Assembly and operating instructions

Dulcodes LP with Comfort Control
UV system

EN

A2244

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

General non-discriminatory approach

In 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 information

Please read the supplementary information in its entirety.

Information

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

Warning information

Warning information includes detailed descriptions of the hazardous situation, see *Chapter 2.1 'Labelling of Warning Information' on page 7*.

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

Tab. 1: More symbols

Symbol	Description
1.	Action, step by step.
⇨	Outcome of an action.
	Links to elements or sections of these instructions or other applicable documents.
■	List without set order.
[Button]	Display element (e.g. indicators). Operating element (e.g. button, switch).
'Display /GUI'	Screen elements (e.g. buttons, assignment of function keys).
`CODE`	Presentation of software elements and/or texts.

Table of contents

1 About this UV System

Application

Dulcodes UV systems are used for the disinfection of:

- Potable water
- Process water

The water to be disinfected is subjected to short-wave UV radiation during the UV disinfection process. This so-called UV radiation kills any germs quickly and reliably.

The UV system can also be used for breaking down combined chlorine in swimming pool water.

Dulcodes UV systems are supplied ready for connection. The UV systems are available in different designs, defined by their identity code. The performance data can be found in the data sheet enclosed with the Dulcodes UV system.

Scope of delivery

- Reactor
- Lamp with lamp protection tube
- UV-C sensor
- Pt 1000 temperature sensor
- Control cabinet with control
- Documentation

Depending on the system type, the UV system either has no wiper or is equipped with an automatic wiper.

Available options:

- Automatic wiper
- LAN/WLAN communication interface

1.1 Correct and Proper Use

Correct and Proper Use

The operator is liable for damage caused by installation and operating errors!

- *The system is intended solely for the treatment of water.*
- *The system may only be used in accordance with the technical data and specifications outlined in the operating instructions!*
- *Any other use or modification of the system is prohibited.*
- *The system may only be operated by trained and authorised personnel!*
- *It is imperative that the information in the operating instructions relating to the different phases of the unit's service life is observed!*

2 Safety

2.1 Labelling of Warning Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed warning information and are provided as clear step-by-step instructions.

The warning information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Description of hazard

– Denotes an immediate threatening danger. If the situation is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

– Denotes a possibly hazardous situation. If the situation is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

– Denotes a possibly damaging situation. If the situation is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information.

Source of the information. Additional measures.

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

2.2 Users' qualifications

WARNING!

Danger of injury with inadequately qualified personnel!

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.

– All work on the unit should therefore only be conducted by qualified personnel.
– Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him 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 electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised 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 adhered to!

2.3 Dulcodes safety information

WARNING!

UV-C radiation

Possible consequence: Serious injuries.

UV-C radiation is harmful to the eyes and skin

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

WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries.

- Measure: Disconnect the device from the power supply before opening it.
- Disconnect damaged and defective devices or devices that have been tampered with from the power supply.

WARNING!

Insufficient water treatment

Possible consequence: Illness.

Please read the technical data sheet for your UV system.

Ensure that:

- The maximum permissible water flow rate is not exceeded.
- The UV transmission does not fall below the permissible level.
  - As otherwise adequate treatment of the water cannot be guaranteed.

WARNING!

Falling objects

Possible consequence: Crushing of feet.

Remedy: Wear safety shoes.

CAUTION!

Overheating of the lamp and reactor

Possible consequence: Material damage.

– Only switch on the UV system after the reactor has been filled with water.

CAUTION!

Unauthorised operating parameters

Possible consequence: Material damage

Ensure that:

– The installation place is dry and frost-free.
– There is guaranteed protection for the UV system from chemicals, dyes and vapours.
– The ambient temperature and the radiation temperature in the direct vicinity of the system do not exceed 40 °C.
– The maximum permissible operating pressure is not exceeded.
– There are no solid particles and no turbidity in the water to be treated.
– If necessary, fit an appropriate treatment system upstream of the UV system.

2.4 Safety equipment

Labels on reactor

ATTENTION: Hazardous ultraviolet radiation

⚠ UV-C radiation is harmful to the eyes and skin! The UV lamps may only be operated when installed. The UV system should be installed in accordance with all pertinent regulations prior to commissioning the UV lamps.

ATTENTION: Hazard

⚠ Disconnect the system from the mains power supply or switch off the master switch prior to commencing maintenance work. Depressurise the reactor prior to commencing maintenance work.

Labels on control cabinet

⚠ Disconnect the system from the mains power supply or switch off the master switch prior to opening.

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 control cabinet to OFF or disconnect from the mains power supply.

3 Storage, transport and ambient conditions

3.1 Permissible ambient conditions

During storage

Permissible ambient temperature: - 20 °C ... + 70 °C.

Humidity: maximum 95 % relative air humidity, non-condensing.

Other: No dust, no direct sunlight.

During operation

Permissible ambient temperature: + 5 °C ... + 40 °C.

Humidity: maximum 92 % relative air humidity, non-condensing.

Other ambient conditions: No dust, no direct sunlight. No corrosive gases, vapours and dust.

3.2 Packaging material

Packaging material

Dispose of packaging material in an environmentally responsible way. All packaging components carry the corresponding recycling code ♻.

The packaging is intended to protect the components from damage before installation. Do not damage the packaging and only remove just before installation.

