

NS

Assembly and operating instructions Dulcodes S UV System for the aquatics market



General non-discriminatory approachIn order to make it easier to read, this document uses the male
form in grammatical structures but with an implied neutral sense. It
is aimed equally at both men and women. We kindly ask female
readers for their understanding in this simplification of the text.Supplementary informationPlease read the supplementary information in its entirety.

The following are highlighted separately in the document:

- Enumerated lists
- Instructions
 - ⇒ Outcome of the instructions

Information



This provides important information relating to the correct operation of the device or is intended to make your work easier.

Safety notes

The safety information includes detailed descriptions of the hazardous situation, see & *Chapter 2.1 "Explanation of the safety instructions" on page 7*

Table of contents

1	About this system		
	1.1 Correct and proper use	. 6	
2	Safety chapter	. 7	
	2.1 Explanation of the safety instructions	. 7	
	2.2 Users' qualifications	. 8	
	2.3 Dulcodes safety information	. 8	
	2.4 Safety Equipment	. 9	
	2.5 Information in the event of an emergency	10	
3	Function	11	
-	3.1 Commissioning	11	
	3.2 Normal mode	11	
	3.3 Automatic wiper	11	
	3.4 Temperature monitoring.	12	
	3.5 Switching off	12	
	3.6 Cool down	12	
4	Control	13	
-	4.1 Display	13	
	4.1 Display	15	
	4.2.1 Trend display	16	
	4.2.2 Changing access code	17	
	4.2.3 Set the local language	17	
	4.2.4 Calibrating the sensor	17	
	4 2 5 Triggering the wiper cycle	18	
	4.2.6 Setting the safety threshold	18	
	4.2.7 Setting the warning threshold	19	
	4.2.8 Adjusting the wiper interval	20	
	4.2.9 Adjusting the display range of the trend display	20	
	4.2.10 Analogue output UV sensor signal: Assigning the	20	
	4.2.11 Pause function	20	
	4.2.12 Displaying/resetting the counter	21	
	4.2.12 Displaying/resetting the counter	21	
F	4.2.15 Alarm Signal Telay	22	
5	Mounting and installation.	23	
	5.1 Radiation champer	24	
	5.1.1 Assembly	20	
	5.1.2 Allach the warning label	20	
	5.1.5 Trydraulic connectors	20	
	5.2 Control cabinet and control	27	
	5.2.1 Assembly	21	
	5.2.2 Electrical connections	27	
	5.3. Installing the LIV lamp protection tube	27	
	5.3.1 Installing the LIV lamp protection tube without the	21	
	wiper.	27	
	5.3.2 Installing the UV lamp protection tube with manual wiper	28	
	5.3.3 Fitting the UV lamp protection tube with automatic wiper	29	
	5.4 Assembly and connection of the LIV Lamp	30	
	5.5 Retrofitting a manual wiper	31	
		51	

	5.5.1	Removing the UV lamp protection tube with manual wiper	31	
	552	Assembly and installation of the manual winer	33	
	5.6	Retrofitting an automatic wiper	34	
	5.61	Removing the LIV lamp protection tube with auto-	94	
	5.0.1	matic wiper	35	
	5.6.2	Assembly and installation of the automatic wiper	37	
6	Com	missioning	42	
	6.1	Leak testing and ventilation of the radiation chamber	42	
	6.2	Switching on the UV system	42	
	6.3	Calibrating the UV sensor	43	
	6.3.1	UV Sensor calibration	43	
7	Main	tenance	44	
	7.1	Cleaning	45	
	7.1.1	Cleaning the UV lamp protection tube	45	
	7.1.2	Cleaning with a manual wiper	45	
	7.1.3	Cleaning after dismantling the UV lamp protection		
		tube	47	
	7.1.4	Cleaning with a cleaning solution	49	
	7.1.5	Cleaning the UV Sensor	50	
	7.2	Replacing the wiper elements (systems with manual wiper)	51	
	7.3	Replace the O-ring on the clamping screw	53	
	7.4	Maintenance of the automatic wiper	55	
	7.4.1	Replacing the wiper elements (UV systems with automatic wiper)	55	
	7.5	Replacing the lamp	58	
	7.6	Calibrating the UV sensor	60	
	7.7	Replacing the filter mats	60	
8	Trou	bleshooting	61	
9	Tech	nical data	64	
	9.1	Dimensions sheet	65	
	9.2	Electrical data	67	
10	Appe	andix	69	
	10.1	Spare parts 1 kW - 3 kW single UV lamp system		
		without wiper or manual wiper	69	
	10.2	Spare parts 1 kW - 3 kW single UV lamp system with automatic wiper	72	
	10.3	Spare parts 2x2 kW, 2x3 kW, 3x3 kW multiple UV		
		lamp system with automatic wiper	76	
	10.4	Dulcodes S Terminal Wiring Diagram	80	
	10.5	Dulcodes UV system unit operating log	81	
11	EC D	Declaration of Conformity	82	
12	Index			

1 About this system

Application

The Dulcodes S UV systems are used for photochemical treatment and to support the disinfection of:

- Process water
- Swimming pool water

In the treatment of swimming pool water, harmful substances, such as chloramines, can be effectively reduced by UV radiation and also germs, which are difficult to inactivate with chlorine, can be safely killed.

The Dulcodes UV systems are supplied fully wired. They are available in different versions, which are defined by their identity code. The performance data can be found in the data sheet enclosed with the Dulcodes UV system.

Scope of supply

- Radiation chamber
- Lamp with lamp protection tube
- UV-C sensor
- Temperature switch
- Control cabinet with control
- Mounting materials
- Documentation

Dependent on the system type, the system is equipped with no wiper, a manual wiper or an automatic wiper. Retrofitting with a manual or automatic wiper is easily possible.

Allocation of wiper versions to the device types

Device type	Without wiper	Manual wiper	Automatic Wiper
		(manual wiper)	(automatic wiper)
1.00 kW	Х	0	0
2.00 kW	X	0	0
3.00 kW	Х	0	0
2x2.00 kW			0
3x2.00 kW			0
3x3.00 kW			0
X = standard; O = optional; = not available			

1.1 Correct and proper use

Correct and proper use

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- The UV system is intended solely for the treatment of water.
- The UV system may only be used in accordance with the technical data and specifications outlined in the Operating Manual.
- Any other use or modification of the system is prohibited.
- The UV system must only be operated by trained and authorized personnel.
- You are obliged to observe the information contained in the operating instructions at the different phases of the device's service life.

The operator shall be liable for any damage caused by installation or operating errors.

2 Safety chapter

2.1 Explanation of the safety instructions

-	•	
Introduction		These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed safety information and are provided as clear step-by-step instructions.
		The safety information and notes are categorized according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.
		Nature and source of the danger Danger!
		 Denotes an immediate threatening danger. If this is disre- garded, it will result in fatal or very serious injuries.
		Consequence: Fatal or very serious injuries Measure to be taken to avoid this danger.
		Nature and source of the danger Warning!
		 Denotes a possibly dangerous situation. If this is disregarded, it could result in fatal or very serious injuries.
		Possible consequence: Fatal or very serious injuries Measure to be taken to avoid this danger
		Nature and source of the danger Caution!
		 Denotes a possibly dangerous situation. If not avoided, it could result in slight or minor injuries. May also be used as a warning about material damage.
		Possible consequence: Slight or minor injuries Material damage. Measure to be taken to avoid this danger.
	NOTICE	Nature and source of the danger Note!
		 Denotes a possibly damaging situation. If not avoided, the product or an object in its vicinity could be damaged.
		Damage to the product or its surroundings Measure to be taken to avoid this danger.
	•	Type of information
		Information!
		 Denotes hints on use and other especially useful information. It does not indicate a hazardous or damaging situation.

Hints on use and additional information. Source of information. Additional measures

2.2 Users' qualifications

Danger of injury with inadequately qualified personnel! – All work on the unit is to be conducted by qualified personne
only. Keep unqualified personnel away from the hazard zones.
The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled. If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

Training	Definition	
Instructed personnel	An instructed person is deemed to be a person instructed and, if required, trained in the tasks assigned and possible dangers resulting from improper behavior, as well as having been instructed in the required protective equipment and protective measures.	
Trained user	A trained user is a person who fulfills the requirements of an instructed person and who has also received additional training specific to the system from ProMinent or another authorized distribution partner.	
Trained qualified per- sonnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.	
Electrician	Electricians are deemed to be people, who are able to complete work on elec- trical systems and recognize and avoid possible dangers independently based on their technical training and experience, as well as knowledge of pertinent standards and regulations.	
	Electricians are specifically trained for the working environment in which they are employed and know the relevant standards and regulations.	
	Electricians must comply with the provisions of the applicable statutory direc- tives on accident prevention.	
Service	Service refers to service technicians, who have received proven training and have been authorized by ProMinent to work on the system.	
	Note for the system operator The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations must be observed.	

2.3 Dulcodes safety information

UV-C radiation

UV-C radiation is harmful to the eyes and skin.

- Only operate the UV lamp A when it is fully fitted and installed
- Install the UV lamp into the UV system in accordance with the regulations prior to commissioning

Possible consequence: Serious injuries

	WARNING	 Live parts! Measure: The device must be disconnected from the power supply before it is opened Disconnect damaged, defective or manipulated devices from the power supply Possible consequence: Fatal or very serious injuries Insufficient water treatment Ensure that
		 The maximum permissible water now rate is not exceeded and UV transmission does not drop below the permissible level. Otherwise adequate treatment cannot be guaranteed.
		Possible consequence: Illness Please read the technical data sheet for your UV system
		 Overheating of lamp and treatment chamber Ensure that, with the exception of when the UV lamp is warming up, there is sufficient flow through the radiation chamber so that overheating of the radiation chamber is avoided.
		 Only switch on the UV system after the radiation chamber has been filled with water. Switch the UV system off if the flow of water is interrupted.
		 Switch the OV system on in the now of water is interrupted. Possible consequence: Material damage
		Unauthorized operating parameter Ensure that
		 the installation place is dry and frost-proof, the protection of the UV system from chemicals, dyes and vapors is guaranteed, the ambient temperature and the radiation temperature in the direct vicinity of the system does not exceed 104.0°F, the maximum permissible operating pressure is not exceeded, and there are no solid particles or turbidity in the water to be treated. If necessary, install a suitable filter prior to the UV system.
		Possible consequence: Material damage
2.4 Safe	ety Equipment	
Labels on ra	idiation chamber	ATTENTION: Hazardous ultraviolet radiation
		▲ UV-C radiation is harmful to the eyes and skin. The lamps may only be operated when installed. The system is to be installed in accordance with all pertinent regulations prior to commissioning the lamps.
		ATTENTION: Hazard
		A Disconnect the system from the power supply or switch off the

▲ Disconnect the system from the power supply or switch off the main switch prior to commencing maintenance work on the system. Depressurize the radiation chamber prior to commencing maintenance work.

Labels on switch cabinet

 $\underline{\land}$ Disconnect the system from the power supply or switch off the main switch prior to opening the cabinet.

2.5 Information in the event of an emergency

In the event of an emergency, switch the red-yellow main switch on the side of the switch cabinet to *[OFF]* or disconnect from the power supply.

3 Function

The water to be treated flows through the stainless steel chamber past the UV lamp. The UV radiation kills the germs and reduces substances, such as chloramines, in the swimming pool water.

The medium pressure UV lamp used generates very high UV-C radiation output, which is particularly effective for the treatment of water. The UV lamp is located in a lamp protection tube made of high-grade quartz with a high level of UV permeability.

The compact design of the radiation chamber and the optimum flow of radiation result in evenly distributed irradiation of the entire water flow.

A control monitors the UV system along with a UV sensor.

