.

Factory setting0 %Setting range:0 ... 100 %

- Actual Hum. Capacity Cyl. A: Shows the current humidification capacity of steam cylinder A in kg/hr.
- Actual Hum. Capacity Cyl. B: Shows the current humidification capacity of steam cylinder B in kg/hr.

Note: The current humidification capacity of steam cylinder B only appears for large units and double units with two steam cylinders.

- Heat Group 1/1 Cyl. A to Heat Group 3/1 Cyl. A: Shows the current output of the corresponding heat group of steam cylinder A in % of the maximum output.
- Heat Group 1/1 Cyl. B to Heat Group 3/1 Cyl. B: Shows the current output of the corresponding heat group of steam cylinder B in % of the maximum output.

Note: The heat groups for steam cylinder B only appear on large units and double units with two steam cylinders.

3.4.3.2 Functions in the "Output Diagnostics Cyl. A" submenu



- Control CH1 Select [5043]: With this function you can switch the humidity or demand signal between voltage and current signal.
- Control CH2 Select [5045]: With this function you can switch the humidity or demand signal of the supply air limiter between voltage and current signal.
- Main Contactor [5047]: With this function you can switch on and off the main contactor.
- AC Relay Drain Pump [5049]: With this function you can switch on and off the relay for the voltage supply of the drain pump.
- Relay Heat Group 2/1 [5051]: With this function you can switch on and off the contactor for heat group 2/1.
- Relay Heat Group 3/1 [5053]: With this function you can switch on and off the contactor for heat group 3/1.
- Heat Group 1/1 [5063]: With this function you can switch on and off heat group A1/1.
- Heat Group 1/2 [5065]: With this function you can switch on and off heat group 1/2
- Heat Group 1/3 [5067]: With this function you can switch on and off heat group A1/3.
- Heat Group 2/1 [5069]: With this function you can switch on and off heat group A2/1.
- Heat Group 3/1 [5075]: With this function you can switch on and off heat group A3/1.
- Inlet Valve 1 [5055]: With this function you can open and close the inlet valve.
- Inlet Valve 2 [5057]: With this function you can open and close the second inlet valve on Option P units.

Note: This parameter only appears on Option P units.

- Drain Cooling Valve [5059]: With this function you can open and close the optional drain cooling valve.
 Note: This parameter only appears if the drain cooling valve option has been installed and activated in the engineering level of the control software.
- Complete Drain Valve [5061]: With this function you can open and close the optional scale collector tank drain valve.
 Note: This parameter only appears if the optional scale collector tank drain valve has been installed and activated in the engineering level of the control software.

3.4.3.3 Functions in the "Output Diagnostics Cyl. B" submenu

Note: The submenu "Output Diagnostics Cyl. B" only appears for large units and double units with two steam cylinders.



4.1 W1 - Smartcard

Function: Indicates that there is no communication with the smartcard on the control board.

Procedure: If there is no communication with the Smartcard on the control board, the system is blocked and the warning "W01" is displayed. The warning display is automatically reset as soon as communication with the Smartcard is restored.

Behavior on activation:

	Warning	No Error
Error Message:	W1: Smartcard	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	_	-
System:	Unit remains in normal operating	-
	mode	
Time delay:	-	-
Reset:	self-healing as soon as commu-	_
	nication with the smartcard is re-	
	established.	

- Check whether a smartcard is inserted in the control board.
- Check that the correct smartcard is inserted in the control board.
- Check whether the smartcard is defective.

4.2 W6 - Main missing

Function: indicates that there is no connection between the extension unit and the main unit.

Procedure: if the connection between the extension unit and the main unit is lost, the system will be blocked and the warning "W6" will be displayed. The warning display is automatically reset as soon as a connection is available again.

Behavior on activation:

	Warning	No Error
Error Message:	W6: Main Missing	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	-	-
System:	Unit blocked	-
Time delay:	-	-
Reset:	self-healing as soon as the con-	-
	nection between the main unit and	
	extension unit is available again.	

- Check whether the main unit is turned on.
- Check Linkup cable connection between the main unit and the extension unit.
- Check device interconnection settings in the control software (Menu > Controls > Device interconnection).

4.3 E10 – Controller Reset

Function: Indicates that the Integrated Controller of the Condair RS has carried out an automatic restart due to a software problem.

Procedure: If the Integrated Controller of the Condair RS detects a software problem that makes continued operation impossible, the controller carries out an automatic restart. After the restart, error message "E10" appears and the system is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E10: Controller Reset
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E10
System:	-	Unit blocked
Time delay:	-	-
Reset:	_	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Reset the error message and check whether the Condair RS then works correctly again.
- If the error occurs repeatedly, carry out a software update.
- Replace the control board if necessary.

4.4 E15 – Program Fault

Function: Indicates that the countdown has elapsed.

Procedure: This function switches the humidifier off automatically after a selectable time ("Time" parameter). You can choose between 1-30 days.

The function is deactivated ex works. A password must be assigned when activating the function. The humidifier can only be unlocked with this password. If the password is forgotten, the Integrated Controller must be replaced.

Behavior on activation:

	No Warning	Error
Error Message:	-	E15: Program Fault
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E15
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Self-healing (after entering the de- fined password)

Diagnostic actions:

• Deactivate the countdown function with the specified password or check the settings in the "Engineering" submenu.

4.5 W20/E20 - Safety loop

Function: Indicates that the safety loop is open.

Procedure: if the external safety loop is open the system is blocked and the warning message "W20" is triggered. As soon as the safety loop is closed again the warning or error message is automatically reset. Note: By setting the parameter "Safety Loop" in the "Network > Remote Fault Indication" submenu in the user level to "Error" an open safety loop triggers the Error "E20" and the error relay is activated.

Behavior on activation:

	Warning (Parameter "Safety Loop" in the "Network > Remote Fault Indication" submenu in the user level is set to "Warning")	Error (Parameter "Safety Loop" in the "Network > Remote Fault Indication" submenu in the user level is set to "Error")
Error Message:	W20: Safety Loop	E20: Safety Loop
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E20
System:	Unit blocked	Unit blocked
Time delay:	_	-
Reset:	self-healing	self-healing

- Check all safety monitoring devices (e.g. ventilation interlock, high limit humidistat, air proving switch) for correct function.
- Check wiring of safety loop connected to terminals "SC1" and "SC2" on driver board of module A.

4.6 E22 - Water Missing

Function: Indicates that the maximum filling time has exceeded. The maximum times are defined as follows.

Capacity	Maximum filling time			
	from level 0 to 1	from level 1 to 3	from level 3 to 4	from level 4 to 5
10 lbs (5 kg)	1500 s	240 s	180 s	180 s
15 lbs (8 kg)	1500 s	240 s	180 s	180 s
20 lbs (10 kg)	1500 s	240 s	180 s	180 s
30 lbs (16 kg)	1800 s	240 s	180 s	180 s
45 lbs (20 kg)	1800 s	240 s	180 s	180 s
52 lbs (24 kg)	1800 s	240 s	180 s	180 s
65 lbs (30 kg)	1800 s	240 s	180 s	180 s
90 lbs (40 kg)	1800 s	240 s	180 s	180 s

Procedure: the Condair RS monitors the filling process with different levels. If a level is not reached within the preset time (see table above) warning message "W22" is triggered and the heating is blocked as soon as the level drops below level 1 (level red). However the filling process is not stopped. If the next level is still not reached within 30 minutes, the error message "E22" will be triggered and the unit is blocked.

	Warning	Error
Error Message:	W22: Water Missing	E22: Water Missing
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E22
System:	Heating is blocked	Unit blocked
Time delay:	30 minutes	30 minutes
Reset:	self-healing if next level is reached	If parameter "Unit stop: Fill time E22" in the factory level is set to "On": Reset the error using the reset func- tion of the control software or switch the humidifier off and on again. If parameter "Unit stop: Fill time E22" in the factory level is set to "Off":
		self-healing if next level is reached.