4 Function

Shut-off valves and flushing valves do not form part of the scope of delivery

The shut-off valves and flushing valves do not form part of the scope of delivery of the UV system and are provided by the operator on site.

The water to be treated flows through the stainless steel reactor past the UV lamp. UV radiation disinfects the water.

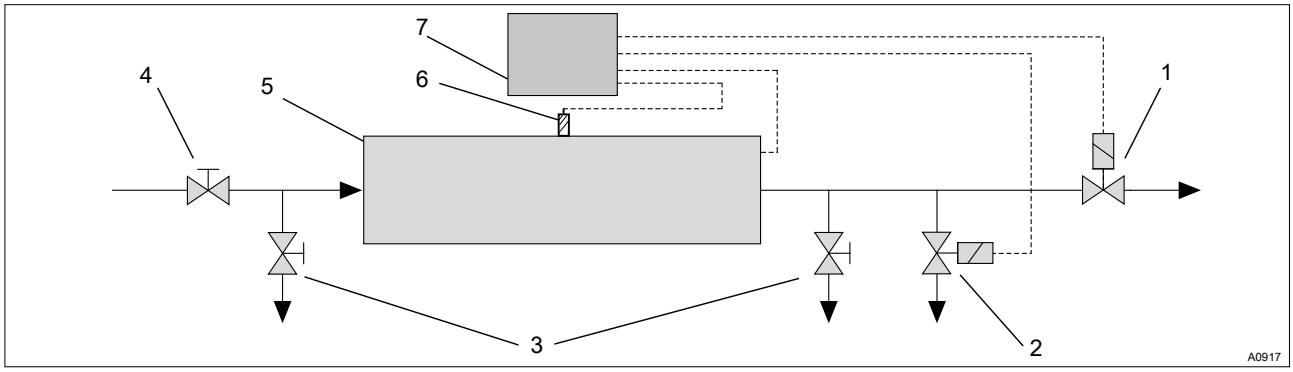

Fig. 1: Typical installation diagram for a UV system

1 Shut-off valve (supplied on site)
2 Rinse valve (supplied on site)
3 Sampling taps (supplied on site), fireproof
4 Shut-off valve (supplied on site)
5 Reactor
6 UV sensor
7 Control

The UV low-pressure lamp used generates a very high output of UV radiation, 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 transparency.

The compact design of the reactor and the flow result in evenly distributed radiation of the entire stream of water.

A control monitors the UV system together with the UV sensor.

4.1 Commissioning

Once the Dulcodes UV system has been switched on, the UV lamps are ignited. Following ignition, the UV lamps need several minutes until the UV lamps reach operating temperature.

The UV sensor monitors the UV lamps. As soon as the UV output has exceeded the minimum radiation intensity threshold, the rinse valve opens for the start rinse.

If the minimum radiation intensity is not exceeded within the maximum permissible warm-up time, then the rinse valve will open regardless. However, if the minimum radiation intensity is also not exceeded within the maximum rinse duration, then the control switches the UV system off and goes into fault mode.

The shut-off valve is opened after the start rinse is completed. The UV system goes into normal mode.

Operation of the UV system in *'Control'* operating mode: To ensure the fault-free control of the UV lamps, control of the UV lamps starts 5 minutes after the UV system has started.

4.2 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 output.

If the UV output falls below the minimum radiation intensity threshold: The shut-off valve closes and the rinse valve opens. However, If the minimum radiation intensity threshold is also not exceeded within the maximum rinse duration, then the control switches the UV-system off and goes into fault mode.

All UV lamps are monitored to ensure that they operate optimally. If a UV lamp fails, the shut-off valve is closed and the control switches the UV-system off and goes into fault mode.

4.3 Automatic wiper (optional)

Manually triggering a wiper cycle

During the wiper process, the warning threshold and the minimum radiation intensity threshold are not monitored; consequently the shadowing caused by the wiper does not trigger a false alarm.

If you press the Enter key in the *'Wiper'* display, then a wiping process is triggered. This is independent of whether the UV system is *'ON'* or *'OFF'*.

If you start the wiping process in warm-up mode, the warming up process is stopped and once the wiping process is ended, the warm-up time is restarted.

Regular wiping

After elapse of the set interval time, an automatic wiper cycle starts. This function cannot be deactivated.

In the event of a wiper fault, the UV system issues a warning message, but the UV system remains in operation.

4.4 Temperature monitoring

The water temperature in the reactor 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.

4.5 Switching off

When the UV system is switched off, the shut-off valve closes and the UV lamps are turned off. If the UV lamps require postburning, then the lamps are switched off after the lamp postburning duration has elapsed.