3.1 Commissioning

Once the Dulcodes UV system has been switched on, the UV lamp is ignited. Following ignition, the UV lamp needs approx 1 - 3 minutes until it has reached its operating temperature.

The UV-C sensor monitors the UV lamp: As soon as the UV-C output has exceeded the warning threshold, the system switches to normal operation.

If the safety threshold is not exceeded within the maximum permissible warm-up time, the control switches the UV system off and goes into fault mode.

3.2 Normal mode

In normal mode, the UV sensor continues to monitor the UV output:

If the UV output falls below the warning threshold: A warning is emitted.

If the UV output falls below the safety threshold: The control switches the UV system off and goes into fault mode.

3.3 Automatic wiper

Manually triggering a wiper cycle

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During the wiping process, warning and safety thresholds are not monitored to prevent shadowing caused by the wiper from triggering a false alarm.

The wiping process is triggered upon pressing the "Enter" button in the *"Wiper"* display. This is independent from the system's *"ON"* oder *"OFF"* settings.

If you start the wiping process in warm-up mode, the warm-up process is stopped; once the wiping process has ended, the warm-up time will be restarted.

Regular wiping



During the wiping process, warning and safety thresholds are not monitored to prevent shadowing caused by the wiper from triggering a false alarm. If you activated interval wiping, a wiping cycle occurs automatically after the set interval has elapsed.

3.4 Temperature monitoring

The water temperature in the radiation chamber is monitored continuously while the UV lamp is in operation.

As soon as the water temperature exceeds the maximum temperature, the UV system goes into fault mode.

3.5 Switching off

When the OFF switch on the UV control is pressed, the UV lamp is switched off immediately.

3.6 Cool down

As the UV lamp can only be re-ignited after switching off the UV system and sufficient cooling, the system goes into cooling mode.

After the extreme key has been pressed during cool-down, the UV system only restarts automatically after the remaining cooling time has elapsed. Even if pause mode is canceled during cool-down, the UV system only restarts after the cool-down period has elapsed.



Only during service work

During the cool-down period an attempt at ignition can be made by pressing the 🕞 key.

Control 4

	NOTICE	With the exception of sensor calibration, modifications to the set- tings should only be undertaken when the UV system is switched off.
Version		As the electronics and software are always subject to improve- ments, the version number has been introduced as a means of identification. This number must be provided with complaints. It can be called up on the display.
Default settin	gs	The control used in the Dulcodes UV systems is reset in the fac- tory. Therefore, with many applications a modification of the set- tings is not required.

4.1 Display

The system is provided with a graphical LCD display.



START/STOP key

Hold down the e key for at least 2 seconds. The display will return to normal for the respective operating mode 5 minutes after the last time a key has been pressed.

In operating mode

- Display of the operating mode
- Warnings are indicated via flashing arrows and displays
 - Faults are displayed by means of a flashing fault alert

In programing mode

Flashing display of the numerical values and inputs that can be changed.



Fig. 1: Display and operating unit

Control

Destition		Prove attack
Position number	Кеу	Function
1		Housing
2		LCD display
5		UP key
		In programing mode: Raises the displayed numerical value or changes an input
7		BACK key
		Moves back one level in the menu
6	\bigcirc	DOWN key
		In programing mode: Lowers the displayed numerical value or changes an input
8	$\textcircled{(s)}{(s)}$	CHANGE key
		In operating mode: Changes the display window
		In programing mode: Changes adjustable parameters
3	STOP	START/STOP key
	START	Switches the UV system on and off
4		ENTER key
		In operating mode: Switches into programing mode or acknowledges a fault
		In programing mode: Applies a set value or mode



4.2 Operating status display and parameter settings

Fig. 2: Operating status display (with the system running)

- A + Back to Trend display
- **B** = Change to Programing mode
- C = Change to "Change Access Code" mode

Programing manual





NOTICE

NOTICE

Access code

Once the access code has been correctly entered, it is not necessary to re-enter the code for further programing processes; the flashing numbers or settings will appear directly as soon as the key is pressed. The enable code is automatically canceled 5 minutes after a key was last pressed or after a return to the Trend or Standard display.

4.2.1 Trend display



Fig. 4: Trend display

Display calibration

- Each calibration of the UV sensor is documented by a vertical continuous line in the trend display.
- The content of the trend display is deleted when the display range changes and when the operating hour counter is reset.
- 1 UV sensor signal
- 2 Warning threshold
- 3 Safety threshold
- 4 Switch on's/off's
- 5 Calibration

The trend display is used to monitor the aging of the UV-lamps, the formation of a film coating on the lamp protection tubes or changes to the water quality.

The progress of the UV sensor signal is shown in a time frame. Horizontal lines show the safety threshold and the warning threshold respectively. The short vertical lines show when the UV system is switched on. The display range of the sensor signal lies between 0% and the value, which has been assigned to the analogue output value of 20 mA. The time frame can be adjusted and guarantees an ongoing display: Once the selected time has expired, the oldest value is deleted and the new value is displayed.

Default setting

- Time frame: 100 days
- Maximum value of the UV sensor signal: 120%



4.2.2 Changing access code



Fig. 5: Changing access code

To protect against unauthorized changes of the settings, the system control has an access code for the programing mode. It can be freely selected by the operator. The programing mode is still disabled after a change of the access code. It is only unlocked when the new access code is entered.

4.2.3 Set the local language





Fig. 6: Set the local language

4.2.4 Calibrating the sensor

Default setting 1.000



Fig. 7: Calibrating the sensor



4.2.5 Triggering the wiper cycle



If an additional cleaning requirement exists, you can trigger a wiper cycle additional to those at the programed intervals by pressing the key.

Fig. 8: Triggering the wiper cycle

4.2.6 Setting the safety threshold



Fig. 9: Setting the safety threshold

WARNING
 UV lamp replacement

 Check and possibly reset the safety and warning threshold when the UV lamp is replaced.
 Only a correctly set safety threshold will guarantee adequate UV radiation.

 Possible consequence: Illness

 Monitoring the safety threshold
 During automatic wiper operation, the safety threshold is not monitored.
 Reliable and safe water treatment can no longer be guaranteed if

Reliable and safe water treatment can no longer be guaranteed if the UV-C output falls so low that the UV sensor signal falls below the safety threshold. When the signal falls below the safety threshold on the display, this is shown by two flashing arrows. A signal device can be connected to the SAFETY THRESHOLD signal relay of the control. The relay is closed when the signal falls below the safety threshold.

Setting the safety threshold



The safety threshold must be below the warning threshold. It is not possible to set it above the warning threshold.

- **1.** Switch on the UV system using the B button.
- 2. Wait until the UV lamp has reached its full capacity, i.e. the UV-C sensor signal must be stable.
- 3. _ Read the UV-C intensity displayed and note it down.
- **4.** Switch off the UV system with the 🔄 button.
- 5. Set the safety threshold to 50%.
- **6.** Now set the warning threshold.

4.2.7 Setting the warning threshold



Requirements:

- The UV-C intensity is stable.
- The safety threshold has been set.
- __ Set the warning threshold to 60%
 - ⇒ The safety and warning thresholds have been set, the system is now ready for operation and can be switched on using the key.

4.2.8 Adjusting the wiper interval

Default setting 2 hours



On systems with an automatic wiper, the interval (h:min) between wiping can be set between 1:00 and 9:59. Adjustment takes place in steps of one minute each.

Fig. 11: Adjusting the wiper interval

4.2.9 Adjusting the display range of the trend display

Default setting 100 days



Fig. 12: Adjusting the display range of the trend display

4.2.10 Analogue output UV sensor signal: Assigning the standard signal

Default setting

Analog output 0 % = 0 mA 120 % = 20 mA

Fig. 13: Analogue output UV sensor signal: Assigning the standard signal

0% = 0 mA 100% = 20 mA (depending on the settings)

NOTICE	Maximum value of the trend display The UV sensor signal assigned to the 20 mA is simultaneously the maximum value of the trend display. Adjust this UV sensor signal value to 120 % of the maximum value so that the trend display can never "overflow".
	The signal from the UV sensor can also be recorded for documen- tation purposes using a recorder. To do so, connect the recorder to the standard output of the control.
	It is possible to choose a standard signal between 0 to 20 mA and between 4 to 20 mA:
	 0 or 4 mA correspond to the 0% UV sensor signal. The 20 mA value can be allocated to any maximum % value (0 % - 999 %).

4.2.11 Pause function

Default setting

Pause on
Pause contactDefault setting: Closed (UV system starts up when the Pause contact is open)The UV system can be switched on and off by opening and closing
an external contact that is connected to the Pause input of the con-
trol. It is possible to select whether the UV system starts up with an
open or closed Pause contact.

Fig. 14: Pause function

4.2.12 Displaying/resetting the counter



OPERATING HOUR and CONNECTION counters cannot be reset.

Fig. 15: OPERATING TIMES and CONNECTIONS

400 h

LAMP HOUR and LAMP CONNECTIONS can be reset.

Lamp turn-ons

Lamp hours

25 np tum-ons

Fig. 16: LAMP HOURS and LAMP CONNECTIONS

4.2.13 Alarm signal relay

A signal device can be connected to the ALARM signal relay of the control. The relay drops out if there is a fault/malfunction or in the event of a power failure.

5 Mounting and installation

	Insufficient disinfection efficiency Ensure that
	 the maximum permissible water flow rate is not exceeded and UV transmission does not drop below the permissible level. Otherwise adequate treatment cannot be guaranteed!
	Possible consequence: Illness Please read the technical data sheet for your system.
	Unauthorized operating parameter Ensure that
	 the installation place is dry and frost-proof, the protection of the UV system from chemicals, dyes and vapors is guaranteed, the ambient temperature and the radiation temperature in the direct vicinity of the system does not exceed 104.0°F, the maximum permissible operating pressure is not exceeded, and there are no solid particles or turbidity in the water to be treated. If necessary, install a suitable filter in front of the UV system.
	Possible consequence: Material damage.
NOTICE	Switching on and off Possibility of increased wear on UV lamp Operate the UV system in such a way as to avoid switching the UV lamp on and off fre- quently.

5.1 Radiation chamber



Fig. 17: Layout of the radiation chamber with manual wiper

- 1 Mushroom knob
- 2 Clamping screw
- 3 Chamber cover
- 4 5 O-ring
- Outlet
- 6
- Centering bolt Air vent/drain/flushing connection with O-ring (depending on installation location) 7
- 8 UV sensor
- 9 O-ring

- Lamp protection tube 10
- 11 Lamp
- 12 Inlet
- 13 Wiper element
- Bracket with wiper rod 14
- Protective earth conductor cable 15
- Temperature switch 16
- Support plate for lamp protection tube 17



Fig. 18: Layout of the radiation chamber with automatic wiper

- 1. Motor
- 2. Protective cover
- 3. Chamber cover
- 4. O-ring
- 5. Outlet
- 6. Wiper rod
- 7. Air vent/drain/flushing connection with O-ring (depending on installation location)
- 8. UV sensor
- 9. O-ring

- 10. Lamp protection tube
- 11. Lamp
- 12. Inlet
- 13. Wiper element
- 14. Bracket
- 15. Protective earth conductor cable
- 16. Temperature switch
- 17. Support plate UV lamp protection tube

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5.1.1 Assembly

Location

	Location Possibility of reduced power and premature failure of lamp. The UV system must be installed in such a way that the UV lamp lies hori- zontally.
NOTICE	Maintenance work Leave adequate room for maintenance work! The clearance required can be found in the dimensions sheet enclosed (replace- ment of lamp protection tube).
	Attach the radiation chamber using appropriate fixing material (pipe clamp, frame). The installation position can in principle be chosen at random and, if required, can be adapted to conditions on site. Ensure that the UV lamp lies horizontally. In the case of UV systems equipped with manual wipers, ensure that the wiper can be operated easily.