Behavior on activation:

- Check water supply to unit (check water pressure is within range 14.5-145 psi (1-10 bar), check external filter valve or shut-off valve and water filter)
- Check inlet valve in unit (check correct electrical connection, check/clean filter insert)
- · Check hose connections to the level unit and the level unit itself.
- Check duct pressure is within range max. 1500 Pa
- Check water system for leaks.

4.7 E26 – Main contactor jammed

Function: Indicates that the level in the steam cylinder has dropped, although there is no humidity demand.

Procedure: if the Condair RS detects a level change without a request being present, the error message "E26" immediately appears and the system is blocked. The reason for this may be a leak or a jammed main contactor.

Behavior on activation:

	No Warning	Error
Error Message:	-	E26: Main contactor jammed
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E26
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check the main contactor and replace it if necessary.
- Check the Condair RS for leakages/seal leakages.
- Remove the 10-core connecting cable between the driver board and the power board. If afterwards the error appears again, the problem lays with one of the two circuit boards or with the 10-core connecting cable.

4.8 W28 - Maintenance

Function: Indicates that the small maintenance is due. The small maintenance interval is defined as follows.

Steam capacity	Maintenance interval time Small Maintenance	
	Tap water *	
10 lbs (5 kg)	500 h	
15 lbs (8 kg)	500 h	
20 lbs (10 kg)	500 h	
30 lbs (16 kg)	450 h	
45 lbs (20 kg)	400 h	
52 lbs (24 kg)	400 h	
65 lbs (30 kg)	350 h	
90 lbs (40 kg)	350 h	

* The standard settings for untreated tap water refer to a water hardness of 360 ppm (20 °dH or 36 °fH, respectively).

Procedure: If the maintenance counter for the small maintenance (scale collector tank) has elapsed, the warning message "W28" is triggered, the unit continues to operate in normal operating mode.

Behavior on activation:

	Warning	No Error
Error Message:	W28: Maintenance	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay activated	-
Entry error history:	-	-
System:	Unit remains in normal operating	-
	mode	
Time delay:	-	-
Reset:	Perform small maintenance, then	-
	reset maintenance counter.	

Diagnostic actions:

• Perform small maintenance in accordance with the instructions in the operation manual of the Condair RS, then reset maintenance counter.

4.9 W29 - Maintenance

Function: Indicates that the extended maintenance is due. The extended maintenance interval is defined as follows.

Steam capacity	Maintenance interval time Extended Maintenance	
	Tap water *	RO water **
10 lbs (5 kg)	1500 h	3000 h
15 lbs (8 kg)	1500 h	3000 h
20 lbs (10 kg)	1500 h	3000 h
30 lbs (16 kg)	1350 h	3000 h
45 lbs (20 kg)	1200 h	3000 h
52 lbs (24 kg)	1200 h	3000 h
65 lbs (30 kg)	1050 h	3000 h
90 lbs (40 kg)	1050 h	3000 h

* The standard settings for untreated tap water refer to a water hardness of 360 ppm (20 °dH or 36 °fH, respectively).

** Water from a reverse osmosis system or de-ionized water

Procedure: If the maintenance counter for the extended maintenance has elapsed, the warning message "W29" is triggered, the unit continues to operate in normal operating mode.

Behavior on activation:

	Warning	No Error
Error Message:	W29: Maintenance	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay activated	-
Entry error history:	-	-
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	Perform extended maintenance, then reset maintenance counter.	_

Diagnostic actions:

• Perform extended maintenance in accordance with the instructions in the operation manual of the Condair RS, then reset maintenance counter.

4.10 E33 - Control CH2 signal interrupted

Function: Indicates that the limiter sensor signal is outside the valid range. The system is blocked.

Procedure: The monitoring of the limiter sensor signal is only active if the internal controller is activated. If the limiter sensor signal is below the limit value of 5 %, the fault message "E33" is triggered, and the system is blocked. When the limiter sensor signal rises above the limit value again, the system returns to normal operating mode.

Behavior on activation:

	No Warning	Error
Error Message:	-	E33: Control CH2 signal interrupted
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E33
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check electrical connections between limiter sensor and driver board of module A.
- Check signal from limiter sensor and compare with signal configuration in "Controls CH2" submenu in the user level (e.g. signal type is set to mA but sensor emits a Volt signal or signal type is set to 2-10V but sensor signal range is 0-10V.

4.11 W34/E34 - Maximum drain time exceeded

Function: Indicates that the maximum drain time has exceeded.

Procedure: the Condair RS monitors the draining process with different levels. If the next lower level is not reached within the preset time of 20 seconds, the warning message "W34" is triggered. The unit starts a level test and continues the draining process.

- If during the level test the next lower levels are reached within the admissible drain time (<20 s) the warning message is automatically reset and the unit returns to normal operating mode.
- If the maximum drain time of 20 seconds is exceeded two more times during level test (drain time >40 seconds since the warning is shown) the error message "E34" is triggered, and the unit is blocked.

Behavior on activation:

	Warning	Error
Error Message:	W34: Maximum drain time exceeded	E34: Maximum drain time exceeded
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E34
System:	Humidifier performs a level test	Unit blocked
Time delay:	20 s	60 s
Reset:	self-healing	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check electrical connections between the drain pump and the driver board of the appropriate module.
- Check hose connections to the level unit and the level unit itself.
- Check function of the drain pump.
- Check drain cup and drain line.

4.12 W35 - Signal Timeout

Function: Indicates that no control signal has been transmitted via the BACnet or Modbus bus system for longer than the time specified with the "Signal Timeout" parameter (factory setting: 300 s).

Procedure: As soon as the control signal (demand or humidity signal) is sent via the BACnet or Modbus bus system, communication of the bus system is also monitored. The control signal must be updated periodically within the time specified with the "Signal Timeout" parameter. If this does not happen, warning W35 "Signal Timeout" appears, and the humidification is stopped until the control signal or another writable parameter is successfully transmitted via the bus system.

	Warning	Error
Error Message:	W35: Signal Timeout	E35: Signal Timeout
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	Service relay is activated if the cor- responding function is activated	Error relay activated
Entry error history:	-	W35
System:	Unit blocked	Unit blocked
Time delay:	-	-
Reset:	self-healing	self-healing

Behavior on activation:

Behavior on activation:

- Check whether a demand or control signal is being transmitted via the bus system.
- Check whether there is communication with the bus system.
- Check in the control software whether the "Source" parameter is set to "Modbus" or "BACnet".
- When using the optional gateway boards, the BMS timeout is only recognized on the Modbus side. This means that if the communication between the gateway board and the Integrated Controller is interrupted, the BMS timeout can be detected, but not if the communication on the BACnet or Lonworks side fails.

4.13 E41 - Control CH1 signal interrupted

Function: Indicates that the humidity sensor signal is out of range. Unit is blocked.

Procedure: The monitoring of the humidity sensor signal is only active if the internal controller is activated. If the humidity sensor signal is below the limit value of 5 %, the error message "E41" is triggered, and the system is blocked. When the humidity sensor signal rises above the limit value again, the system returns to normal operating mode.

Behavior on activation:

	WarnIng	Error
Error Message:	-	E41: Control CH1 signal
		Interrupted
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E41
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	self-healing

- Check wiring between humidity sensor and driver board of module A.
- Check signal from humidity sensor and compare with signal configuration in "Controls CH1" submenu in the user level (e.g. signal type is set to mA but sensor emits a Volt signal or signal type is set to 2-10V but sensor signal range is 0-10V).

4.14 W47/E47 - Level Sensor

Function: Indicates that a wrong level has been detected (e.g. level 1 and 4 have been detected in the same time, level detected though the level switch is closed).