5 Operation and control (Comfort control)

5.1 Control elements

Control elements

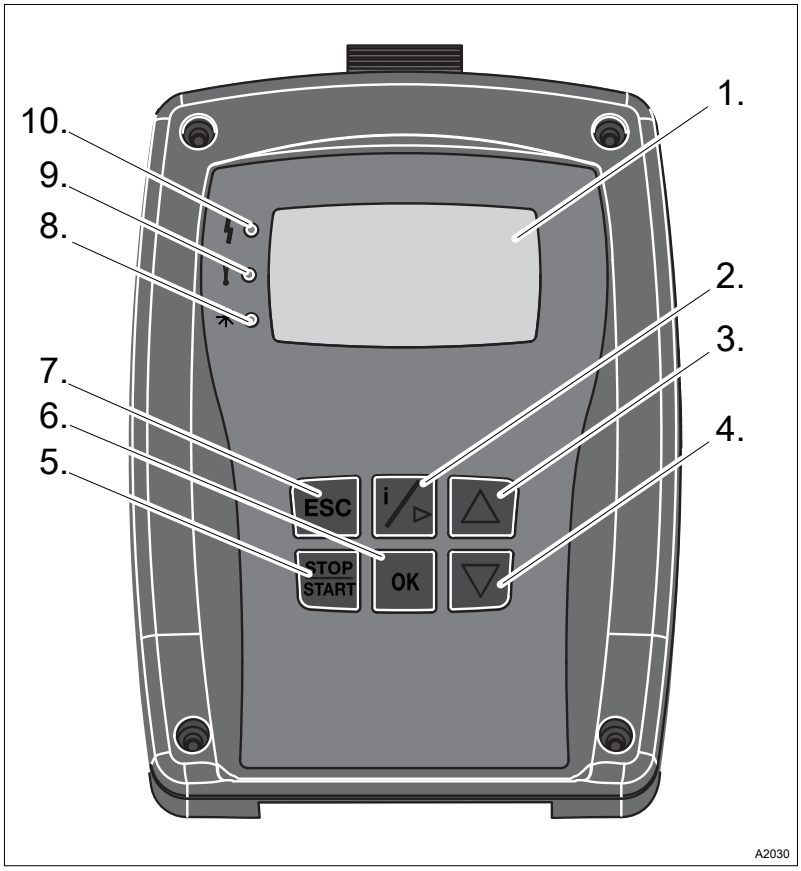

Fig. 2: HMI control elements

1 LCD display
2 *[i]* key / jump to value and move to right
3 *[UP]* key
4 *[DOWN]* key
5 *[START/STOP]* key
6 *[OK]* key; jump to the menu.
7 *[ESC]* key
8 Operating indicator (green)
9 Warning indicator (yellow)
10 Fault indicator (red)

Continuous display

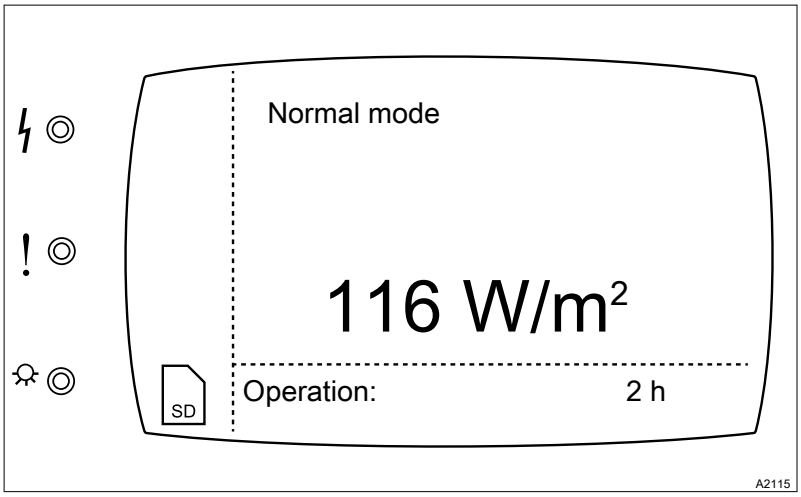

Fig. 3: Continuous display: Normal mode. Display in W/m² or J//m²

LED indicators and symbols

LED and symbols	Function
Red LED	The system is in fault mode.
Yellow LED	The system has warning messages.
Green LED	The system is in operation.
SD	The SD card is in its socket and is active.
⇨ or ⇦	The flashing arrow symbol means that the wiper is operating and indicates the direction of movement.

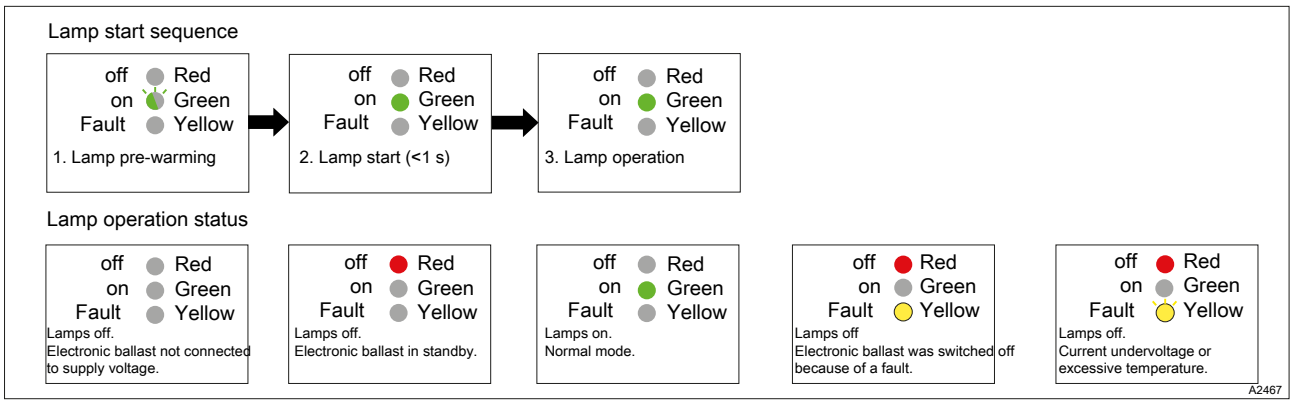

Fig. 4: Operating status and LED displays of lamp operation equipment.