5.1.2 Attach the warning label



The supplied self-adhesive warning label is to be attached to the radiation chamber so that it is clearly visible.

5.1.3 Hydraulic connectors

	Installation instructions Possibility of incorrect assembly Implement the hydraulic connec- tion of the radiation chamber in compliance with the applicable general guidelines and local installation regulations.
	Damage to lamp and wiper element Possibility of damage to lamp and wiper element. The UV system may only be operated when the radiation chamber is completely filled with water. In the case of an empty or only partially filled radi- ation chamber there is a risk of damaging the lamp, radiation chamber ad the wiper element. It must therefore be ensured that the radiation chamber cannot run empty when the pump is switched off.
NOTICE	 Provide valves upstream and downstream of the radiation chamber to shut off the radiation chamber for maintenance work. It is also recommended with radiation chambers, which are regularly cleaned by filling them with a cleaning solution, that the water drain and vent screws are replaced with suitable valves. With larger radiation chambers, it is recommended that they are filled through the water drain opening using an appropriate acid-resistant pump. If the radiation chamber is filled with a pump, it is also useful to circulate the cleaning solution through the air vent opening. This will shorten the cleaning time and achieve better results.

5.2 Control cabinet and control

5.2.1 Assembly



5.2.2 Electrical connections

A WARNING	 Electrical connections Please observe all generally applicable guidelines and local installation regulations. Only carry out maintenance work on the UV system when it has been disconnected from the power supply! Connect a protective earth conductor to both the radiation chamber and the cover of the chamber. Ensure a continuous power supply by means of a suitable fault current protection switch. Only an authorized electrician may open the switch cabinet. Do not extend the connecting cable for the UV lamp or the UV sensor cable. The electrical installation must be carried out by an authorized,
	 The electrical installation must be carried out by an authorized, qualified electrician using the documents supplied (wiring dia- gram).
	Possible consequence: Fatal or very serious injuries.

5.2.3 Fitting the temperature sensor

A WARNING

Overheating of radiation chamber Possible consequences: Serious injuries and property damage due to overheating. The radiation chamber may overheat if the temperature sensor is not fitted correctly.

The temperature sensor monitoring the water temperature must be screwed into the socket provided on the radiation chamber.

- **1.** Carefully push the O-ring over the thread of the temperature sensor.
- **2.** Screw the temperature sensor "finger-tight" into the sleeve.
- 3. Attach the connecting cable and fix in place.

5.3 Installing the UV lamp protection tube

5.3.1 Installing the UV lamp protection tube without the wiper

- **1.** Using a face spanner wrench, loosen the lamp protection tube bracket and remove it (place on the holes, not on the threads).
- 2. Carefully pull the transport protection (gray plastic pipe) completely out of the radiation chamber.
- 3. Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.

- **4.** Push a new O-ring onto the end of the UV lamp protection tube
- 5. A CAUTION!
 - Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the UV lamp protection tube is seated correctly.
 - The UV lamp protection tube must not project out more than 0.5" nor be offset at an angle.

Ensure that the UV lamp protection tube is seated correctly. The UV lamp protection tube must not project out more than 0.5" nor be offset at an angle.

5.3.2 Installing the UV lamp protection tube with manual wiper.

 Unsecured wiper rod An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury. Therefore always lock the wiper rod in place with the fixing bushing.
Possible material damage and slight bodily injury
Wiper rod, manual wiper Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.
 Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
 Loosen the fixing bushing from the locked position of the clamping screw.
3. Pull the wiper rod out to its stop position - it must remain in its stop position until it is pushed in again.
4. Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
5. Using a face spanner wrench, loosen the lamp protection tube bracket and remove it (place on the holes, not on the threads).
6. Carefully pull the transport protection (gray plastic pipe) completely out of the radiation chamber.
Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
 Push a new O-ring onto the end of the UV lamp protection tube.

9. A CAUTION!

- Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
- Ensure that the UV lamp protection tube is seated correctly.
 - The UV lamp protection tube must not project out more than 0.5" nor be offset at an angle.

Ensure that the UV lamp protection tube is seated correctly. The UV lamp protection tube must not project out more than 0.5" nor be offset at an angle.

10. A CAUTION!

 Push the wiper rod into the radiation chamber only if its surface is clean. Otherwise the O-ring could be damaged.

Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).

- 11. Push the wiper rod completely into the radiation chamber.
- 12. Lock the fixing bushing in the clamping screw.
- **13.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).

5.3.3 Fitting the UV lamp protection tube with automatic wiper

- 1. Using a face spanner wrench, loosen the lamp protection tube bracket and remove it (place on the holes, not on the threads).
- 2. Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **3.** Push a new O-ring onto the end of the UV lamp protection tube.
- 4. A CAUTION!
 - Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the UV lamp protection tube is seated correctly.

Ensure that the UV lamp protection tube is seated correctly. The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.

- 5. Insert the UV lamp with the cable clamp fully into the UV lamp protection tube.
- 6. Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with an Allen key.
- **7.** Push the protective cover in the longitudinal direction over the motor up to the end position.

5.4 Assembly and connection of the UV Lamp

	UV-C radiation is harmful to the eyes and skin.
	 Only start up the UV lamps when they are properly installed. Prior to commissioning, install the UV lamp into the UV system in accordance with the instructions.
	Consequence: Serious injuries
	Live parts!
	 Measure: The device must be disconnected from the power supply before it is opened.
	 Disconnect damaged, defective or manipulated devices from the power supply.
	 Do not modify the fitted UV lamp connection cable without authorization.
	 Do not modify the distance between the plug and the UV lamp cover
	 Otherwise, it cannot be guaranteed that the UV lamp lies against the closed end of the UV lamp protection tube.
	Possible consequence: Fatal or very serious injuries
	Fingerprints on the UV lamp
	 Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure.
	 For this reason always clean the lamp thoroughly with a cloth
	 Then wipe the UV lamp with a soft cloth.
	 Also thoroughly clean the glass of the UV lamp return cable.
	Possible consequence: Premature failure of the UV lamp
i	Safety switch for the UV lamp cover The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radia- tion when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.
	1. Check whether the O-ring on the lamp protection tube bracket is in the designated groove - the sealing surfaces of the O-ring must be completely smooth and clean.
	 Place the O-rings into the designated groove on the lamp protection tube bracket.
	3. Remove protective packaging from UV lamp.
	4. Wipe the UV lamp with the cleaning cloth provided.
	5. Re-wipe the UV lamp with a soft cloth.
	6. Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 3.9".
	7. Attach the UV lamp to the cable clamp using a Phillips head screwdriver.
	8. Insert the UV lamp fully into the UV lamp protection tube.
	9. Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten using the supplied Allen key.
	10. Install the safety switch of the UV lamp cover.

5.5 Retrofitting a manual wiper

Deposits of, for example iron, manganese or lime scale, can form on the lamp protection tubes during operation. As these deposits absorb UV radiation, they must be removed at regular intervals.

Should frequent cleaning of the lamp protection tubes be required, a manual wiper mechanism can be retrofitted for 1 kW, 2 kW and 3 kW system sizes.

For this purpose, the following retrofitting set is required:

Material number	UV system type
1035800	Dulcodes 1x1 S
1035801	Dulcodes 1x2 S
1035802	Dulcodes 1x3 S

5.5.1 Removing the UV lamp protection tube with manual wiper

Live parts! Measure: The device must be disconnected from the power
supply before it is opened.
 Disconnect damaged, defective or manipulated devices from the power supply.
 Do not modify the fitted UV lamp connection cable without authorization.
Possible consequence: Fatal or very serious injuries
UV-C radiation is harmful to the eyes and skin.
 Only start up the UV lamps when they are properly installed. Prior to commissioning, install the UV lamp into the UV system in accordance with the instructions.
Consequence: Serious injuries
Fingerprints on the UV lamp
 Only touch the glass of the UV lamp with cotton gloves.
 Fingerprints or impurities burn into the glass and can result in premature failure.
 For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing.
 Then wipe the UV lamp with a soft cloth.
 Also thoroughly clean the glass of the UV lamp return cable.
Possible consequence: Premature failure of the UV lamp
Wiper rod, manual wiper
 An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 Therefore always lock the wiper rod in place with the fixing bushing.
Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.

Safety switch for the UV lamp cover

The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radiation when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.

- 1. Close the shut-off valves upstream and downstream of the radiation chamber.
- **2.** Switch off the UV disinfection system with the e button.
- 3. Switch off the main switch or disconnect from the power supply.
- 4. Drain the radiation chamber.
- **5.** Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
- **6.** Loosen the fixing bushing from the locked position of the clamping screw.
- **7.** Pull the wiper rod out to its stop position it must remain in its stop position until it is pushed in again.
- **8.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 9. Remove the safety switch of the UV lamp cover.
- **10.** Loosen the attachment screws of the lamp cover using an Allen key and remove the lamp cover and the lamp.
- **11.** Put the UV lamp cover and the UV lamp aside completely.
- 12. Using a face spanner, loosen the UV lamp protection tube bracket and remove it (place on the holes not on the threads).
- **13.** Carefully remove the UV lamp protection tube completely from the radiation chamber and place on a suitable clean surface.
- 14. Remove the O-ring from the lamp protection tube.
- **15.** Wash the UV lamp protection tube with cleaning solution or immerse it in cleaning solution until the film has been removed without leaving a trace.
- **16.** Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.
- **17.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **18.** Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be smooth and clean.
- **19.** Loosen the attachment screws on the cover of the chamber.
- 20. Remove the cover of the chamber.

5.5.2 Assembly and installation of the manual wiper



Fig. 19: Components of the manual wiper on the chamber cover and lamp connection

- 1 Mushroom knob
- 2 Guide bolt
- 3 Fixing bushing
- 4 Clamping screw
- 5 Wiper rod
- 6 O-ring
- 7 Chamber cover
- 8 Lamp protection tube
- 9 O-ring
- 10 Lamp protection tube bracket
- 11 O-ring
- 12 Cable clamp
- **1.** Insert the wiper rod with the wiper element through the fixing bushing of the chamber cover.
- **2.** Attach a new O-ring to the cover of the chamber.
- 3. Screw the cover of the radiation chamber with the manual wiper to the radiation chamber so that it is moisture-proof.
- **4.** Insert the clamping screw, but do not tighten.
- 5. Screw the mushroom knob (with fixing bushing) onto the wiper rod using an SW 11 open-jaw wrench.
- **6.** Pull the wiper rod out to its stop position it must remain in its stop position until it is pushed in again.
- **7.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 8. A CAUTION! Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the lamp protection tube is seated correctly.
 - The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.

Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.

- 9. Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be completely smooth and clean.
- 10. Screw the UV lamp protection tube bracket into the cover of the chamber and tighten firmly (place on the holes not on the threads!).
- **11.** Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
- 12. A CAUTION! The seal on the wiper rod can become damaged. Only push the wiper rod into the radiation chamber if the rod's surface is clean.

Push the wiper rod completely into the radiation chamber.

- 13. Lock the fixing bushing in the clamping screw.
- **14.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 15. A CAUTION! Wiper rod, manual wiper
 - An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 - Therefore always lock the wiper rod in place with the fixing bushing.

Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.

Check whether the O-ring on the UV lamp protection tube bracket is in the designated groove - the sealing surfaces of the O-ring must be completely smooth and clean.

16. A CAUTION! When installing the lamp, rotate it in such a way that the lamp return cable is pointing downwards (between 4 o'clock and 8 o'clock). Otherwise this may result in premature failure of the UV lamp.

Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 3.9".