Procedure: if a wrong level is detected the "W47" is triggered, and the unit stops humidifying and starts a level test. If the level test has passed, the humidifier restarts steam production. If the level test cannot be passed three times, the error message "E47" is triggered, and the unit is blocked.

	Warning	Error
Error Message:	W47: Level Sensor	E47: Level Sensor
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	Service relay activated, if function is activated	Error relay activated
Entry error history:	-	E47
System:	Humidifier performs a level test	Unit blocked
Time delay:	-	-
Reset:	self-healing	Reset the error using the reset function of the control software or switch the humidifier off and on again.

Behavior on activation:

- Check hose connections to the level unit and the level unit itself.
- Check whether a magnetic field is in the vicinity of the unit.
- Replace level PCB.
4.15 E54 – Leak Monitoring

Function: Indicates that the optional leak sensor connected to contact J8 has detected leaking water.

Procedure: If the optional leak sensor detects leaking water, the error message "E54" appears immediately, and the system is blocked. The reason for this can be a leak in the water supply or drain line or a leak in the device.

Behavior on activation:

	No Warning	Error
Error Message:	-	E54: Leak Monitoring
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E54
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Find and remedy the cause of the leak.
- If no leak sensor is connected, deactivate the leak monitoring function in the control software.

4.16 E56 - Internal safety loop interrupted

Function: Indicates that the internal safety loop is interrupted.

Procedure: if the internal safety loop is open the error message "E56" is triggered, and the system is blocked. As soon as the internal safety loop is closed again the error message is automatically reset and the unit returns to normal operating mode.

Behavior on activation:

	No Warning	Error
Error Message:	-	E56: Internal safety loop interrupted
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E56
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	self-healing

Diagnostic actions:

- Check the plug connection between the steam cylinder and the electronic parts.
- Check the cylinder and the thermostat (Klixon) on it.
- Check the connection between the power board and the driver board.

4.17 W57 - Activation Code

Function: Indicates that the system is locked, and the activation code must be entered to unlock it.

Procedure: The system remains locked until the valid activation code is entered.

Behavior on activation:

	Warning	No Error
Error Message:	W57: Activation Code	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay activated, if function	-
	is activated	
Entry error history:	-	-
System:	Unit blocked	-
Time delay:	-	-
Reset:	Enter the valid activation code under	_
	"Menu > Maintenance > Activation	
	Code".	

4.18 E74 - Keep Alive

Function: Indicates that the communication between control board and driver board is interrupted.

Procedure: As soon as the keep alive signal from driver board is missing, the system is blocked and error "E74" is triggered.

Behavior on activation:

	No Warning	Error
Error Message:	-	E74: Keep Alive
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E74
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check connecting cable between control board and driver board.
- Replace driver board.

4.19 E80 - USB Data Logger

Function: Indicates that there is a USB data logger fault.

Procedure: If the USB data logger is activated and the unit cannot write data on the memory stick, the error "E80" is triggered, but the unit stays in normal operating mode.

Behavior on activation:

	No Warning	Error
Error Message:	-	E80: USB Data Logger
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E80
System:	-	Unit remains in normal operating
		mode
Time delay:	-	-
Reset:	-	Reset the error using the reset
		function of the control software or
		switch the humidifier off and on
		again.

- · Check whether the USB data logger mode is activated, without using it
- Check whether a FAT32 formatted USB memory stick is connected to the USB port on the control board.
- Replace FAT32 formatted USB memory stick.

4.20 E82 - Driver missing

Function: Indicates that the communication with driver board via the RS485 interface is interrupted.

Procedure: As soon as there is no communication between the control and the driver board, error "E82" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	_	E82: Driver Missing
LED indication on unit:	_	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E82
System:	-	Unit blocked
Time delay:	_	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check cable and plugs between the control and driver board.
- Check the voltage from the driver board to the control board (IC board), it should be 24 VDC. If it is higher than 25 VDC, replace the driver board.
- Replace the control board.
- Verify the position of the rotary switch "SW1 on the driver board:
 - Single units, unit modules A and extension modules A must be set to position "0".
 - Unit modules B and extension modules B must be set to position "1".

4.21 E83 - Slave Address

Function: Indicates that the driver board address of the extension unit (linkup system) is wrong. The integrated controller cannot differ between main unit and extension unit.

Procedure: If the address of the driver board of the extension unit set with the rotary switch is not 1, error "E83" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E83: Slave Address
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E83
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

Diagnostic actions:

• Check whether the rotary switch on the driver board of the extension unit is set to 1.

4.22 E84 - Driver Defective

Function: Indicates that the driver board is defective.

Procedure: if the driver board is defective, the error "E84" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E84: Driver Defective
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E84
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

Diagnostic actions:

• Replace driver board.

4.23 E85 - Driver ID Wrong

Function: Indicates that the product ID of the driver board does not match.

Procedure: if a wrong driver board is installed (e.g. driver board of Condair EL), error "E85" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E85: Driver ID Wrong
LED indication on unit:	_	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E85A(B)
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Replace driver board.
- Install correct Condair RS driver board.

4.24 E86 - Driver Incompatible

Function: Indicates that the driver board is not compatible with other hardware of the Condair RS.

Procedure: if the driver board has an incompatible software or hardware version, error "E86" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E86: Driver Incompatible
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E86A(B)
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

Diagnostic actions:

• Replace driver board.

4.25 E87 – Local 24V Supply

Function: Indicates that the internal 24 V voltage supply is not in the admissible range ±10 %.

Procedure: As soon as the internal 24V is out of the range, error "E87", "E88" or "E89" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E87: Local 24V Supply
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E87
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset func-
		tion of the control software or switch
		the humidifier off and on again.

- Go to "Main Menu > Maintenance > Input Diagnostics Cyl. A / CYL. B" and check the 24 V value.
- If not possible to get the 24V voltage to a value within permissible range, replace transformer.

4.26 E88 – Local 5V Supply

Function: Indicates that the internal 5 V voltage supply is not in the admissible range ± 10 %.

Procedure: As soon as the internal 24V is out of the range, error "E87", "E88" or "E89" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E88: Local 5V Supply
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E88
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset func-
		tion of the control software or switch
		the humidifier off and on again.

- Go to "Main Menu > Maintenance > Input Diagnostics Cyl. A / CYL. B" and check the 5 V value.
- If not possible to get the 24V voltage to a value within permissible range, replace transformer.

4.27 E89 – Local Reference Supply

Function: Indicates that the internal 24 V, 5 V and/or the reference voltage supply of the driver board is not in the admissible range ± 10 %.

Procedure: As soon as the internal 24V are out of the range, error message ""E89" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error		
Error Message:	-	E89: Local Reference Supply		
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E89		
System:	-	Unit blocked		
Time delay:	-	_		
Reset:	-	Reset the error using the reset func-		
		tion of the control software or switch		
		the humidifier off and on again.		

- Go to "Main Menu > Service > Input Diagnostics Cyl. A / CYL. B" and check the and check the value of the reference supply voltage.
- If it is not possible to set the reference supply voltage to a value within the permissible range, replace the transformer.

4.28 E95 - Heating voltage missing

Function: Indicates that the heating voltage is missing although a demand is present.

Procedure: if a humidity demand is present the control check every two minutes, whether or not heating voltage is present. If no heating voltage is present the error message "E95" is triggered, and the system is blocked. As soon as the heating voltage is present again, the unit returns to normal operating mode.

Behavior on activation:

	No Warning	Error		
Error Message:	 E95: Heating voltage missing 			
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E95		
System:	-	Unit blocked		
Time delay:	-	-		
Reset:	-	self-healing		

- Check correct function of the main contactor.
- Check voltage of all phases of the heating voltage supply.

4.29 E97 - External 24V Supply

Function: Indicates that the 24 V output of the driver board is not in the admissible range.