5.2 Data Backup and Menu navigation

SD card

Data backup / limited service life

There is a possibility of loss of data with all types of data storage. Data loss can be caused by damage to hardware, software, or unauthorised access etc. The operator of the device is responsible for backing up data recorded by the data logger. This has to be done in accordance with the national and international requirements, regulations and standards applicable to the operator of the device. Define and document this data backup in a backup or recovery plan.

The manufacturer of the device is not responsible for backup or recovery of data.

SD cards only have a limited service life. This service life is based, for example, on the general ageing of the SD card and due to the memory type (Flash Memory) from the fundamentally limited number of write processes. Bear this in mind with your data backup strategy and ensure that you regularly use your SD card.

The maximum size of the SD card is currently 512 MB.

The SD card is currently supplied as an industrial 512 MB SD card. Unlike *'consumer'* cards, industrial SD cards have an operating temperature of up to 85°C and the data is stored twice in the SD card's memory for security reasons.

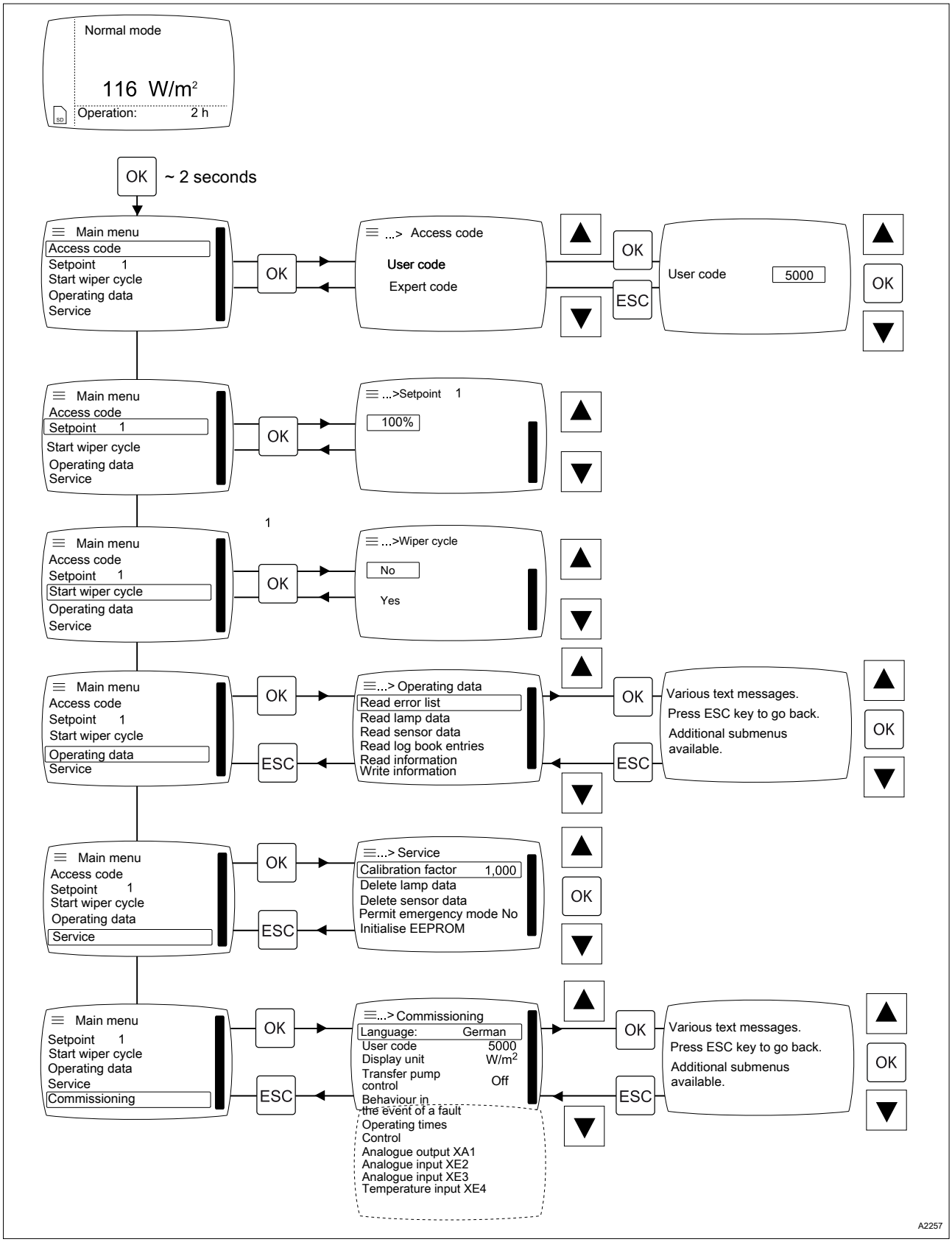

Fig. 5: Main menus and sub-menus of the user interface.