- **17.** Attach the UV lamp to the cable clamp using a Phillips head screwdriver.
- **18.** Insert the UV lamp fully into the UV lamp protection tube.
- **19.** Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with the Allen key.
- 20. Install the safety switch of the UV lamp cover.
- 21. Switch on the main switch or connect to the power supply.
- 22. Switch on the UV system with the e button.
- **23.** Slowly open the shut-off valve upstream of the radiation chamber.

5.6 Retrofitting an automatic wiper

Deposits of, for example iron, manganese or lime scale, can form on the lamp protection tubes during operation. As these deposits absorb UV radiation, they must be removed at regular intervals.

Should frequent cleaning of the lamp protection tubes be required, an automatic wiper can be retrofitted.

Material number	UV system type
on request	Dulcodes 1x1 S
on request	Dulcodes 1x2 S
on request	Dulcodes 1x3 S
on request	Dulcodes 2x2 S
on request	Dulcodes 2x3 S
on request	Dulcodes 3x3 S

For this purpose, the following retrofitting set is required: Automatic wiper

5.6.1 Removing the UV lamp protection tube with automatic wiper

A WARNING	 Live parts! Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply. Do not modify the fitted UV lamp connection cable without authorization. Possible consequence: Fatal or very serious injuries
	UV-C radiation is harmful to the eyes and skin.
	 Only start up the UV lamps when they are properly installed. Prior to commissioning, install the UV lamp into the UV system in accordance with the instructions.
	Consequence: Serious injuries
	 Fingerprints on the UV lamp Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure. For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing. Then wipe the UV lamp with a soft cloth. Also thoroughly clean the glass of the UV lamp return cable.
	Possible consequence: Premature failure of the UV lamp
i	Safety switch for the UV lamp cover The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radia- tion when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.
	 Close the shut-off valves upstream and downstream of the radiation chamber.
	2. Switch off the UV disinfection system with the 🗟 button.
	 Switch off the main switch or disconnect from the power supply.
	4. Drain the radiation chamber.
	5 Remove the safety switch of the UV lamp cover.

- 6. Loosen the attachment screws of the lamp cover using an Allen key and remove the lamp cover and the lamp.
- 7. Put the UV lamp cover and the UV lamp aside completely.
- 8. Using a face spanner, loosen the UV lamp protection tube bracket and remove it (place on the holes not on the threads).
- **9.** Carefully remove the UV lamp protection tube completely from the radiation chamber and place on a suitable clean surface.
- **10.** Remove the O-ring from the lamp protection tube.
- **11.** Wash the UV lamp protection tube with cleaning solution or immerse it in cleaning solution until the film has been removed without leaving a trace.
- **12.** Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.
- **13.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **14.** Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be smooth and clean.
- **15.** Loosen the attachment screws on the cover of the chamber.
- **16.** Remove the cover of the chamber.


5.6.2 Assembly and installation of the automatic wiper

Fig. 20: Assembly and installation of the automatic wiper

- **1.** Grease the X-ring (1) on the inside diameter using Carbaflo 2371 (TN1026526) and insert it into the cover (2).
- 2. Screw the bearing cover (3) onto the chamber cover (2) using the screws (4).
- 3. Push the O-ring (5) onto the spacer rod (6).
- **4.** Press the spacer rod (6) into the chamber cover (2) and screw it in with the fastening set (7).
- **5.** Push the wiper rod (8) through the chamber cover (2) into the bearing cover (3).
- **6.** Secure the wiper rod (8) with the safety collar/supporting washer (9).



7. Push the bracket (10) onto the opposing spacer rod (6), so that the wiper cannot tilt.



- 8. Push the support plate (11) with the slide bearing to the front onto the threaded rod.
- 9. Screw the support plate (11) on to the spacer rods (6) using the fastening set (12).
- **10.** Clip the bearing ring (13) centrally on the support plate (11)



- **11.** Screw the distance pin (14) into the chamber cover (2).
- **12.** Screw the adapter plate (15) with the hexagon screws/lock washer onto the distance pin (14).
- **13.** Push the hexagon sleeve (16) onto the hexagon axle of the wiper rod (8).
- **14.** Screw the actuator drive motor (17) to the adapter plate (15) using the fastening set (18).





Fig. 21: Adjustment instructions end stop (all dimensions in "mm")

15. Now adjust the end position of the wiper. This is described in the adjustment instructions of the actuator motor. Adjust the wiper so that the wiper stops 0.4" or 0.2" in front of the stops as shown in Fig. 21.

A CAUTION! Inspect the UV lamp protection tube for damage.

- You must not refit a damaged UV lamp protection tube.
- Ensure that the UV lamp protection tube is seated correctly.
 - The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.
- **16.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **17.** Push a new O-ring onto the end of the UV lamp protection tube.
 - ⇒ The sealing surfaces of the O-ring must be completely smooth and clean.
- I Place on the holes and not on the threads.
- **18.** Screw the UV lamp protection tube bracket into the chamber cover and tighten the screws.
- 19. Condition of the O-rings Check whether the O-ring on the UV lamp protection tube bracket is seated in the designated groove. The sealing surfaces of the O-ring must be completely smooth and clean.

Insert the UV lamp into the UV lamp protection tube.

- ⇒ The UV lamp must project approx. 3.9".
- **20.** Secure the the UV lamp to the cable clamp using a Phillips screwdriver.
- **21.** Completely insert the UV lamp into the UV lamp protection tube.
- **22.** Place the UV lamp cover onto the UV lamp protection tube bracket.
- **23.** Screw the UV lamp cover onto the bracket using an Allen key.
- **24.** Install the safety switch of the UV lamp cover.



- **25.** Push the the protective cover (19) in the longitudinal direction up to the end position over the actuator motor (17).
- 26. Switch the main switch on, or insert the plug in a power outlet
- 27. Switch the UV system on using the STOP/START button.
- **28.** Slowly open the shut-off valves upstream and downstream of the radiation chamber.

6 Commissioning

6.1 Leak testing and ventilation of the radiation chamber

Using your fingers, tighten the clamping screw on the wiper rod just until water stops leaking under operating pressure.

- **1.** Open the air vent on the radiation chamber.
- 2. Slowly open the shut-off valve upstream of the radiation chamber.
- **3.** Fill the radiation chamber until water emerges from the vent screw.
- 4. Close the air vent screw this takes very little effort.
- 5. Check that the radiation chamber is not leaking.
- 6. Open the shut-off valve downstream from the radiation chamber (only necessary with a manual shut-off valve).

6.2 Switching on the UV system

Only switch on the UV system after the radiation chamber has been filled with water.

The power of system types Dulcodes 1x2 S to 3x3 S can be manually controlled in three steps by a step switch.

Setting the steps

- Step 1: 50% of the stated rated power in kW
- Step 2: 75% of the stated rated power in kW
- Step 3: 100% of the stated rated power in kW

Setting the power output allows the system to be adjusted to the load of the pool. If the chloramine contamination is low then the system power can be reduced.

- **1.** Switch the main switch on.
- **2.** Check the control parameters in programing mode. If necessary, change them.
- 3. NOTICE! Ensure that the UV lamp is started at maximum output. Set the manual step switch to the maximum UV lamp output (100%).

Switch the UV system on using the ekey, keep the key pressed down for at least 2 seconds.

- **4.** Should the control go into PAUSE mode, activate the Pause contact.
 - ⇒ Once the lamp has ignited, it will take approx. 1 3 minutes until the full UV output has been reached.

6.3 Calibrating the UV sensor



6.3.1 UV Sensor calibration

Calibration

- 1. Press the Skey to go to the SENSOR CALIBRATION display.
- 2. Confirm with the 😒 key; REQUEST ACCESS CODE will appear on the display.
- **3.** \blacktriangleright Enter the access code and confirm with the \bigcirc key.
 - ⇒ SENSOR CALIBRATION re-appears. Adjustable values are flashing.
- **4.** Using the O and O keys to adjust the UV sensor value to 100%.
- 5. Confirm by pressing 🛞 key.
 - ⇒ The message "Saving data" appears briefly. The UV sensor is now calibrated.
- 6. Use the low key to exit the programing mode.
 - ⇒ The Dulcodes UV disinfection system is now ready for operation.

7	Maintenance	tenance			
		UV-C radiation UV-C radiation is harmful to the eyes and skin.			
		 Only operate the UV lamp when it is fully installed. Install the UV lamp into the UV system in accordance with the regulations prior to commissioning. 			
		Possible consequence: Serious injuries			
		 Live parts! Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply. 			
		Possible consequence: Fatal or very serious injuries			
	CAUTION NOTICE	General safety measures Depressurize the radiation chamber before commencing any main- tenance work. Dirty filter mats on the fan and air outlet filter can lead to the control cabinet overheating and becoming damaged.			
		Maximum permissible service life he UV lamps should be replaced at the latest after their maximum permissible service life. Otherwise, the operating safety of the UV system is no longer warranted. The maximum permissible service life is 8,000 operating hours, unless otherwise stated in the enclosed data sheet.			
	i	Safety switch for the UV lamp cover The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radia- tion when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.			
		The maintenance of the UV system is limited to cleaning the UV lamp protection tube and the sensor window as well as the replacement of the UV lamp at the end of its maximum permissible life time. On systems with manual wipers, the wiper element and the O-ring of the clamping screw must also be replaced.			
		On systems, which have a fan in the switch cabinet, the filter mats of the fan and the air outlet filter on the switch cabinet must be replaced regularly (normally once per year). An operating log should be kept as a record; a form is included in the Appendix.			

7.1 Cleaning

7.1.1 Cleaning the UV lamp protection tube

	Unsuitable cleaning agents – Do not use corrosive acids or acids that could cause stress	
	 Bo not use consideracids of acids that could cause stress cracks, such as hydrochloric acid. Read the safety data sheet for the cleaning agent selected. Wear protective clothing when cleaning (protective eye wear, protective gloves, etc.). Ensure that no cleaning solution will penetrate the lamp protection tube. Ensure, when cleaning UV systems that no cleaning solution will enter the piping. 	
	Possible bodily injury / material damage to the UV systems	
NOTICE	Cleaning time Clean the tube at the very latest when the UV sensor signal falls below the warning threshold, without this being based on other causes, such as aging of the UV lamp or significant deterioration of the UV transmission.	
NOTICE	Disposal of cleaning agent Possible environmental hazard Dispose of the waste cleaning solu- tion in accordance with the pertinent guidelines and regulations.	
	Deposits of, for example iron, manganese or lime scale, can form on the UV lamp protection tubes during operation. As these deposits absorb UV radiation, they must be removed at regular intervals.	
	Annual cleaning of the UV lamp protection tubes when replacing the UV lamp suffices for many UV systems. Clean more frequently when operating with types of water that have a tendency to become dirty. The UV lamp protection tubes can be cleaned man- ually when dismantled or can be cleaned by filling the radiation chamber with a cleaning solution. Acids, such as diluted phos- phoric acid, acetic acid or diluted nitric acid, are particularly suit- able for cleaning.	
i	Cleaning agents for manual cleaning In spite of cleaning with a wiper, we recommend manual cleaning using cleaning solution, when you remove the UV lamp protection tube within the scope of UV lamp replacement.	
	On systems, which are fitted with manual wipers, the UV lamp pro- tection tubes can be cleaned while still installed using the manual wiper.	
	In UV systems with automatic wipers, cleaning of the lamp protec- tion tube while fitted is carried out every 2 years, dependent on the	

7.1.2 Cleaning with a manual wiper

A CAUTION

Wiper rod, manual wiper

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set wiper interval (presetting 2 h).

- An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 - Therefore always lock the wiper rod in place with the fixing bushing.

Possible material damage and slight bodily injury When working on UV systems with manual wipers, take care to avoid bending the projecting wiper rod.