Procedure: If the 24V output had a short circuit or an overload, error "E97" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error		
Error Message:	-	E97: External 24V Supply		
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E97		
System:	-	Unit blocked		
Time delay:	-	-		
Reset:	-	Reset the error using the reset func		
		tion of the control software or switch		
		the humidifier off and on again.		

- Check voltage on 24 V (JP2 set) output of the driver board between the terminals Vout and GND.
- Check and replace the fuse 1 AT on driver board.

4.30 E98 - External 10V Supply

Function: Indicates that the 10 V output of the driver board is not in the admissible range.

Procedure: If the 10V output had a short circuit or an overload, error "E98" is triggered, and the unit is blocked.

Behavior on activation:

	No Warning	Error		
Error Message:	-	E98: External 10V Supply		
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E98		
System:	-	Unit blocked		
Time delay:	-	-		
Reset:	-	Reset the error using the reset func		
		tion of the control software or switch		
		the humidifier off and on again.		

- Check voltage on 10V (JP1 set) output of the driver board between the terminals Vout and GND.
- Check and replace the fuse 1 AT on driver board.

4.31 E109 - Fault state of inlet valve 1

Function: Indicates that the output driver of inlet valve 1 is in fault state.

Procedure: If fault state occurs on the output of the inlet valve 1 the error message "E109" is triggered, and the system is blocked.

Behavior on activation:

	No Warning	Error			
Error Message:	_	E109: Fault state of inlet valve 1			
LED indication on unit:	_	LED lights red			
Remote indication board:	-	Error relay activated			
Entry error history:	-	E100			
System:	-	Unit blocked			
Time delay:	-	-			
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.			

- Check wiring to inlet valve 1.
- Check coil of inlet valve 1 for short circuit.

4.32 E112 - Fault state of complete drain valve

Function: Indicates that the output driver of the optional scale collector drain valve (complete drain valve) is in fault state.

Procedure: If a fault state occurs on the output of the optional scale collector drain valve the error message "E112" is triggered, and the system is blocked.

Behavior on activation:

	No Warning	Error		
Error Message:	-	E112: Fault state of complete drain		
		valve		
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E112		
System:	-	Unit blocked		
Time delay:	-	_		
Reset:	-	Reset the error using the reset		
		function of the control software or		
		switch the humidifier off and on		
		again.		

- Check wiring to optional scale collector drain valve.
- Check coil of optional scale collector drain valve for short circuit.

4.33 E117 - Fault state of inlet valve 2

Function: Indicates that the output driver of inlet valve 2 (only on units with increased control accuracy) is in fault state.

Procedure: If fault state occurs on the output of the inlet valve 2 the error message "E117" is triggered, and the system is blocked.

Behavior on activation:

	No Warning	Error		
Error Message:	-	E117: Fault state of inlet valve 1		
LED indication on unit:	-	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E117		
System:	-	Unit blocked		
Time delay:	-	-		
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.		

- Check wiring to inlet valve 2.
- Check coil of inlet valve 2 for short circuit.

4.34 W120/E120 - Minimum Fill Time

Function: Indicates that the min. fill time from level 1 to 4 has been undershot.

Procedure: If the min. fill time of 15 seconds from level 1 to 4 has been undershoot, the warning message "W120" is triggered. Then the unit performs a level test. If the level test cannot be passed for three times, the error message "E120" is triggered, and the system is blocked.

Behavior on activation:

	Warning	Error		
Error Message:	W120: Minimum Fill Time	E120: Minimum Fill Time		
LED indication on unit:	LED lights yellow	LED lights red		
Remote indication board:	-	Error relay activated		
Entry error history:	-	E120		
System:	Performs level test	Unit blocked		
Time delay:	-	-		
Reset:	self-healing	Reset the error using the reset func- tion of the control software or switch the humidifier off and on again.		

- Check the level unit for calcification and clean if necessary.
- Check the hose connections from the level to the cylinder and clean if necessary.

4.35 W121/E121 - Maximum vaporization time exceeded

Function: Indicates that the maximum vaporization time has exceeded.

Procedure: the Condair RS monitors the vaporization time to reach the requested demand. If the maximum vaporization time has exceeded the warning message "W121" is triggered, and the unit starts a level test.

If the level test has passed the humidification process will be restarted. If the maximum vaporization time exceeds again, the level test is repeated. If the level test has passed the humidification process will be restarted. If the maximum vaporization time exceeds the third time, level test is repeated last time, then error message "E121" is triggered and the unit is blocked.

Behavior on activation:

	Warning	Error			
Error Message:	W121: Maximum vaporization timeE121: Maximum vaporization timeexceededexceeded				
LED indication on unit:	LED lights yellow	LED lights red			
Remote indication board:	-	Error relay activated			
Entry error history:	-	E121			
System:	Humidifier performs a level test	Unit blocked			
Time delay:	-	_			
Reset:	self-healing	Reset the error using the reset function of the control software or switch the humidifier off and on again.			

Diagnostic actions:

- Check power consumption of the heating elements.
- Check voltage on all phases of the heating voltage power supply.
- Check fuses on power board.

Evaporating times:

Canaaity [lba]	200-208V	230-240V	440-480V	550-600V
	[s]	[s]	[s]	[s]
10 lbs	-	850	850	850
15 lbs	_	540	540	540
20 lbs	—	450	450	450
30 lbs	530	530	530	530
45 lbs	440	440	440	440
65 lbs	310	310	310	310
90 lbs	_	—	250	250

Table 1: Evaporating times

These evaporating times are multiplied with a factor depending on the water level.

Level	0	1	2	3	4	5
Factor	1.0	1.0	1.7	2.0	2.2	2.2

Table 2: Evaporation time factor

Monitoring of the evaporation time

The evaporating time is just measured and monitored, above the following values:

Consoity [lbs]	200-208V	230-240V	440-480V	550-600V
	[%]	[%]	[%]	[%]
10 lbs	—	25	25	25
15 lbs	—	25	25	25
20 lbs	_	25	25	25
30 lbs	20	20	20	20
45 lbs	20	20	20	20
65 lbs	20	20	20	20
90 lbs	_	_	20	20

Table 3: Minimal demand for evaporation time monitoring

These values are multiplied with the evaporation Gradient (see <u>Section 3.1.1</u>). The calculation for a 40kg/h 400V unit (threshold is 20%) is as follows:

Threshold 20% * Evaporation Gradient = Actual threshold for monitoring.



With evaporation Gradient set to 5, the monitoring function is disabled

4.36 E139 - Fault state of water cooling valve

Function: Indicates that the output driver of the optional drain water cooling valve is in fault state.

Procedure: If fault state occurs on the output of the optional drain water cooling valve the error message "E111" is triggered, and the system is blocked.

Behavior on activation:

	No Warning	Error
Error Message:	-	E139: Fault state of water cooling valve
LED indication on unit:	-	LED lights red
Remote indication board:	-	Error relay activated
Entry error history:	-	E139
System:	-	Unit blocked
Time delay:	-	-
Reset:	-	Reset the error using the reset function of the control software or switch the humidifier off and on again.

- Check wiring to drain water cooling valve.
- Check coil of drain water cooling valve for short circuit.

4.37 W140/E140 - Safety loop blower pack open

Function: Indicates that the blower pack safety loop is open.

Procedure: If the safety loop of the blower pack is interrupted, the system is blocked and the warning "W140" is displayed. As soon as the safety loop safety loop of the blower pack is closed again the warning or error message is automatically reset.

Note: By setting the parameter "Safety Loop" in the "Network > Remote Fault Indication" submenu in the user level to "Error" an open blower pack safety loop triggers the Error "E140" and the error relay is activated.