5.3 The main menus and the sub-menus

1st level	2nd level	3rd level	4th level	5th level
Main menu	Access code	User code		
		Expert code		
	Setpoint 1 or 2	0 ... 100% or 0 ... max. value m^3/h		
	Start wiper cycle	No/Yes		
	Operating data	Read error list	Error number with texts	
		Read lamp data	Lamp number with texts	
		Read sensor data	UV sensor with texts	
		Read log book entries	Measured values	Measured values with texts
			Controller values	Controller values with texts
			Events	Events with texts
			Operator actions	Operator actions with texts
		Read information	Software versions	`IO type UVCb-LP`
				`IO ware 01.00.00.00`
				`HMI type UVCb-LP`
				`HMI ware 00.02.06.04`
				`HMI data 01.00.00.00`
				`EEP data n02.03.00.02`
			Hardware versions	`IO board 01.00.00.00`
				`HMI 01.08.00.00`
			Current identity code UVCb*****	
		Write information	Yes/No All setting data is written to the SD card.	
	Service	Calibration factor 1,000		
		Delete lamp data		
		Delete sensor data		
		Permit emergency mode		
		Initialise EEPROM		
	Commissioning	Language German		

1st level	2nd level	3rd level	4th level	5th level
		User code 5005		
		Display unit (Physical variable)	W/m² / J/m²	
		Transfer pump control	Yes/No	
		Operating times	Maximum rinsing time	
			Start rinse time	
			Maximum free rinse time	
			Lamp post-burn time	
			Wiper interval	
			Date	
			Time	
			Measured value recording	
		Control	Controller operating mode	No control
				Manual flow
				External flow
			Controller values 1	Setpoint 1
				Transmission
				Target dose
			Delay period of thresh-olds	Delay period of thresholds
		Analogue output XA1	Current signal: 4 ... 20 mA	
			Max. radiation intensity 100 W/m²	
		Analogue input XE2	Function	OFF
				Flow
		Analogue input XE3	Function	
			Current signal	
			Max. turbidity	
		Temperature input XE4	Function	OFF
				Temperature

5.4 Adjustable parameters / access code

Tab. 2: Adjustable parameters / access code

Description	Starting value	Increment	Minimum value	Maximum value	Access code	Access condition
Main menu						
Access code	5000	1	1	9999	---	---
Setpoint 1 or 2	100%	1 %	43 %	120 %	User code	---
Setpoint 1 or 2	20 m^3/h	0.1 m^3/h	0 m^3/h	999.9 m^3/h	User code	---
Wiper cycle	No	No			---	---
		Yes				
Operating data					---	---
Service level 1						
Calibration factor	1	0.001	0.001	9.999	Expert code	System On
Delete lamp data					Expert code	System Off
Delete sensor data					Expert code	System Off
Emergency mode permitted	No	No			Expert code	System Off
		Yes				
Initialise EEPROM	No	No			Expert code	System Off
		Yes				
Commissioning level 1						
Language	German	German			User code	None
		English				
		French				
		Spanish				
		Italian				
User code	5005	1	1	9999	User code	System Off
Display unit	W/m^2	W/m^2/			User code	System Off
		J/m^2				
Transfer pump control	Off	Off			Expert code	System Off
		On				
Operating times level 2						
Maximum rinsing time	5 min	1 min	1 min	99 min	Expert code	System Off
Commissioning of rinsing time	1 min	1 min	0 min	99 min	Expert code	System Off
Maximum free rinse time	0 min	1 min	0 min	99 min	Expert code	System Off
Lamp post-burn time	0 min	1 min	0 min	20 min	Expert code	System Off
Wiper interval	2 h	1 h	1 h	100 h	Expert code	System Off

Description	Starting value	Increment	Minimum value	Maximum value	Access code	Access condition
Date	01.08.2015		01.01.2014	31.12.2100	User code	System Off
Time	12:00		00:00	23:59	User code	System Off
Measured value recording	60 sec	1 sec	1 sec	600 sec	Expert code	System Off
Control level 2						
Controller operating mode	Controller values 1	Controller values 1 Delay period of thresholds			Expert code	System Off
Control values 1 level 3						
Setpoint 1	100%	1 %	50 %	100%	User code	System Off
Minimum radiation intensity	50.0 W/m²	0.1 W/m²	0.0 W/m²	Warning threshold 1	Expert code	System Off
Warning threshold	50.0 W/m²	0.1 W/m²	Minimum radiation intensity	999.9 W/m²	Expert code	System Off
Transmission	98 %	1 %	75 %	98 %	Expert code	System Off
Target dose	400 J/m²	1 J/m²	300 J/m²	3000 J/m²	Expert code	System Off
Max. flow	System-specific	0.1 m³/h	System-specific	System-specific	Expert code	System Off
Delay period thresholds level 3	0 seconds	1 second	0 seconds	1800 seconds	Expert code	System Off
Analogue output XA1 level 2						
Current signal	4 mA	0 ... 20mA 4 ... 20 mA			Expert code	None
Max. radiation intensity	100.0 W/m²	0.1 W/m²	0.1 W/m²	999.9 W/m²	Expert code	None
Analogue input XE2 level 2						
XE2 functional mode	off	off Flow			Expert code	System Off
XE2 current signal	4 mA	0 ... 20mA 4 ... 20 mA			Expert code	System Off
Maximum flow value	System-specific	0.1 m³/h	0.1 m³/h	999.9 m³/h	Expert code	System Off
Analogue input XE3 level 2						
XE3 functional mode	off	off Turbidity Combined chlorine			Expert code	System Off