Fig. 22: Components of the manual wiper on the chamber cover and lamp connection

- 1 Mushroom knob
- 2 Guide bolt
- 3 Fixing bushing
- 4 Clamping screw
- 5 Wiper rod
- 6 O-ring
- 7 Chamber cover
- 8 Lamp protection tube
- 9 O-ring
- 10 Lamp protection tube bracket
- 11 O-ring
- 12 Cable clamp
- **1.** Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
- **2.** Secure the handle to prevent it from thrusting backwards.
- **3.** Loosen the fixing bushing from the locked position of the clamping screw.
- **4.** Pull or slide the wiper rod out of the radiation chamber until it reaches its stop position.
- 5. CAUTION! The seal on the wiper rod can become damaged. Possible consequence: Leakage Only push the wiper rod with a clean surface into the radiation chamber.

Push the wiper rod completely into the radiation chamber.

- 6. Repeat the wiping process as often as is necessary until the display of the UV intensity on the control indicates a sufficiently high value.
- 7. Push the wiper rod completely into the radiation chamber.
- 8. Lock the fixing bushing in the clamping screw.
- **9.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- **10.** Flush the dissolved dirt and impurities out of the radiation chamber with clean water (flushing connections).
- **11.** Connect the radiation chamber hydraulically to the complete system (shut-off valves).

Cleaning with a manual wiper



7.1.3 Cleaning after dismantling the UV lamp protection tube

i	For systems without manual wipers, the irrelevant points can be skipped.		
	UV-C radiation UV-C radiation is harmful to the eyes and skin.		
	 Only start up the UV lamps when they are properly installed. Install the UV lamp into the UV system in accordance with the regulations prior to commissioning. 		
	Possible consequence: Serious injuries		
	 Live parts! Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply. 		
	Possible consequence: Fatal or very serious injuries		
	 Wiper rod, manual wiper An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury. Therefore always lock the wiper rod in place with the fixing busies. 		
	Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.		
	 Fingerprints on the UV lamp Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure. For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing. Then wipe the UV lamp with a soft cloth. 		
	 Also thoroughly clean the glass of the UV lamp return cable. 		
	Possible consequence: Premature failure of the UV lamp		
i	<i>Cleaning the UV Sensor Every time you clean the UV lamp protection tube, also clean the UV sensor.</i>		
i	Safety switch for the UV lamp cover The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radia- tion when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.		
Cleaning after dismantling the UV lamp protection tube	 Close the shut-off valves upstream and downstream of the radiation chamber. 		
	2. Switch off the UV system with the 🗐 button.		
	Switch off the main switch or disconnect from the power supply.		
	4. Drain the radiation chamber.		
	5. Remove the safety switch of the UV lamp cover.		
	6. Loosen the attachment screws of the lamp cover using an Allen key and remove the lamp cover and the lamp.		
	7. Put the UV lamp cover and the UV lamp aside completely.		

- **8.** Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
- **9.** Loosen the fixing bushing from the locked position of the clamping screw.
- **10.** Pull the wiper rod out to its stop position it must remain in its stop position until it is pushed in again.
- **11.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 12. Using a face spanner wrench, loosen the UV lamp protection tube bracket and remove it (place on the holes not on the threads).
- **13.** Carefully remove the UV lamp protection tube completely from the radiation chamber and place on a suitable clean surface.
- **14.** Remove the O-ring from the lamp protection tube.
- **15.** Wash the UV lamp protection tube with cleaning solution or immerse it in cleaning solution until the film has been removed without leaving a trace.
- **16.** Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.
- **17.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **18.** Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be smooth and clean.
- 19. A CAUTION! Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the lamp protection tube is seated correctly.
 - The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.

Screw the UV lamp protection tube bracket into the cover of the chamber and tighten firmly (place on the drill holes - not on the threads!)

20. A CAUTION! The seal on the wiper rod can become damaged. Only push the wiper rod into the radiation chamber if the rod's surface is clean.

Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).

- **21.** Push the wiper rod completely into the radiation chamber.
- **22.** Lock the fixing bushing in the clamping screw.
- **23.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 24. A CAUTION! Wiper rod, manual wiper
 - An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 - Therefore always lock the wiper rod in place with the fixing bushing.

Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.

Check whether the O-ring on the UV lamp protection tube bracket is in the designated groove - the sealing surfaces of the O-ring must be completely smooth and clean. 25. A CAUTION! When fitting the UV lamp, rotate it so that the UV lamp return cable is directed downwards. Otherwise this may result in premature failure of the UV lamp.

Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 3.9".

- **26.** Attach the UV lamp to the cable clamp using a Phillips head screwdriver.
- 27. Insert the UV lamp fully into the UV lamp protection tube.
- **28.** Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with the Allen key.
- 29. Install the safety switch of the UV lamp cover.
- **30.** Attach the pin plug with the UV lamp connection cable to the terminal on the UV lamp cover and fix in place with the knurled nut.
- 31. Switch on the main switch or connect to the power supply.
- 32. Switch on the UV system using the e button.
- **33.** Slowly open the shut-off valve upstream of the radiation chamber.
- **34.** Open the shut-off valve downstream of the radiation chamber (only necessary with a manual shut-off valve).

7.1.4 Cleaning with a cleaning solution

NOTICE	Handling the cleaning solution
	 It is also recommended with radiation chambers, which are regularly cleaned by filling them with a cleaning solution, that the water drain and vent screws are replaced with suitable valves. With larger radiation chambers, it is recommended that they are filled through the water drain opening using an appropriate acid-resistant pump. If the radiation chamber is filled with a pump, it is also useful to circulate the cleaning solution through the air vent opening. This will shorten the cleaning time and achieve better results. If the cleaning solution is collected and stored in a suitable storage tank, it can be reused several times.
Cleaning the lamp protection tubes by	1. Switch off the UV system using the 🞯 button.
filling the radiation chamber with a cleaning solution:	2. Switch off the main switch or disconnect from the power supply.
	3. Close the shut-off valves upstream and downstream of the radiation chamber.
	4. Drain the radiation chamber
	5. Screw in the water drain screw again and tighten; this requires very little effort.
	6. Fill the radiation chamber with the cleaning solution through the vent opening.
	Allow the cleaning solution to work for at least 20 minutes.
	7. Open and remove the water drain screw.

- **8.** Drain the radiation chamber and dispose of the cleaning solution in accordance with the pertinent regulations.
- **9.** Flush the radiation chamber thoroughly with clean water until any cleaning solution residue has been removed.
- **10.** Screw in the water drain screw and tighten; this requires very little effort.
- **11.** Slowly open the shut-off valve upstream of the radiation chamber.
- **12.** Fill the radiation chamber until water emerges from the vent screw.
- **13.** Close the air vent screw and tighten; this requires very little effort.
- **14.** Open the shut-off valve downstream from the radiation chamber (only necessary with a manual shut-off valve).
 - ⇒ Check that the radiation chamber is not leaking.
- 15. Switch on the main switch or connect to the power supply.
 - \Rightarrow The UV system is again ready for operation.

7.1.5 Cleaning the UV Sensor

- 1. Loosen the sensor connection cable from the UV sensor.
- 2. Twist the UV sensor out of the radiation chamber.
- 3. Clean the quartz window with a cloth that has been saturated with cleaning solution until the coating has been removed without leaving a trace.
- **4.** Rinse the quartz window with clean water and dry with a soft cloth.
- **5.** Examine the O-ring for damage and replace any damaged seals.
- **6.** Screw in the UV sensor again and tighten; this requires very little effort.
- 7. Connect the sensor connection cable to the UV sensor.
- **8.** Slowly open the shut-off valve upstream of the radiation chamber.
- **9.** Fill the radiation chamber until water emerges from the vent screw.
- **10.** Close the air vent screw and tighten; this requires very little effort.
- **11.** Open the shut-off valve downstream from the radiation chamber (only necessary with a manual shut-off valve).
 - \Rightarrow Check that the radiation chamber is not leaking.
- 12. Switch on the main switch or connect to the power supply.
 - \Rightarrow The UV system is again ready for operation.

7.2 Replacing the wiper elements (systems with manual wiper)

Maintenance interval: 1 - 2 years

	UV-C radiation UV-C radiation is harmful to the eyes and skin.
	 Only start up the UV lamps when they are properly installed. Install the UV lamp into the UV system in accordance with the regulations prior to commissioning.
	Possible consequence: Serious injuries
	 Live parts! Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply.
	Possible consequence: Fatal or very serious injuries
	Wiper rod, manual wiper
	 An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury. Therefore always lock the wiper rod in place with the fixing
	bushing.
	Possible material damage and slight bodily injury When working on UV systems with manual wipers, take care to avoid bending the projecting wiper rod.
	Fingerprints on the UV lamp
	 Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure.
	 For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing.
	 Then wipe the UV lamp with a soft cloth.
	- Also thoroughly clean the glass of the UV lamp return cable.
Poplacing the winer elements	A Switch off the LIV system using the Shutter
Replacing the wiper elements	 Switch off the main switch or disconnect from the newer
	supply.
	3. Close the shut-off valves upstream and downstream of the radiation chamber.
	4. Drain the radiation chamber.
	5 Remove the safety switch of the UV lamp cover.
	6. Loosen the attachment screws of the UV lamp cover using the enclosed Allen key and remove the lamp cover and the UV lamp.
	7. Put the UV lamp cover and the UV lamp completely aside.
	 Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).
	 Loosen the fixing bushing from the locked position of the clamping screw.
	10. Pull the wiper rod out to its stop position - it must remain in its stop position until it is pushed in again.
	11. Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).

- 12. Using a face spanner wrench, loosen the UV lamp protection tube bracket and remove it (place on the holes not on the threads).
- **13.** Carefully remove the UV lamp protection tube completely from the radiation chamber and place on a suitable clean surface.
- **14.** Remove the O-ring from the lamp protection tube.
- **15.** Wash the UV lamp protection tube with cleaning solution or immerse it in cleaning solution until the film has been removed without leaving a trace.
- **16.** Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.
- 17. Remove the screws of the cover of the radiation chamber.
- **18.** Carefully place the radiation chamber cover and the fully removed wiper rod in a suitable, clean spot.
- 19. Remove one hexagonal screw from a wiper.
- 20. Remove the old wiper element from the side.
- **21.** Insert the new wiper element from the side the wiping lip must point away from the radiation chamber.
- **22.** Insert the Allen screw with the socket into the wiper and tighten.
- 23. NOTICE! The wiper element must sit loosely in the wiper even when the Allen screw is tightened. If this is not the case, eliminate the cause or use another wiper element.

Fit a new O-ring to the cover of the radiation chamber.

- **24.** Carefully insert the radiation chamber cover with the wiper rod still fully pulled out into the radiation chamber the wiper rod must sit in its fixture on the radiation chamber cover and remain there until the lamp protection tube is fitted.
- **25.** Screw the cover of the radiation chamber onto the radiation chamber so that it is moisture-proof.
- **26.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **27.** Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be completely smooth and clean.
- 28. A CAUTION! Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the lamp protection tube is seated correctly.
 - The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.

Screw the UV lamp protection tube bracket into the cover of the chamber and tighten firmly (place on the drill holes - not on the threads!)

29. CAUTION! The seal on the wiper rod can become damaged. Only push the wiper rod into the radiation chamber if the rod's surface is clean.

Loosen the clamping screw slightly (approx. 1/4 turn in an counter-clockwise direction).

- 30. Push the wiper rod completely into the radiation chamber.
- **31.** Lock the fixing bushing in the clamping screw.

- **32.** Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).
- 33. A CAUTION! Wiper rod, manual wiper
 - An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 - Therefore always lock the wiper rod in place with the fixing bushing.

Possible material damage When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.

Check whether the O-ring on the UV lamp protection tube bracket is in the designated groove - the sealing surfaces of the O-ring must be completely smooth and clean.

34. CAUTION! When fitting the UV lamp, rotate it so that the UV lamp return cable is directed downwards. Otherwise this may result in premature failure of the UV lamp.

Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 3.9".

- **35.** Attach the UV lamp to the cable clamp using a Phillips head screwdriver.
- 36. Insert the UV lamp fully into the UV lamp protection tube.
- **37.** Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with an Allen key.
- **38.** Install the safety switch of the UV lamp cover.
- **39.** Switch on the main switch or connect to the power supply.
- **40.** Switch on the UV system using the e button.
- **41.** Slowly open the shut-off valve upstream of the radiation chamber.
- **42.** Open the shut-off valve downstream of the radiation chamber (only necessary with a manual shut-off valve).

7.3 Replace the O-ring on the clamping screw.

Maintenance interval: 1 year



Wiper rod, manual wiper

Possible material damage and slight bodily injury When working on systems with manual wipers, take care to avoid bending the projecting wiper rod.



Fig. 23: Components of the manual wiper on the chamber cover and lamp connection

- 1 Mushroom knob
- 2 Guide bolt
- 3 Fixing bushing
- 4 Clamping screw
- 5 Wiper rod
- 6 O-ring
- 7 Chamber cover
- 8 Lamp protection tube
- 9 O-ring
- 10 Lamp protection tube bracket
- 11 O-ring
- 12 Cable clamp
- **1.** Depressurize the radiation chamber.
- **2.** Loosen the clamping screw slightly (approx. 1/4 turn in an anti-clockwise direction).
- **3.** Loosen the fixing bushing from the locked position of the clamping screw.
- **4.** Fully remove the wiper rod.
- 5. Unscrew the mushroom handle from the wiper rod using an SW 11 open-jaw wrench.
- 6. Push the wiper rod approx. 5.9" into the radiation chamber.
- **7.** Remove the clamping screw.
- 8. Pull the wiper rod fully out again it will pull out the O-ring at the same time.
 - \Rightarrow Clean the wiper rod if required.
- 9. Replace the O-ring.
- **10.** Fit the clamping screw but do not tighten firmly.
- **11.** Screw the mushroom knob (with fixing bushing) onto the wiper rod using an SW 11 open-jaw wrench.
- 12. A CAUTION! The seal on the wiper rod can become damaged. Possible consequence: Leakage Only push the wiper rod with a clean surface into the radiation chamber.

Push the wiper rod completely into the radiation chamber.

13. Lock the fixing bushing in the clamping screw.

14. *i* Using your fingers, tighten the clamping screw on the wiper rod just until water stops leaking under operating pressure.

Tighten the clamping screw slightly using your fingers (approx, 1/4 turn in a clockwise direction).

- A CAUTION! Wiper rod, manual wiper
- An unsecured wiper rod can shoot out of the radiation chamber under operating pressure and cause injury.
 - Therefore always lock the wiper rod in place with the fixing bushing.

Possible material damage and slight bodily injury When working on UV systems with manual wipers, take care to avoid bending the projecting wiper rod.

7.4 Maintenance of the automatic wiper

Maintenance interval: 1 year



Fig. 24: Spare parts kit TN1037735

You must replace these components after an operating period of one year.

7.4.1 Replacing the wiper elements (UV systems with automatic wiper)

Maintenance interval: 1 year

UV-C radiation UV-C radiation is harmful to the eyes and skin.	
 Only start up the UV lamps when they are properly installed. Install the UV lamp into the UV system in accordance with the regulations prior to commissioning. 	
Possible consequence: Serious injuries	

	 Live parts! Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply.
	Possible consequence: Fatal or very serious injuries
	 Fingerprints on the UV lamp Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure.
	 For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing.
	 Then wipe the UV lamp with a soft cloth. Also thoroughly clean the glass of the UV lamp return cable.
	Possible consequence: Premature failure of the UV lamp
i	Safety switch for the UV lamp cover The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radia- tion when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started.
Replace the wiper elements.	 Switch off the UV system using the elimination
	 Switch off the main switch or disconnect from the power supply.
	 Close the shut-off valves upstream and downstream of the radiation chamber.
	4. Drain the radiation chamber.
	5. Remove the safety switch of the UV lamp cover.
	6. Loosen the attachment screws of the UV lamp cover using the enclosed Allen key and remove the lamp cover and the UV lamp.
	Put the UV lamp cover and the UV lamp completely aside.
	8. Pull off the protective cover over the motor in the longitudinal direction
	9. Using a face spanner wrench, loosen the UV lamp protection tube bracket and remove it (place on the holes - not on the threads).
	10. Carefully remove the UV lamp protection tube completely from the radiation chamber and place on a suitable clean surface.
	11. Remove the O-ring from the lamp protection tube.
	12. Wash the UV lamp protection tube with cleaning solution or immerse it in cleaning solution until the film has been removed without leaving a trace.
	13. Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.
	14. Remove the screws of the cover of the radiation chamber.
	15. Carefully lay the radiation chamber cover and the wiper unit in a suitable, clean place.
	16. Remove one hexagonal screw from a wiper.



Fig. 25: Wiper element

- **17.** Remove the old wiper element (1) from the side.
- **18.** Insert the new wiper element (1) from the side the wiping lip must point away from the radiation chamber.
- **19.** Insert the Allen screw with the socket into the wiper and tighten.
- 20. NOTICE! The wiper element must sit loosely in the wiper even when the Allen screw is tightened. If this is not the case, eliminate the cause or use another wiper element.

Fit a new O-ring to the cover of the radiation chamber.

- **21.** Carefully insert the radiation chamber cover with the wiper unit into the radiation chamber.
- **22.** Screw the cover of the radiation chamber onto the radiation chamber so that it is moisture-proof.
- **23.** Carefully push the UV lamp protection tube into the radiation chamber until it reaches its stop position.
- **24.** Push a new O-ring onto the end of the UV lamp protection tube the sealing surfaces of the O-ring must be completely smooth and clean.
- 25. A CAUTION! Check the UV lamp protection tube for damage before fitting.
 - A damaged UV lamp protection tube must not be refitted.
 - Ensure that the lamp protection tube is seated correctly.
 - The UV lamp protection tube may not project by more than 0.5" and must not be offset at an angle.

Screw the UV lamp protection tube bracket into the cover of the chamber and tighten firmly (place on the drill holes - not on the threads!)

26. Insert the UV lamp with the cable clamp fully into the UV lamp protection tube.

- **27.** Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with an Allen key.
- 28. Install the safety switch of the UV lamp cover.
- **29.** Push the protective cover in the longitudinal direction over the motor up to the end position.
- 30. Switch on the main switch or connect to the power supply.
- **31.** Switch on the UV system using the e button.
- **32.** Slowly open the shut-off valve upstream of the radiation chamber.
- **33.** Open the shut-off valve downstream of the radiation chamber (only necessary with a manual shut-off valve).

7.5 Replacing the lamp

	Live parts!		
	 Measure: The device must be disconnected from the power supply before it is opened. Disconnect damaged, defective or manipulated devices from the power supply. 		
	Possible consequence: Fatal or very serious injuries		
	UV-C radiation UV-C radiation is harmful to the eyes and skin.		
	 Only start up the UV lamps when they are properly installed. Install the UV lamp into the UV system in accordance with the regulations prior to commissioning. 		
	Possible consequence: Serious injuries		
	Insufficient treatment efficiency		
	 The UV lamps must be replaced with new lamps as soon as: The sensor signal approaches the minimum safety threshold unless traced back to another cause, such as formation of a coating on the lamp protection tubes or a serious deterioration of the UV transmission; The operating life of the UV lamp is approaching or has exceeded its maximum service life. 		
	Possible consequence: Illness Please read the Technical Data Sheet enclosed with the respective UV system.		
	 Fingerprints on the UV lamp Only touch the glass of the UV lamp with cotton gloves. Fingerprints or impurities burn into the glass and can result in premature failure. For this reason always clean the lamp thoroughly with a cloth moistened with alcohol before installing. Then wipe the UV lamp with a soft cloth. Also thoroughly clean the glass of the UV lamp return cable. 		
	Possible consequence: Premature failure of the UV lamp		
NOTICE	Clean the lamp protection tubes each time a lamp is replaced. Dispose of used lamps in accordance with the applicable guidelines and directives. Usually these can be disposed of together with used fluorescent tubes.		

Safety switch for the UV lamp cover 7 The UV lamp cover is protected by a safety switch. The safety switch has a reed switch and comprises two components. The safety switch ensures that the UV lamp only generates UV radiation when the switch is installed. If the safety switch is removed, the UV lamp switches off. If the safety switch is not installed and thus remains closed, e.g. after installation and maintenance work, the UV lamp cannot be started. 1. Switch off the UV system using the e button. 2. Switch off the main switch or disconnect from the power supply. 3. Close the shut-off valves upstream and downstream of the radiation chamber. 4. Remove the safety switch of the UV lamp cover. 5. Loosen the attachment screws of the lamp cover using an Allen key, remove the lamp cover and pull out the lamp by approximately 3.9". 6. Loosen the UV lamp at the cable clamp using a Phillips head screwdriver. 7. Fully remove the UV lamp and lay it aside. 8. Check whether the O-ring on the UV lamp protection tube bracket is in the designated groove - the sealing surfaces of the O-ring must be completely smooth and clean. A CAUTION! When fitting the UV lamp, rotate it so that the 9. UV lamp return cable is directed downwards. Otherwise this may result in premature failure of the UV lamp.

Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 3.9".

- **10.** Attach the UV lamp to the cable clamp using a Phillips head screwdriver.
- $\fbox{11.}$ Insert the UV lamp fully into the UV lamp protection tube.
- **12.** Place the UV lamp cover onto the UV lamp protection tube bracket and, using the attachment screws provided, screw in and tighten with an Allen key.
- **13.** Install the safety switch of the UV lamp cover.
- **14.** Switch on the main switch or connect to the power supply.
- **15.** Switch on the UV system with the button.
- **16.** Slowly open the shut-off valve upstream of the radiation chamber.
- **17.** Open the shut-off valve downstream of the radiation chamber (only necessary with a manual shut-off valve).

Insufficient treatment efficiency

Possible consequence: Death or illness Check safety and warning threshold. Check and possibly reset the safety and warning threshold when the UV lamp is replaced. Only a correctly adjusted safety threshold will guarantee adequate treatment.

- **1.** With the system switched off, use the S key to display the UV lamp hours and UV lamp connections.
- 2. Confirm using the 🔯 key the "Request Access Code" display will appear.
- 3. Enter the access code and confirm with the 🕥 key the "Reset" display will appear.

Reset UV lamp hours and UV lamp connections.

4. Confirm with the 💿 key - the display will now be reset.

7.6 Calibrating the UV sensor

Calibrate the UV-C sensor compliant to the specifications, see *Chapter 6.3 "Calibrating the UV sensor" on page 43*

7.7 Replacing the filter mats

Replacement of the filter mats on the fan and the air outlet filter

General safety measures

Dirty filter mats on the fan and air outlet filter can lead to the control cabinet overheating and becoming damaged.

Replace the filter mats on the fan and the air outlet filter at least once per year. The filter mats must be replaced at shorter intervals in unfavorable ambient conditions.

- **1.** Switch off the UV system using the e button.
- 2. Switch off the main switch
- 3. Remove the cover of the fan. To do so, insert your fingers into the recesses on the bottom of the cover and remove the cover
- **4.** Remove the dirty filter mat and insert a new filter mat with the white side facing inwards (control cabinet side).
- 5. Replace the filter mat on the air outlet filter as described above
- 6. Switch on the main switch.

8 Troubleshooting



7

Live parts!

- Measure: The device must be disconnected from the power supply before it is opened.
- Disconnect damaged, defective or manipulated devices from the power supply.
- Troubleshooting on the open control cabinet and the replacement of components may only be done by an authorized electrician.