Behavior on activation:

	Warning	Error
	(Parameter "Safety Loop" in the	(Parameter "Safety Loop" in the
	"Network > Remote Fault Indication"	"Network > Remote Fault Indication"
	submenu in the user level is set to	submenu in the user level is set to
	"Warning")	"Error")
Error Message:	W140: Safety loop blower pack open	E140: Safety loop blower pack open
LED indication on unit:	LED lights yellow	LED lights red
Remote indication board:	Service relay is activated if the cor-	Error relay activated
	responding function is activated	
Entry error history:	-	E140
System:	Unit blocked	Unit blocked
Time delay:	-	_
Reset:	self-healing	self-healing

- Check/correctly connect power supply cabling to blower pack.
- When operating without a blower pack, make sure the cable bridge "J1" is connected to the terminal block "X12" on the driver board.

4.38 W141 - Humidity signal CH1 below low-level

Function: Indicates that the humidity sensor signal is below the defined limit value.

Procedure: The monitoring of the humidity sensor signal is only active if the internal controller is activated (RH-P or RH-PI) and the "RH Alert Mode" function are activated. If the humidity sensor signal drops below the set limit value, the warning message "W141" is triggered. The humidifier remains in normal operating mode. When the humidity sensor signal rises above the limit value again, the warning is reset.

Note: The limit value can be modified via: *Menu > Controls > Control CH1 > RH Alert Low*

Please note that the "RH Alert Mode" function must be activated in order to be able to modify the "RH Alert Low" value. After modifying the "RH Alert Low" value, the "RH Alert Mode" function can be deactivated again if necessary.

Behavior on activation:

	Warning	No Error
Error Message:	W141: Humidity signal CH1 below low-level	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay is activated if the cor- responding function is activated	-
Entry error history:	W141	-
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	self-healing	-

- Check electrical connections between sensor and driver board.
- Check "RH Alert Low" setting.

4.39 W142 - Humidity signal CH1 above high-level

Function: Indicates that the humidity sensor signal is above the defined limit value.

Procedure: The monitoring of the humidity sensor signal is only active if the internal controller is activated (RH-P or RH-PI) and the "RH Alert Mode" function are activated. If the humidity sensor signal rises above the set limit value, the warning message "W142" is triggered. The humidifier remains in normal operating mode. When the humidity sensor signal drops below the limit value again, the warning is reset.

Note: The limit value can be modified via: Menu > Controls > Control CH1 > **RH Alert High**

Please note that the "RH Alert Mode" function must be activated in order to be able to modify the "RH Alert High" value. After modifying the "RH Alert High" value, the "RH Alert Mode" function can be deactivated again if necessary.

Behavior on activation:

	Warning	No Error
Error Message:	W142: Humidity signal CH1 above high-level	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay is activated if the cor- responding function is activated	-
Entry error history:	W142	_
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	self-healing	-

- Check electrical connections between sensor and driver board.
- Check "RH Alert High" setting.

4.40 W143 - Humidity signal CH2 below low-level

Function: Indicates that the humidity sensor signal is below the defined limit value.

Procedure: The monitoring of the humidity sensor signal is only active if the internal controller is activated (RH-P or RH-PI) and the "RH Alert Mode" function are activated. If the humidity sensor signal drops below the set limit value, the warning message "W143" is triggered. The humidifier remains in normal operating mode. When the humidity sensor signal rises above the limit value again, the warning is reset.

Note: The limit value can be modified via: *Menu > Controls > Control CH2 > RH Alert Low*

Please note that the "RH Alert Mode" function must be activated in order to be able to modify the "RH Alert Low" value. After modifying the "RH Alert Low" value, the "RH Alert Mode" function can be deactivated again if necessary.

Behavior on activation:

	Warning	No Error
Error Message:	W143: Humidity signal CH2 below low-level	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay is activated if the cor- responding function is activated	-
Entry error history:	W143	_
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	self-healing	-

- Check electrical connections between sensor and driver board.
- Check "RH Alert Low" setting.

4.41 W144 - Humidity signal CH2 above high-level

Function: Indicates that the humidity sensor signal is above the defined limit value.

Procedure: The monitoring of the humidity sensor signal is only active if the internal controller is activated (RH-P or RH-PI) and the "RH Alert Mode" function are activated. If the humidity sensor signal rises above the set limit value, the warning message "W144" is triggered. The humidifier remains in normal operating mode. When the humidity sensor signal drops below the limit value again, the warning is reset.

Note: The limit value can be modified via: Menu > Controls > Control CH2 > **RH Alert High**

Please note that the "RH Alert Mode" function must be activated in order to be able to modify the "RH Alert High" value. After modifying the "RH Alert High" value, the "RH Alert Mode" function can be deactivated again if necessary.

Behavior on activation:

	Warning	No Error
Error Message:	W144: Humidity signal CH2 above high-level	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	Service relay is activated if the cor- responding function is activated	-
Entry error history:	W144	_
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	self-healing	_

- Check electrical connections between sensor and driver board.
- Check "RH Alert High" setting.

4.42 W145 - Timer Overlapp

Function: Indicates that at least two or more timers overlap.

Procedure: If the set time window of two timers overlap, the warning message "W145" is triggered. The humidifier remains in normal operating mode. When the overlap is corrected, the warning is reset.

Behavior on activation:

	Warning	No Error
Error Message:	W145: Timer Overlap	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	_	_
Entry error history:	W145	-
System:	Unit remains in normal operating	-
	mode	
Time delay:	-	-
Reset:	self-healing	-

Diagnostic actions:

• Check set timer times for overlap or deactivate timer.

4.43 W157 – Software download from USB failed

Function: Indicates that the software download from the USB stick to the integrated controller has failed.

Procedure: If the software download from the USB stick to the integrated controller was not successful, the warning message "W157" is triggered.

Behavior on activation:

	Warning	No Error
Error Message:	W157: Software download from USB	-
	failed	
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	W157	-
System:	Unit remains in normal operating	-
	mode	
Time delay:	-	-
Reset:	Self-healing	-

- Repeat download from USB-Stick.
- Switch the Condair RS off and on again.
- Check the update file on the USB stick.

4.44 W158 – Software download from Cloud failed

Function: Indicates that the software download from the Cloud to the integrated controller has failed.

Procedure: If the software download from the Cloud to the integrated controller was not successful, the warning message "W158" is triggered.

Behavior on activation:

	Warning	No Error
Error Message:	W158: Softwaredownload von der	_
	Cloud fehlgeschlagen	
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	W158	-
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	Self-healing	-

- Repeat download from Cloud.
- Switch the Condair RS off and on again.
- Check the update file on the Cloud.

4.45 E158 – Software update failed

Function: Indicates that the software update has failed.

Procedure: If the software update could not be carried out successfully or the software update was canceled, the error message "E158" appears.

Behavior on activation:

	kein Warning	Error
Error Message:	-	E162: Software update failed
LED indication on unit:	_	LED lights red
Remote indication board:	-	-
Entry error history:	-	W162
System:	-	Unit blocked
Time delay:	_	_
Reset:	-	Self-healing

Diagnostic actions:

• Switch Condair RS off and on again and perform software update again.

4.46 W169 – Device Interconnection

Function: Indicates that there is a warning or an error on an extension unit in the device interconnected system.

Procedure: If a warning or a fault is present on an extension unit in the device interconnected system, the warning message "W169" is triggered on the main unit. The main unit remains in normal operating mode. As soon as the malfunction in the extension unit has been rectified and, if necessary, the error message has been reset, the warning message "W169" in the main unit is reset.

Behavior on activation:

	Warning	No Error
Error Message:	W169: Device Interconnection	-
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	W169	-
System:	Unit remains in normal operating	-
	mode	
Time delay:	-	-
Reset:	self-healing	-

Diagnostic actions:

• Rectify the fault on the corresponding extension unit in the device interconnected system and reset the error message if necessary.

4.47 W170 – Extension Unit Missing

Function: Indicates that an extension unit cannot be found in the device interconnected system.