Description	Starting value	Increment	Minimum value	Maximum value	Access code	Access condition
XE3 current signal	4 mA	0 ... 20mA 4 ... 20 mA			Expert code	System Off
Max. turbidity	1.00 NTU	0.01 NTU	0.01 NTU	10.00 NTU	Expert code	System Off
Max. combined chlorine	1.00 ppm	0.01 ppm	0.01 ppm	20.00 ppm	Expert code	System Off
Temperature input XE4 level 2						System Off
XE4 functional mode	off	off Temperature			Expert code	System Off
Maximum operating temperature	50 °C	1 °C	0 °C	Max. water temperature less 5 °C	Expert code	System Off

5.5 Access code

'Access code' display

Under the main menu option 'Access code' you enter the known access code. This access code can be the user code or the expert code.

Once the correct access code has been entered, preferences can be set in the service, commissioning, or configuration menus. Once entered, the access code remains for up to 5 minutes after leaving the settings menu.

You can input the user code or the expert code in the *'Access code'* main menu item. You have differently extensive rights, depending on which of these access codes you have input. You can use the table *Table on page 22* to see which code is matched with a given adjustment option. The access code (user or expert) must be entered in the menu item *'Access code'* prior to any actions undertaken by the operator. If you have input an access code that is too low to be able to change a certain parameter, you can select the parameter, but cannot change this parameter.

Name	Enables ...	Access code
User code	Enables functions that users must apply in their day-to-day work.	Factory setting: 5005 Adjustable in the menu: *'Commissioning' > 'User code'*
Expert code	Enables additional functions that technical experts must use in their day-to-day work.	Is only disclosed during technical expert training courses or on request as system information.

5.6 Setpoints 1 or 2

Warning messages and system faults
To avoid warning messages and system faults, the lamp output should be set so that the sensor signal at the set lamp output is clearly above the warning threshold.

The control can automatically switch between 2 setpoints via a digital contact input. Only setpoint 1 is activated in the factory setting. Setpoint 2 can be activated by the service technician, if required, during commissioning. Please contact the manufacturer's Service department for subsequent activation.

Adjusting the lamp output in control operating mode *'No control'*

In *'No control'* operating mode, the lamp output can be set within a range of 50 ... 100% of the nominal electrical power of the lamp. If during operation, the output of the UV lamp falls and the sensor signal reaches or falls below the warning threshold, the lamp output should be changed accordingly.

Adjusting the setpoint in *'Manual flow'* operating mode

Control of the lamp output
The lamp output is only controlled within a range specified by the electric ballast (50 ... 100%).

You can specify the setpoint in *'Manual flow'* operating mode. During operation, the lamp output is then controlled so that the specified sensor signal is adhered to. Consequently, there is automatic adjustment of the UV system to changing operating conditions, such as lamp ageing, variations in water quality etc.

After inputting the controller values:

- Setpoint (maximum flow),
- Transmission,
- Target dose,

the control then calculates from this the associated minimum radiation intensity (sensor signal), target radiation intensity and the control variable for the lamp output.

Adjusting the setpoint in *'External flow'* operating mode

Control of the lamp output

The lamp output is only controlled within a range specified by the electric ballast.

You can adjust the lamp output via the analogue signal of an external flow meter in *'External flow'* operating mode.

The control calculates the associated minimum radiation intensity (sensor signal), target radiation intensity and the control variable for the lamp output from the value:

- Flow signal,
- Transmission,
- Target dose.

The prerequisite for the use of the *'External flow'* function is the connection of a flow meter (4 ... 20 mA) to the analogue input XE2.

There is automatic adjustment of the UV system to changing parameters, such as:

- Fluctuating flow,
- Lamp ageing,
- Fluctuating water quality,
- etc.

5.7 Start wiper cycle

The *'Start wiper cycle'* menu item is available if your UV system has an automatic wiper. If an additional cleaning requirement exists, you can trigger a wiper cycle additional to those at the programmed interval by pressing the key. The warning and minimum radiation threshold are not monitored during the wiper process. If the wiper cycle is not completed within a specified period, a warning is issued. The UV system continues to run; however, no further wiper cycles are triggered.

5.8 Operating data

5.8.1 Read error list

The current faults and warnings are displayed along with the fault numbers.

5.8.2 Read lamp data

Information relating to the electronic ballast and connected UV lamps is displayed.

5.8.3 Read sensor data

Information relating to the UV sensor is displayed.

5.8.4 Read log book entries

All events, operator actions, controller values and measured values are displayed. Number 1 is the most recent entry. As the numbers increase, the entries get older.

5.8.5 Measured values

The recorded measured values for the minimum radiation intensity and, if connected, the measured values for both analogue inputs XE2 and XE3 are displayed.

5.8.6 Control Values 1 or 2

The control values set are displayed for:

- Transmission in %
- Target dose
- Setpoint 1 or 2 (Maximum flow)

5.8.7 Events

The last events will be displayed.

5.8.8 Operator actions

The last operator actions carried out are displayed.

5.8.9 Read information

The software and hardware information, and also identity code, are displayed.