Possible consequence: Fatal or very serious injuries



Fig. 26: Warning threshold transgressed



Fig. 27: Safety threshold transgressed

After acknowledging the fault message

If you have acknowledged a fault, the UV system will switch from the [Fault] state to the [Off] state. Before starting the UV system, you must check whether possibly implemented troubleshooting measures were successful. Only after clearing all fault-related errors does a new start make sense.

I	Fault alert*	Possible cause	Remedy
	Warning threshold transgressed Message: Down arrow	Lamp output too low	Increase lamp output (using the manual rotary dial on systems with output control).
	Safety threshold transgressed	Coating formed on	Clean lamp protec- tion tube and UVC sensor.
Message: UV sensor	Message: UV sensor	tube and/or the UVC sensor.	
		Deterioration in the UV-transmission of the water to be treated.	Improve water quality Possible cause UV lamp at the end of its service life
		UV lamp at the end of its UV emission service life	Replace the UV sensor.
		UV sensor not cali- brated	Calibrating UV Sensor, see <i>Chapter 6.3 "Calibrating the UV</i> sensor" on page 43

*Acknowledge the fault alert with the 🕥 key.

Troubleshooting

	Fault alert*	Possible cause	Remedy
Fault	Safety threshold	UV lamp defective	Replace UV lamp.
Lown foult	transgressed Message: Lamp fault; UV sensor 0%	Starters defective	Replace starters.
	*Acknowledge the fault alert with the 🕞 key.		





Fig. 29: Message: Excess temperature



Fig. 30: Flashing double arrow during calibration



Fig. 31: Message: Other faults



Display	Possible cause	Remedy	
Flashing double arrow during calibra- tion	UV lamp protection tube and/or UV sensor are dirty.	Clean UV lamp pro- tection tube and/or UV sensor.	
	UV sensor defective	Use a new UV sensor.	
If a flashing double arrow appears in the calibration display instead of the sensor signal, the sensor signal is too weak for			

correct calibration. Calibration cannot be performed.

Fault alert*	Possible cause	Remedy					
Message: Other faults	External fault signal device triggered	Eliminate cause of external fault.					
	No external fault signal device con- nected and the con- tacts at the fault input are not bridged	Bridge contacts at fault input.					
*Acknowledge the fault alert with the 💿 key.							

Fig. 32: Message: Memory error

–	Fault alert*	Possible cause	Remedy		
Fault	Message: Memory error or Message: Default setting	During self-testing, the control has detected an error in the memory.	Replace the control (only an electrician is authorized to do so).		
Default setting	*Acknowledge the fa	*Acknowledge the fault alert with the 🕥 key.			

Fig. 33: Message: Default setting

9 Technical data

Performance data

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NOTICE
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Data sheet

This technical data supplements the enclosed data sheet. If in doubt, the information on the data sheet applies.

Туре	Number of lamps	Lamp output	power input
1x1S	1	0.78 kW	0.90 kW
1x2S	1	2.00 kW	2.10 kW
1x3S	1	3.00 kW	3.20 kW
2x2S	2	4.00 kW	4.20 kW
2x3S	2	6.00 kW	6.20 kW
3x3S	3	9.00 kW	9.20 kW

Туре	Max. flow*		Connector Nominal width can be selected			
1x1S	1,871.7 cubic feet/h	225 GPM	DN 100/125	ANSI 4"		
1x2S	3,143 cubic ft/h	392 GPM	DN 125/150	ANSI 6"		
1x3S	6,250.1cubic ft/h	779 GPM	DN 200/250	ANSI 8"		
2x2S	8,475.5 cubic ft/h	1057 GPM	DN 200/250	ANSI 8"		
2x3S	11,653.1 cubic ft/h	1453 GPM	DN 250	ANSI 10"		
3x3S	17,657.3 cubic ft/h	2202 GPM	DN 250/300	ANSI 12"		
* 98%/0.4" transmission: 600 J/10.8 square ft						

Туре	Pressure loss at maximum flow		Minimum clear- ance for Maintenance work	Net weight / Operating weight Radiation chamber	Volume
1x1S	7 mbar	0.1 psi	15.76"	68.2 lbs. / 103.4 lbs.	4.2 gal.
1x2S	6 mbar	0.1 psi	19.7"	83.6 lbs. / 143 lbs.	7.1 gal.
1x3S	4 mbar	0.05 psi	23.6"	114.4 lbs. / 259.6 lbs.	17.4 gal.
2x2S	6 mbar	0.1 psi	39.4"	171.6 lbs. / 365.2 lbs.	26.4 gal
2x3S	10 mbar	0.15 psi	39.4"	171.6 lbs. / 365.2 lbs.	26.4 gal
3x3S	25 mbar	0.5 psi	39.4"	171.6 lbs. / 365.2 lbs.	DN 250 = 26.4 gal.



Permissible operating temperatures:

- Water temperature: 5 ... 104.0°F
- Ambient temperature: 5 ... 104.0°F



Operating pressure* The permissible operating pressure is possibly lower with systems that have a non-standard design,

Requirements of the water to be treated:

- Maximum temperature: 104.0°F
- Maximum operating pressure: 6 bar* //
- No corrosive or abrasive properties, chloride content < 250 ppm
- No tendency for sedimentation

9.1 Dimensions sheet



Fig. 34: Dulcodes 1 kW - 3 kW dimensions sheet (drawings not to scale) (all dimensions in "mm")

Тур	1x1 S DIN	1x1 S ANSI	1x2 S	1x3 S			
D1	168,3	6.63"	219,1	323,9			
L1	700,0	27.56"	700,0	800,0			
Drawings not true to scale.							
(All dimensions in "mm")							

Technical data

Тур		1v1 S ANSI	1v2 S	1x3 S		
קעי			122 0	120.0		
L2	425,0	16.73"	525,0	625,0		
L3	208,0	8.19"	258,0	308,0		
L4	579,0	22.80"	679,0	779,0		
L5	819,0	32.24"	1019,0	1219,0		
L6	230,0	9.06"	230,0	280,0		
L7	500,0	19.68"	600,0	600,0		
L8	500,0	19.68"	600,0	600,0		
Ø	139,7	29.92"	139,7	139,7		
l.	Cable length approx. 16.4'					
Drawings not true to scale.						

(All dimensions in "mm")

Dimensions sheet Dulcodes 2x2 kW, 2x3 kW, 3x3 kW, multiple UV lamp systems



Fig. 35: Dimensions sheet Dulcodes 2x2 kW, 2x3 kW, 3x3kW, multiple UV lamp systems (drawings not to scale) (all dimensions in "mm")

Туре	2x2 kW	2x3 kW	3x3 kW
DN	200	250	250
DN	250		300

9.2 Electrical data

NOTICE

Fuses

The fuses are located in fuse boxes with a bayonet lock, on the right in the terminal box of the control.

Technical data

Туре	Voltage		Frequency	
1x1S	230 V AC	460 V AC*	50 Hz	60 Hz*
1x2S	400 V AC	480 V AC*	50/60 Hz	50/60 Hz*
1x3S	400 V AC	480 V AC*	50/60 Hz	50/60 Hz*
2x2S	400 V AC	480 V AC*	50/60 Hz	50/60 Hz*
2x3S	400 V AC	480 V AC*	50/60 Hz	50/60 Hz*
3x3S	400 V AC	480 V AC*	50/60 Hz	50/60 Hz*

* = Alternative power supply. Observe the supplied system circuit diagram.

Fuse	Version	Spare parts number					
Upper fuse	0.16 A slow	712048					
(self-supply by the control)							
Lower fuse	2.50 A slow	712033					
(switched power outputs)							
(XR1-XR3)							

Control cabinet

Inputs

- Contact inputs (-X3:1 ... -X3.6): for contacts or switching transistors: Open circuit voltage: 5V ± 0.5 V Input resistance: 10 kOhm
- Outputs
 - Voltage outputs (-X1:1 ... -X1.10): Type of contact: NOC Load capacity: 250 V AC / 3 A / 100 VA With inductive loads provide RC protection circuits
 - Relay outputs (-X4:1 ... -X4.6): Type of contact: NOC Load capacity: 250 V AC / 3 A / 100 VA With inductive loads provide RC protection circuits
 - Alarm relay (-X4:7 ... -X4.9): Type of contact: Changeover contact Load capacity: 250 V AC / 3 A / 100 VA With inductive loads provide RC protection circuits
 Standard signal output mA (-X3:7 ... -X3.8):
 - 0/4...20 mA, potential-free Maximum load: 600 Ohm

10 Appendix

10.1 Spare parts 1 kW - 3 kW single UV lamp system without wiper or manual wiper



Fig. 36: Spare parts drawing Dulcodes S single UV lamp system with manual wiper

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No.	Description	Spare parts number	Replacement interval	each
101	UV lamp protection tube d1.6x0.1x15" Q, 1 kW	1035166	2 - 3 years	1
101	UV lamp protection tube d1.6x0.1x19" Q, 2 kW	1035041	2 - 3 years	1
101	UV lamp protection tube d1.6x0.1x22.9" Q, 3 kW	1035193	2 - 3 years	1
102	UV lamp 0.65 kW, 1 kW	1035179	max. 8,000 h	1
102	UV lamp 2 kW	1035057	max. 8,000 h	1
102	UV lamp 3 kW	1035180	max. 8,000 h	1
104	UV lamp protection tube bracket	1035059	on request	1
105	Retainer 1.9/1.5 x 0.12" PTFE white	1035074	on request	1
113	Temperature switch G 3/4	1035104	on request	1
114	Bearing ring D 2.1/1.6 x 0.5" PTFE	1035058	on request	1
120	Locking screw DIN 910 G 3/4	1002753	on request	1
130	UV sensor M G 3/4 1.4539	1034147	on request	1
132	UV sensor connection cable 32.8'	1028063	on request	1
141	O-ring 5.9" - 0.2" EPDM	1027463	after opening chamber	1
150	O-ring 1.6" - 0.2" EDDM	1023569	on request	2
153	O-ring/M 0.9" - 0.1" EPDM	1002175	on request	2
154	O-ring/M 1" - 0.08" EPDM	792872	on request	2
301	Turning mushroom knob GN 597-45-M10	1027877	on request	
310	Guide bolt M0.3/M0.4x2.6"	1027931	on request	1
311	Complete clamping screw for wiper rod	1027975	on request	1
312	Fixing bushing with pins	1027930	on request	1
316	O-ring 0.5" - 0.1" EPDM	790410	1 year	1
320	Complete bearing flange for wiper rod	1024944	on request	1
340	Wiper rod compl. UVS 1KW	1035177	on request	1
340	Wiper rod compl. UVS 1KW	1035131	on request	1
340	Wiper rod compl. UVS 1KW	1035178	on request	1
860	Face spanner wrench for \varnothing 0.6" - 3.9"	409805	on request	1
900	Wiper element	1027879	1 - 2 years	1
901	Retaining ring d2.4"/1.8"x0.2"	1028100	on request	1

No.	Description	Spare parts number	Replacement interval	each
	Filter mat each 3322/700 Control cabinet ventilation	1004212	1/2 - 1 year	2
	Lamp cable ÖLFLEX [®] 540 P, 0.08"x0.1"	1035509	on request	1



10.2 Spare parts 1 kW - 3 kW single UV lamp system with automatic wiper




Spare parts list 1 kW - 3 kW single UV lamp system with automatic wiper

No.	Description	Spare parts number	Replacement interval	each				
90	Spare parts kit UVS 1 3 kW	1037735	1 year	1				
95	Installation tool for UVS motor bearing bush	1036907	on request	1				
96	Installation tool for UVS motor threaded sleeve	1037738	on request	1				
* = fo	★ = forms part of the spare parts kit UVS 1 - 3 kW (1037735)							