Procedure: If the extension units configured in the device interconnected system cannot be found, the warning message "W170" is triggered. The humidifier remains in normal operating mode. As soon as communication to all configured expansion devices is re-established, the warning must be reset using the reset function of the control software or by switching the humidifier off and on again.

Behavior on activation:

	Warning	No Error
Error Message:	W170: Extension Unit Missing	_
LED indication on unit:	LED lights yellow	-
Remote indication board:	-	-
Entry error history:	W170	-
System:	Unit remains in normal operating mode	-
Time delay:	-	-
Reset:	Reset the warning using the reset function of the control software or switch the humidifier off and on again.	_

- Check the electrical connection between the individual devices (interconnected device cable).
- Check configuration under "Menu > Controls > Device interconnection system".

4.48 Fault behavior of units in a device interconnected system

Fault in the main unit

If a fault occurs on the main unit that is relevant to the system (e.g. request signal interrupted, external safety chain open, etc.), a fault is displayed on the main unit and all units in the device interconnected system are stopped.

If a fault occurs in the main unit that is not system-relevant (e.g. internal safety loop of ventilation unit open, maintenance due, etc.), a fault is displayed in the main unit and the main unit is stopped depending on the severity of the fault. The remaining units in the device interconnected system continue to humidify normally.

Fault in the extension unit

If a fault occurs in an extension unit (e.g. external safety loop open, service due, etc.), a fault is displayed on the affected extension unit and, depending on the severity of the fault, the affected extension unit is stopped. A warning is displayed on the main unit that an extension unit in the device interconnected system has a fault. The main unit continues to humidify normally.

If a fault occurs in an extension unit (e.g. external safety loop open, service due, etc.), a fault is displayed on the affected extension unit and, depending on the severity of the fault, the affected extension unit is stopped. A warning is displayed on the main unit that an extension unit in the device interconnected system has a fault. The main unit continues to humidify normally.

Units in the device interconnected system cannot be found

If units cannot be found in the device interconnected system (e.g. unit is switched off, connection problems, etc.), a warning is displayed on the main unit that an extension unit cannot be found in the device interconnected system. The main unit continues to humidify normally (unless the unit is switched off). An error is displayed on the affected extension unit indicating that the main unit cannot be found, and humidification is stopped (unless the unit is switched off). The remaining extension units in the device interconnected system continue to humidify normally.

5 Notes on unit components and functions

5.1 Main electronic components

The Condair RS is built-up by three electronic boards.

- Integrated controller board The operating and control module of the unit. The main software functionality is implemented on this board. It's possible to control up to an 180 lbs (80 kg) unit with one integrated controller.
- Driver board Peripheral module between the integrated controller and the actors (pump, valves, level unit, power board). It converts the commands from the integrated controller to the specific actor control signals.
- Power board Power electronic board to control the heating elements according to the demand.
- Transformer
 Generates the internal supply voltage.

5.2 Unit versions

The Condair RS is distinguished by a basic version and additional options.

Туре	Characteristics	
Basic	Power board and heating contactors	
Option P	 Second valve (Pulse-Width-Modulation filling) Higher steam control accuracy (Only semiconductor use to control the heating elements) 	

5.3 Control signals

The control signal input unit is capable of handling a variety of signals. A suitable signal range can be selected under "*Menu > Controls > Control CH1/CH2 > Control CH1/CH2 Signal Type*".

Control signals	Jumper JP2 on driver board	Remarks
24V (ON/OFF)	JP2	
0-5V	JP1	
1 – 5V	JP1	
0 – 10V	JP1	Default
2 – 10V	JP1	
0 – 16V	JP2	
3.2 – 16V	JP2	
0 – 20V	JP2	
0 – 20mA	JP1 / JP2	
4 – 20mA	JP1 / JP2	

In double units, the control signal applies to both modules.

The standard output signal is set to 0 %, when:

- The heating control is deactivated
- The external security chain is open
- When the level < level low
5.4 Heating control Condair RS

230-240 V 10 lbs, 15 lbs, 20 lbs							
Steam	Steam Heating assembly module A (Steam cylinder A)						
demand [%]	A1/1	A1/2	A1/3	A2	A3		
0	PWM	OFF	OFF				
33	ON	PWM	OFF				
67	ON	ON	PWM				
100	ON	ON	ON				

5.4.1 Steam demand and heating assemblies Condair RS

200-208 V 30 lbs / 230-240 V 30 lbs, 45 lbs							
Steam	Heating assembly module A (Steam cylinder A)						
demand [%]	A1/1	A1/2	A1/3	A2	A3		
0	PWM	OFF	OFF	OFF			
17	ON	PWM	OFF	OFF			
33	ON	ON	PWM	OFF			
50	PWM	OFF	OFF	ON			
67	ON	PWM	OFF	ON			
83	ON	ON	PWM	ON			
100	ON	ON	ON	ON			

200-208 V 45 lbs, 65 lbs / 230-240 V 65 lbs									
Steam		Heating assembly module A (Steam cylinder A)							
demand [%]	A1/1	A1/2	A1/3	A2	A3				
0	PWM	OFF	OFF	OFF	OFF				
11	ON	PWM	OFF	OFF	OFF				
22	ON	ON	PWM	OFF	OFF				
33	PWM	OFF	OFF	ON	OFF				
44	ON	PWM	OFF	ON	OFF				
56	ON	ON	PWM	ON	OFF				
67	PWM	OFF	OFF	ON	ON				
78	ON	PWM	OFF	ON	ON				
89	ON	ON	PWM	ON	ON				
100	ON	ON	ON	ON	ON				

400 V 10 lbs, 15 lbs, 20 lbs / 440-480 V 20 lbs / 550-600 V 20 lbs, 30 lbs						
Steam	Heating assembly module A (Steam cylinder A)					
demand [%]	A1/1	A1/2	A1/3	A2	A3	
0	PWM		OFF			
50	ON		PWM			
100	ON		ON			

400 V 30 lbs, 45 lbs / 440-480 V 30 lbs, 65 lbs / 550-600 V 45 lbs							
Steam	Heating assembly module A (Steam cylinder A)						
demand [%]	A1/1	A1/2	A1/3	A2	A3		
0	PWM		OFF	OFF			
25	ON		PWM	OFF			
50	PWM		OFF	ON			
75	ON		PWM	ON			
100	ON		ON	ON			

400 V 65 lbs, 90 lbs / 440-480 V 45 lbs, 90 lbs / 550-600 V 65 lbs, 90 lbs								
Steam		Heating assembly module A (Steam cylinder A)A1/1A1/2A1/3A2A3						
demand [%]	A1/1							
0	PWM		OFF	OFF	OFF			
17	ON		PWM	OFF	OFF			
33	PWM		OFF	ON	OFF			
50	ON		PWM	ON	OFF			
67	PWM		OFF	ON	ON			
83	ON		PWM	ON	ON			
100	ON		ON	ON	ON			

Note: The heaters are activated only:

- when the main contactor of the corresponding module is switched on.
- when the external safety circuit of the corresponding module is closed.
- If the steam demand is >4%
 Note: if the steam demand is lower than 4%, the steam demand is set to 0 % and if the steam demand is higher than 98 %, the steam demand is set to 100 %.

5.5 Level unit

The water level inside the steam cylinder is determined with the assistance of a level measuring device, called "level unit" that is provided with five Reed contacts. With this 5 Reed contacts six levels can be detected (level 0 to 5). The different levels are shown in the following table.

Level	Reed contacts			Remarks
	high	mid	low	
0	0	0	0	No level detected
1	0	0	1	Min. level
2	0	1	1	
3	0	1	0	
4	1	1	0	
5	1	0	0	Max. level

The level unit is the most important part of the steam humidifier. Without the level unit the humidifier is not able to produce steam in a secure and precise manner. Due to the importance, the level unit is checked by a level tests after certain states and times.