5.8.10 Write information

The adjustment data is written to the SD card in a text file "Report.txt".

5.9 Service

You can only make changes to the service menu with the correct access code. Every change is entered into the log book with the date and time.

5.9.1 Calibration factor

The following applies to non-certified systems:

The UV sensor is factory-calibrated and does not require any further adjustment. The minimum radiation intensity must be set correctly to maintain effective disinfection.

The following applies to certified systems:

WARNING!

Poor disinfection

Cause: Defective calibration of the UV sensor.

Consequence: Defective water disinfection.

Measure: The UV sensor must be checked regularly using a reference radiometer. The UV sensor must be replaced at least every 2 years or after 10,000 operating hours, depending on which occurs first, by a UV sensor with a valid calibration certificate.

WARNING!

UV radiation

Cause: If the UV sensor is removed, UV radiation that is harmful to the eyes and skin will be emitted from the sensor window when the UV lamps are switched on.

Consequence: Possible irreversible damage to the skin and eyes.

Measure: Operating the UV system with the UV sensor removed is therefore only permissible when checking and recalibrating the UV sensor. Wear the designated protective gear when checking and calibrating the UV sensor e. g. protective goggles.

Always check the UV sensor at least twice a year. However, with flow rates over 100 m^3/h, check it once a month using a reference radiometer. A certified reference radiometer with a valid calibration certificate is required for checking the UV sensor.

In the event of an unauthorised deviation between the reference measurement and UV sensor, the measured value of the UV sensor must be adjusted using the calibration factor so that the measured value agrees with the reference measurement. In accordance with worksheet DVGW W 294, the calibration factor may only be set within the range of 0.8 ... 1.2. In the event that the deviation between the UV sensor and reference radiometer is so great that the UV sensor display value can no longer be harmonised, the UV sensor must be replaced with a UV sensor with a valid calibration certificate. On this subject, see the specifications in DVGW worksheet W 294.

5.9.2 Delete lamp data

After the lamp has been changed, the operating hours and the number of lamp changeovers can be set to "0" individually for each UV lamp. The total operating hours of the UV system are not affected.

You can reset the lamp data only in the *'Off'* state.

5.9.3 Delete sensor data

You can set the operating hours to "0".

The UV sensor data can only be reset in the *'Off'* state.

5.9.4 Permit emergency mode

Non-certified systems
This function is only available for non-certified systems.

The *'Emergency mode'* function is enabled in order to keep the UV system running with limited output in the event of a fault, e. g. a lamp failure in a multiple lamp system. In order to activate this function, you must also activate emergency mode in the commissioning menu.

5.9.5 Initialising the EEPROM (restoring factory settings)

If you initialise the EEPROM , then all setting data is reset to its default value:

- All setting data
- All configuration data
- All lamp operating hours and lamp changeovers
- All sensor operating hours
- The operating time of the system

5.10 Commissioning

Adjustments can only be made in the commissioning menu once the correct access code has been entered in "Access code" in the main menu.

5.10.1 Language

You can select between different languages.

5.10.2 User code

The system control has a user code for protection against unauthorised modifications of the system control settings. This user code enables the programming mode for users/operators. You can freely select the user code. The programming mode remains disabled after a change of the user code. The lock is only cancelled when you have input the new user code under *[Access code]*.

5.10.3 Display unit (Physical unit)

The UV sensor monitors the UV output and the disinfection efficiency. The unit of measure of the sensor signal display (radiation intensity) is W/m².

The UV dose of the UV system is calculated depending on the:

- UV transmission,
- Flow,
- Radiation intensity.

The control calculates the UV dose displayed from these values. The UV dose can be displayed on the HMI by converting the unit displayed to J/m^2.

5.10.4 Transfer pump control

CAUTION!

Damage to the UV lamps and reactor

Cause: The UV system may only be operated when the reactor is fully filled with water. With an empty or only partially filled reactor there is a risk of damaging the UV lamps.

Measure: It must be ensured that the reactor cannot run empty when the transfer pump is switched off. As the transfer pump has a certain post-rinse duration, the lamp postburning time should be set to at least one minute. This ensures that water conveyed during the post-rinse period is disinfected.

The pump control system must be activated in order to control the feed pump with the pump relay. The pump relay releases when the UV system is switched off and remains released with *'pump control off'*, even when the UV system is running.

If the UV system is switched on with *'pump control on'* then the UV system will exit warm-up mode only when the warning threshold is exceeded. The pump relay operates.

If the UV system is switched off or the UV system switches over to pause mode, the pump relay will release.

If the minimum radiation intensity is not reached during operation or a UV lamp fails, then the pump relay will release and the UV system switches to fault mode.

5.10.5 Behaviour in the event of a fault

CAUTION!

Reduced disinfection efficiency in emergency mode

Emergency mode is not permissible for applications where high demands are made on the disinfection performance, such as e. g. drinking water disinfection.

Emergency mode is not available for certified systems.

In emergency mode, any shut-off valve that may be available opens immediately, not just when the minimum radiation intensity has been exceeded. The minimum radiation intensity is not monitored. -

Prior to enabling emergency mode in the programming menu, and also any time before emergency mode is switched on, the UV system operator must check that there is no risk to personnel or property as a result of the significantly reduced UV intensity.