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NI-	Description	On and a sets assurb as	Dealessaut	h
NO.	Description	Spare parts number	Replacement interval	each
101	UV lamp protection tube	1035166	2 - 3 years	1
	d1.6x0.1x15" Q, 1 kW			
101	UV lamp protection tube	1035041	2 - 3 years	1
	d1.6x0.1x19" Q, 2 kW			
101	UV lamp protection tube	1035193	2 - 3 years	1
	d1.6x0.1x22.9" diameter, 3 kW			
102	UV lamp 0.65 kW, 1 kW	1035179	max. 8,000 h	1
102	UV lamp 2 kW	1035057	max. 8,000 h	1
102	UV lamp 3 kW	1035180	max. 8,000 h	1
104	UV lamp protection tube bracket	1035059	on request	1
105	Retainer 1.9"/1.5" x 3 PTFE white	1035074	on request	1
113	Temperature switch G 3/4	1035104	on request	1
114	Bearing ring D 2.1"/1.6" x 12 PTFE	1035058	on request	1
115	Washer	1035004	on request	1
120	Locking screw DIN 910 G 3/4	1002753	on request	1
121	Complete cable clamp, ø1.35" x 1.4"	1035011	on request	1
122 *	Safety collar DIN 471, 0.31" x 0.03"	467238	1 year	1
130	UV sensor M G 3/4 1.4539	1034147	on request	1
131	UV sensor connection cable 32.8'	1028063	on request	1
141	O-ring 5.9" - 0.2" EPDM	1027463	after opening chamber	1
150	O-ring 1.6A" - 0.2" EPDM	1023569	on request	2
152	O-ring/M 0.24" - 0.1" FPM-B	740331	on request	1
153	O-ring/M 0.9" - 0.1" EPDM	1002175	on request	2
154	O-ring/M 1" - 0.08" EPDM	792872	on request	2
316 *	X-ring 0.5 x 0.2x 0.2" 70 EPDM 281	1010384	1 year	1
320	Bearing cover complete UVS motor wiper	1037028	on request	1
340	Wiper rod complete UVS 2 kW automatic wiper	1037069	on request	1
340	Wiper rod complete UVS 3 kW automatic wiper	1037680	on request	1
353	Motor actuator D714s	1037490	on request	1
360	ÖLFLEX [®] Classic 100 4 G 0.75 gray	1024879	on request	1
361	Contact box STAK 3N gray	1037535	on request	1
362 *	Slide bearing 0.3 x 0.4 x 0.4" Iglidur H1	1037033	1 year	1

***** = forms part of the spare parts kit UVS 1 - 3 kW (1037735)

No.	Description	Spare parts number	Replacement interval	each
363 *	Bearing D 0.6" x 0.7" PVDF	1037100	1 year	1
364 *	Threaded sleeve Tr0.5" x 0.1" POM	1037070	1 year	1
365 *	Slide bearing D 0.67" x 0.6" Iglidur A500	1037575	1 year	1
860	Face spanner wrench for \varnothing 0.6" - 3.9"	409805	on request	1
880	Filter mat each 3322/700 Control cabinet ventilation	1004212	1/2 - 1 year	2
900 *	Wiper element	1027879	1 year	1
901	Retaining ring d2.4" / 1.8" x 0.2" for UVR PTFE pure white	1028100	on request	1
	Lamp cable ÖLFLEX [®] 540 P, 0.08"x0.1", 18.0'	1035504	on request	1
* = fo	rms part of the spare parts kit UVS 1 - 3 kW (10)37735)		

10.3 Spare parts 2x2 kW, 2x3 kW, 3x3 kW multiple UV lamp system with automatic wiper



Fig. 39: Spare parts drawing Dulcodes S multiple UV lamp system with automatic wiper



Fig. 40: Spare parts drawing Dulcodes S multiple UV lamp system with automatic wiper, detail "A" and "B"

Spare parts list 2x2 kW, 2x3 kW, 3x3 kW multiple UV lamp system with automatic wiper

No.	Description	Spare parts number	Replacement interval	each
090	Spare parts kit UVS 3x3 kW	1037757	1 year	1
090	Spare parts kit UVS 2x2 kW, 2x3 kW	1037756	1 year	1
095	Bearing bush installation tool	1036907		1
096	Threaded sleeve installation tool	1037738		1
101	UV lamp protection tube d1.6"x0.08"x18.9", 2 kW	1035041	2 - 3 years	1
101	UV lamp protection tube d1.6"x0.08"x22.9", 3 kW	1035193	2 - 3 years	1
102	UV lamp 2 kW	1035057	max. 8,000 h	1

***** = forms part of the spare parts kit UVS 3x3 kW (1037757) or spare parts kit UVS 2x2 kW, 2x3 kW (1037756)

No.	Description	Spare parts number	Replacement interval	each				
102	UV lamp 3 kW	1035180	max. 8,000 h	1				
104	UV lamp protection tube bracket	1035059	on request	1				
105	Snap ring 1.9"/1.5" x 3 PTFE white	1035074	on request	1				
113	Temperature switch G 3/4	1035104	on request	1				
114	Bearing ring D 2.1"/1.6" x 12 PTFE	1035058	on request	1				
115	Washer D 2.7" x 0.8"; M0.6" x 06"	1035004	on request	1				
120	Locking screw DIN 910 G 3/4	1002753	on request	1				
121	Complete cable clamp; D34; 5 x 36	1035011	on request	1				
122 *	Safety collar DIN 471; 0.3" x 0.03"	467238	1 year	1				
130	UV sensor M G 3/4 1.4539	1034147	on request	1				
131	UV sensor connection cable 10 m	1028063	on request	1				
141	O-ring 149.2 - 5.34 EPDM	1027463	after opening chamber	1				
150	O-ring 40 - 5 EPDM	1023569	on request	1				
152	O-ring 6 - 3 FPM-B	740331	on request	1				
153	O-ring/M 22.00 - 3.00 EPDM	1002175	on request	1				
154	O-ring/M 1" - 0.08" EPDM	792872	on request	1				
316	X-Ring 13; 75 x 5; 3 x 4; 75 70 EPDM 28	1010384	1 year	1				
320	Bearing cover complete with UVS motor	1037028	on request	1				
340	Wiper rod complete for 2x2 kW, 2x3 kW	1037485	on request	1				
340	Wiper rod complete for 3x3 kW	1037522	on request	1				
353	Motor actuator	1037490	on request	1				
360	Ölflex Classic 100 4 G 0.75 gray	1024879	on request	1				
361	Contact box STAK 3N gray	1037535	on request	1				
362 *	Slide bearing F 0.3"x0.4"x0.4" Iglidur	1037033	1 year	1				
363 *	Bearing D16x17; PVDF	1037100	1 year	1				
364 *	Threaded sleeve Tr 12 x 3 POM	1037070	1 year	1				
365 *	Slide bearing D16, 0.3" x 0.6", Iglidur	1037575	1 year	1				
860	Face spanner wrench for $\emptyset 0.6" - 3.9"$	409805	on request	1				
880	Filter mat each 3322/700	100/212	1/2 - 1 voor	2				
000	Control cabinet ventilation	1004212	1/2 - I year	2				
* = fo (1037)	★ = forms part of the spare parts kit UVS 3x3 kW (1037757) or spare parts kit UVS 2x2 kW, 2x3 kW (1037756)							

No.	Description	Spare parts number	Replacement interval	each
900 *	Wiper element	1027879	1 year	1
901	Holding ring d2.4"/1.8" x 0.2"	1028100	on request	1
	Lamp cable ÖLFLEX [®] 540 P, 0.08"x0.1", 18.0'	1035504	on request	2-3

***** = forms part of the spare parts kit UVS 3x3 kW (1037757) or spare parts kit UVS 2x2 kW, 2x3 kW (1037756)

10.4 Dulcodes S Terminal Wiring Diagram



Fig. 41: Dulcodes S Terminal Wiring Diagram

Date	Turn-ons UV lamp	Operating hours UV lamp	Signal dis- play Sensor [%] // [w/ft. ²]	UV-trans- mission [%/1 cm]	Flow [cubic ft./h]	Maintenance work Maintenance work	Signature

10.5 Dulcodes UV system unit operating log

11	EC Declaration of Conformity
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EU Declaration of Conformity

We, hereby declare that,	ProMaqua GmbH Maaßstraße 32/1 D - 69123 Heidelberg

on the basis of its functional concept and design and in the version marketed by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations. Any modification to the product not approved by us will invalidate this declaration.

Product description:	UV disinfection system Dulcodes
Product type:	UVCa
Serial number:	Please refer to the type plate on the device
Relevant EC regulations	EU - Low Voltage Directive (2006/95/EC) EU - EMC Directive (2004/108/EC) EU Pressure Equipment Directive (97/23/EC)
Harmonised standards applied, in particular:	EN 60204-1, EN 60335-1, EN 60529 EN 610000-3-2, EN 610000-6-1/2/3/4
Harmonised national standards and other technical specifications applied, in particular:	
Technical documents have been compiled by documentation specialists:	Dr. W. Weibler Maaßstraße 32/1 D - 69123 Heidelberg
Date /manufacturer's signature:	7.5.2010
The undersigned:	∑ Ralf Kiermaier, Managing Director of ProMaqua GmbH

Fig. 42: EC Declaration of Conformity / Dulcodes without wiper or with manual wiper

EU Declaration of Conformity

We, hereby declare that,	ProMaqua GmbH Maaßstraße 32/1 D - 69123 Heidelberg
on the basis of its functional concept the product specified in the following laid down by EC regulations. Any modification to the product not a	t and design and in the version marketed by us, complies with the relevant, fundamental safety and health stipulations approved by us will invalidate this declaration.
Product description:	UV disinfection system Dulcodes
Product type:	UVCa 7
Serial number:	Please refer to the type plate on the device
Relevant EC regulations	EU - Machinery Directive (2006/42/EC) EU - EMC Directive (2004/108/EC) EU Pressure Equipment Directive (97/23/EC) Compliance with the protection targets of the Low Voltage Directive 2006/95/EC according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN ISO 12100-1, EN ISO 12100-2 EN 60204-1, EN 60335-1, EN 60529 EN 610000-3-2, EN 610000-6-1/2/3/4
Harmonised national standards and other technical specifications applied, in particular:	
Technical documents have been compiled by documentation specialists:	Dr. W. Weibler Maaßstraße 32/1 D - 69123 Heidelberg
Date /manufacturer's signature:	7.5.2010
The undersigned:	Ralf Kiermaier, Managing Director of ProMaqua GmbH

Fig. 43: EC Declaration of Conformity / Dulcodes with automatic wiper

12 Index

В	
BACK key 14	ł
С	
CHANGE key 14	ł
Chloramine	5
Control cabinet	3
Cooling mode 12	2
D	
Data sheet 5	5
Disinfection support	5
DOWN key 14	ł
E	
Emergency 10)
ENTER key 14	ł
F	
Flashing arrows	3
Flashing fault alert 13	3
Formation of coating	3
Fuses	3
G	
General non-discriminatory approach 2	2
Н	
Housing 14	ł
I	
Inputs	3
L	
LCD display 13, 14	ŀ
Load	3
M	_
Maximum temperature 12	2
N	
Non-discriminatory approach	<u> </u>
Normal display 14	ŀ

Normal mode 11
0
Operating error 6
Operating mode 14
Operating parameters
Operating temperature 11
Outputs 68
Overheating 9
P
Photochemical 5
Programing mode 14
S
Safety notes 7
Standard signal output 68
START/STOP key 14
Т
Time frame 16
U
Ultraviolet radiation
UP key 14
Use 6
Users' qualifications 8
UV lamp switch-off 12
UV output 11
UV transmission 9
W
Warm-up time 11
Water temperature 12



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