5.6 Fill and drain sequences

The fill and drain control is made up of different procedures, which run together event-driven.

5.6.1 Fill and drain states on the Basic unit

Sta	nte	Procedure	Condition	Condition NO	Condition YES	Next procedure
-	Start up Stand still level test	Level test	Level ≤1		Steam cylinder will be filled until ≥ Level 5	Drain steam cyl- inder until <-3
-	Failure		Level > Level 1	Drain steam cylinder until level =1	Steam cylinder will be filled until ≥ Level 5	Drain steam cyl- inder until <-3
- - -	Humidifying Standby Keep warm	Refill	Level = 1		Steam cylinder will be filled until ≥ Level 4	
-	Humidifying	Timer controlled drain	Level >= 3 and level change to lower level		Drain steam cyl- inder until level = level -1	
_	Humidifying	Level controlled drain	Level = 5 for 10s		Drain steam cyl- inder until level = level -1	

5.6.2 Fill and drain states on the Basic unit with option P

State		Procedure	Condition	Condition NO	Condition YES	Next procedure
– Sta – Sta leve	art up and still el test	Level test	Level ≤1		Steam cylinder will be filled until ≥ Level 5	Drain from N to N-1
– Fail	lure		Level > Level 1	Drain steam cylinder until level =1	Steam cylinder will be filled until ≥ Level 5	Drain from N to N-1
– Hur – Sta – Kee	midifying andby ep warm	Refill	Level = 1		Steam cylinder will be filled in PWM mode until ≥ Level 4	
– Hur	midifying	Timer controlled drain	Level >= 3 and level change to lower level		Drain steam cyl- inder until level = level -1	
– Hur	midifying	Level controlled drain	Level = 5 for 10s		Drain steam cyl- inder until level = level -1	

Note:

- On the level test it will be drained to level 1, so that the refill begins on a defined point to check the minimal filling time.
- The level test is used, to check the level unit

5.7 Level controlled drain

The prerequisites for level-controlled flushing are as follows: Level \geq level 4 for a period of at least 2 seconds (Double units contain a separate timer for each module)

Note: Excessive salt content of the water can cause the level inside the steam cylinder to rise.

In double units, flushing takes place only in the module concerned.

5.8 Idle Drain

If the unit is a certain time in standby the cylinder with the standing water would be the perfect environment for legionella and bacteria. Because of that, the idle drain is used to change the cylinder water after a defined time of 1-100h.

The prerequisites for idle drain are as follows:

- During the past (1-100) hours there was no demand for steam; no total steam demand in double units (steam demand = 0%) the standard input signal had a value of 0%.
- The last idle drain took place (0-100) hours ago.

The idle drain interval time can be adjusted with the following parameter (Path: *Menu > Features > Standby > Time Until Drain*):

Time Until Drain 1...100 hours

Note: The purpose of this flushing cycle is to ascertain that the floater is not stuck. In double units, a flushing cycle is performed in both modules, because the unit is reset to the startup condition.

5.9 Timer controlled drain

The drain interval can be with the following parameter (Path: *Menu > Maintenance > Water Management > Reduction Interval Time*):

Reduction Interval Time 10...720 minutes

Depending on the actual steam demand (total steam demand in double units), the drain interval is extended (referred to as extended flushing interval). The extension factor is equal to the reciprocal value of the actual steam demand (no integration) and is recalculated every second. During times of low steam demand, the extension factor can become unproportional large and is therefore limited to a value of 10.

Prerequisites for timer-controlled drain are as follows:

- If after expiration of the flushing timer the level prerequisites are not met, the water reduction is delayed until conditions are met (corresponding level has been reached). After successful execution of the draining cycle (both modules flushed in double units), the timer is reset.
- In double units, flushing is accomplished in both modules but not simultaneously. The respective timing is determined by the fulfilment of the level prerequisites.

The flushing timer is provided with zero-voltage retentive memory.

5.10 Service interval times and reduction time

The service interval times and reduction time can be configured in two different ways.

5.10.1 Manual input of the service interval times and reduction time

With this type of configuration, the interval times for the small and the extended maintenance as well as the reduction time are manually inputted in the control software. The configuration is made by the parameters "Interval Small Maintenance", "Interval Extended Maintenance" and "Reduction Interval Time" in the "Maintenance > Water Management" submenu in the user level. The default values are shown in the following tables:

Steam	Water reduction time			Maintenance interval time				
Steam	Water reduction time							
capacity				Small Mai	ntenance	Extended M	laintenance	
	Potable water *	RO water **	DI water ***	Potable water *	RO water **	Potable water *	RO water **	
					DI water ***		DI water ***	
10.0 (4.5)	120 min	180 min	360 min	800 h	3000 h	1600 h	3000 h	
15.0 (6.8)	60 min	180 min	360 min	750 h	3000 h	1500 h	3000 h	
20.0 (9.0)	60 min	180 min	360 min	750 h	3000 h	1500 h	3000 h	
30.0 (13.6)	30 min	180 min	360 min	700 h	3000 h	1400 h	3000 h	
45.0 (20.4)	20 min	180 min	360 min	600 h	3000 h	1200 h	3000 h	
65.0 (29.5)	10 min	180 min	360 min	500 h	3000 h	1500 h	3000 h	
90.0 (40.8)	10 min	180 min	360 min	400 h	3000 h	1200 h	3000 h	
130.0 (59.0)	10 min	180 min	360 min	500 h	3000 h	1500 h	3000 h	
180.0 (81.6)	10 min	180 min	360 min	400 h	3000 h	1200 h	3000 h	

* The default settings for untreated potable water refer to a water hardness of 210 ppm (12 °dH or 12.5 grains/gal, respectively).

** Default settings for water from a reverse osmosis system (RO water) >5 ... \leq 30 μ S/cm

*** Default settings for de-ionized water (DI water) \leq 5 µS/cm

Determination of the parameters for manual water mode via:

Menu > Maintenance > Water Management

18:04 RS 02.04.2024
 Water Management
Water Mode _{Manual}
Maintenance Mode Small+Extended
Interval Small Mainte ^{400 hr}
Interval Extended Mai 1200 hr
Paduction
Reduction ^{On}
Reduction Interval Time

Water Mode:MMaintenance Mode:EInterval Small Maintenance:1Interval Extended Maintenance:1Reduction:CReduction Interval Time:5

Manual Extended or Small+Extended 100 ... 3000 hr 100 ... 6000 hr On 5 ... 720 minutes

5.10.2 Calculated service interval and reduction time

If the water supply quality is well known, it's also possible to set the water mode in such a way, that the interval times for the small and the extended maintenance as well as the reduction time are automatically calculated based on the water quality. This calculation is based on experience values and comprised the following nominal values, definitions and equations:

5.10.2.1 Nominal values for the equations

Small Maintenance interval time:

Steam capacity [kg]	Nominal values Small Maintenance interval time				
	Tap water [min] *	RO water [min]			
10 lbs (5 kg)	800	3000			
15 lbs (8 kg)	750	3000			
20 lbs (10 kg)	750	3000			
30 lbs (16 kg)	700	3000			
45 lbs (20 kg)	600	3000			
52 lbs (24 kg)	600	3000			
65 lbs (30 kg)	500	3000			
90 lbs (40 kg)	400	3000			

Extended Maintenance interval time:

Steam capacity [kg]	Nominal values Extended Maintenance interval time	
	Tap water [min] *	RO water [min]
10 lbs (5 kg)	1600	3000
15 lbs (8 kg)	1500	3000
20 lbs (10 kg)	1500	3000
30 lbs (16 kg)	1400	3000
45 lbs (20 kg)	1200	3000
52 lbs (24 kg)	1200	3000
65 lbs (30 kg)	1500	3000
90 lbs (40 kg)	1200	3000

Reduction time:

Steam capacity [kg]	Nominal values reduction time	
	Tap water [min] *	RO water [min]
10 lbs (5 kg)	120	360
15 lbs (8 kg)	60	360
20 lbs (10 kg)	60	360
30 lbs (16 kg)	30	360
45 lbs (20 kg)	20	360
52 lbs (24 kg)	20	360
65 lbs (30 kg)	10	360
90 lbs (40 kg)	10	360

The standard settings for untreated tap water refer to a water hardness of 210 ppm (12 °dH or 21 °fH, respectively).

5.10.2.2 Definitions

Water type:

Water type	Description
Tap water	Untreated tap water
RO water with low conductivity	< 5uS
RO water with high conductivity	> 5uS

Equation parameter:

Equation parameter	Tap water	RO water < 5uS	RO water > 5uS
Equation parameter Reduction			
(are used to calculate the reduction time)			
Factor	1.0	1.0	0.5
Reference water hardness	12°dH		
Gradient	0.5		
Water hardness gradient range	6°dH		
Equation parameter Maintenance			
(are used to calculate the maintenance interval times	5)		
Factor	1.0	1.0	0.8
Reference water hardness	12°dH		
Gradient	0.4		
Water hardness gradient range	10°dH		

Features Settings:

The feature setting depends on the water mode (manual or calculated) and the water quality. User definable parameters are marked accordingly.

Water Mode	Manual	Calcu	ulated
Water type		Tap water	RO water
Automatic expansion of the mainte- nance interval times and the reduction time dependent on the steam request active	Yes	Yes	No
Activation/deactivation small maintenance	User *	User *	No
Reduction interval	User	Equation 1	Equation 2
Maintenance interval	User	Equation 1	Equation 2

* the small maintenance can be activated/deactivated in the factory level

5.10.2.3 Equations for the calculation of the maintenance and reduction intervals

Equation 1:

Equation 1 is used to calculate the interval time for the small and the extended maintenance as well as the reduction interval time when using **tap water**. Except the water hardness which has to entered in the control software by the user all other equation values are stored in the control software.

Equation 2:

t_{Interval} = Factor * t_{IntervalNom}

Die **Equation 2** is used to calculate the interval time for the small and the extended maintenance as well as the reduction interval time when using **RO water**. All equation values are stored in the control software.

5.10.2.4 Calculated service interval examples

Example 1: 45 lbs (20kg) unit, Small maintenance: Small maintenance interval according to small maintenance table (see <u>Section 5.10.2.1</u>):
600 h Water quality: Tap water, 12 °dH Used equation: Equation 1

	(12 °dH – 12 °dH)
t _{Interval} = 1 * (600 h +	* 600 h * 0.4 = 600 h
	10 °dH

If the water supply quality on site is 12 °dH and hence it's equal to the default value, the calculated maintenance interval time corresponds to the default value, which you would have entered in manual mode.

```
Example 2: 45 lbs (20kg) unit, Small maintenance:
Small maintenance interval according to small maintenance table (see <u>Section 5.10.2.1</u>):
600 h
Water quality: Tap water, 7 °dH
Used equation: Equation 1
```

$$t_{interval} = 1 * (600 h + \frac{(12 ° dH - 7 ° dH)}{10 ° dH} * 600 h * 0.4 = 720 h$$

If the water quality is 7 °dH and hence it's smaller than the default value of 12 °dH, the maintenance interval time increases about 120 h to 720 h.

Example 3: 45 lbs (20kg) unit, Small maintenance: Small maintenance interval according to small maintenance table (see <u>Section 5.10.2.1</u>):
600 h Water quality: Tap water, 18 °dH Used equation: Equation 1

 $t_{interval} = 1 * (600 h + \frac{(12 °dH - 18 °dH)}{10 °dH} * 600 h * 0.4 = 456 h$

If the water quality is 18 °dH and hence it's larger than the default value of 12 °dH, the maintenance interval time decreases about 144 h to 456 h.

Determination of the parameters for calculated water mode via:

Menu > Maintenance > Water Management

18:04 RS 02.04.2024	Water Mode:	Calculated
Water Management	Maintenance Mode:	Extended or Small+Extended
Water Mode	Water Reduction:	On
Calculated	Water Quality:	Untreated Drinking Water,
Maintenance Mode		RO Water < 5µS/cm or
Small+Extended		RO Water > 5µS/cm
Reduction ^{On}	Water Hardness:	1 30 °dH
Water Quality Untreated Drinking Water		
Water Hardness		

5.11 Smartcard

The main memory for the settings is in the flash memory of the integrated controller; the Smartcard serves as a backup of all settings. When starting the integrated controller, the serial number of the Smartcard is compared to that of the integrated controller. The integrated controller starts normally even without a Smartcard and is ready for operation. The warning about a missing Smartcard is given. The following behavior may occur:

5.11.1 The integrated controller starts with a new, empty Smartcard

The integrated controller copies the settings from its flash memory to the Smartcard. Data flow: Integrated controller to Smartcard.

There is no mismatch and therefore no message appears on the display.

5.11.2 The integrated controller starts with a with a smartcard with existing data

The message "Data Mismatch" appears as shown in *Fig. 4 – Error message of the Smartcard*. Note: If you want to cancel the start process for any reason (wrong smartcard inserted), select "Nothing Replaced".



Fig. 4: Error message of the Smartcard



Fig. 5: Smartcard (receptacle open)

5.11.2.1 The serial number of the Smartcard and the integrated controller are identical

Select the "Smartcard replaced" option in the "Data mismatch" display (see <u>Fig. 4 – Error message of</u> <u>the Smartcard</u>) to write the data from the Integrated Controller's flash memory to the Smartcard. Data flow: Integrated controller to Smartcard.

5.11.2.2 The serial number of the Smartcard and the integrated controller are not identical

There are two different options here, depending on whether you have replaced the integrated controller or the smartcard. Therefore, the behavior after replacing the respective spare part differs if the serial numbers are not identical.

- Smartcard has been replaced

Select the "Smartcard replaced" option in the "Data mismatch" display (see <u>Fig. 4 – Error message of</u> <u>the Smartcard</u>) to write the data from the flash memory of the integrated controller to the Smartcard.

Data flow: Integrated controller to Smartcard.

Integrated controller has been replaced

Select the "Display replaced" option in the "Data mismatch" display (see <u>Fig. 4 – Error message of</u> <u>the Smartcard</u>) to write the data from the smartcard to the flash memory of the integrated controller. Data flow: Smartcard to Integrated Controller

The following histories must then be reset in the control software:

- Delete error and warning history:
 - Select "Menu > Maintenance > Histories > Clear Error/Warning History".
 - In the confirmation window, confirm the deletion of the error and warning history with <Continue>.



Abb. 6: Delete error and warning history

• Delete maintenance history:

- Select "Menu > Maintenance > Histories > Clear Maintenance History".
- In the confirmation window, confirm the deletion of the maintenance history with <Continue>.



Abb. 7: Delete maintenance history

6 Appendix

6.1 RS 2 208 V wiring schematics





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6.2 RS 2 240 V wiring schematics





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6.3 RS 2 480 V wiring schematics



2594823 - WI RS WIRING SCHEMATICS















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10 E RS2 480V[~3] 90LBS ļ ACC - Blower pack Power 0~~0 96 5 × 1 SFI-Board H 8 ЧĽ, CON- UMP TACTOR AC ALVE 2 HEAT GR. MAIN SUPPLY ŵ **PCB** Ľ Ŧ DRAIN INLET NODULE <u>____</u> HEATTING VOLTAGE 24VAC 34VOC LEGEND DRIVER BOARD 44 ŵ 4 ONTROL NA 24 Ŷ 32 200 200 R5485 PWR XXX XXX INTEGRATED CONTROLLER 2 3 4 5 6 7 8

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6.4 RS 2 600 V wiring schematics





2594823 - WI RS WIRING SCHEMATICS

















































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