Operator's responsibility

Responsibility for the use of emergency mode and the associated consequences lies with the operator of the UV system.

Normally the UV system is switched off in the event of a fault. However, for certain applications it may be a good idea to continue operating the UV system with a reduced output. This operating status is known as emergency mode.

If emergency mode has been selected when a fault has occurred, the UV system switches to *[Emergency mode]* in the event of lamp failure or if the minimum radiation intensity is not reached, after completion of the free rinsing time.

The following settings must have been selected to trigger automatic transfer to Emergency mode:

In the *[Service]* menu:

- Permit emergency mode; yes.

In the *[Commissioning]* menu:

- Behaviour in the event of fault: Emergency mode

Bridging the switching input:

- *[Emergency mode]* on the control module, see wiring diagram.

5.10.6 Minimum radiation intensity

WARNING!

Poor disinfection

Cause: Insufficient radiation intensity in UV system.

Consequence: Poor disinfection performance of the UV system.

Measure: The minimum radiation intensity is dependent on the type of system and the maximum flow through the UV system, which can be taken from the enclosed data sheet for the UV system.

NOTICE!

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

Warning threshold undershot

The system issues a warning should the UV output drop so far that the sensor signal falls below the warning threshold.

To prevent it from dropping below the warning threshold, the UV lamp protection tubes should be cleaned, the UV lamps replaced or the water quality improved by means of appropriate water treatment.

Dropping below the warning threshold is signalled on the display (1 downward arrow). A signal device can be connected to the signal relay of the control. The relay is closed when the signal falls below the warning threshold.

Minimum radiation intensity not reached

Reliable and safe water treatment can no longer be guaranteed if the UV output falls so low that the UV sensor signal drops below the minimum radiation intensity threshold. In this case, a shut-off valve, should one be fitted, will close and a rinsing process is initiated.

To prevent the value from falling below the minimum radiation intensity, the UV lamp protection tubes should be cleaned, the UV lamps replaced or the water quality improved by means of appropriate water treatment.

If the minimum radiation intensity is not reached, this is indicated on the display (2 downward arrows). If the sensor signal remains below the minimum radiation intensity after the rinsing process, the UV system switches off and goes into fault mode. A signal device can be connected to the signal relay of the control. The relay is closed when the signal falls below the minimum radiation intensity.

5.10.6.1 Minimum radiation intensity

'No control' **operating mode:**

The minimum radiation intensity depends on the UV system type and the maximum flow through the UV system. The minimum radiation intensity values can be found in the technical data sheet of the UV system.

'Manual or external flow' **operating mode:**

The minimum radiation intensity is calculated from the flow entered or from the external flow signal.

5.10.6.2 Warning threshold

UV systems in operating mode ***'No control'*****:**

The warning threshold depends on the UV system type and the maximum flow through the UV system. The minimum radiation intensity values can be found in the technical data sheet or on the nameplate on the UV system. When entering the setpoint, refer to chapter .

Set the warning threshold 5 ... 10% above the minimum radiation intensity.

UV systems in operating mode ***'Control on'*****:**

The warning threshold is calculated from the flow entered or from the external flow signal.

The warning threshold is 5% above the minimum radiation intensity.

5.10.7 Operating times

5.10.7.1 Maximum rinsing time

The maximum permissible water temperature in the reactor is monitored. In the event of excessive temperature, the UV system automatically activates the rinsing process. If the maximum permissible water temperature does not fall by approx. 5 °C within the maximum permissible rinsing time, the control switches off the UV lamp and enters fault mode.

5.10.7.2 Start rinse time

In most cases, a start rinse time of "1 min" is sufficient.

If there is no rinse valve available, the start rinse time can be set to "0 min".

The start rinse time is intended to ensure that only optimally treated water can flow through to the consumer. As soon as the UV lamps reach operating temperature after ignition and the UV sensor signal has exceeded the minimum radiation intensity, the automatic rinse valve opens (if fitted) for the start rinse process. Only then does the shut-off valve open.

5.10.7.3 Maximum time rinse free

The free rinsing process is primarily used for the disinfection of drinking water. Free rinse times of > 10 hours are often used during drinking water disinfection. After periods of heavy rainfall it is possible that UV transmission will decrease e. g. if the water has poor natural filtering characteristics. The sensor signal then fails to reach the minimum radiation intensity.

During free rinsing the shut-off valve closes and the rinse valve opens. Once the water quality has improved, the UV system switches back to normal mode. However, if the sensor signal fails to exceed the minimum radiation intensity within the maximum rinse free time, then the UV system switches to fault mode.

5.10.7.4 Lamp post-burn time

In large-scale UV systems, it may take some time for the shut-off valve to close in some cases, or for the water flow to be stopped by another means. In the case of drinking water disinfection, the lamp post-burn prevents insufficiently disinfected water from reaching the consumer while the UV system is being shut down. In most cases, a lamp postburning time of 1 minute is sufficient.

5.10.7.5 Wiper interval

Here you can adjust the pause between two wiping processes. You can only change the wiper interval in the *'Off'* state. This menu is only present if a wiper device is present.

5.10.7.6 Setting the date

You can only change the date in the *'Off'* state. The European display format is used.

5.10.7.7 Set time

You can only change the time in the *'Off'* state. The European display format is used.

5.10.7.8 Measured value recording

You can adjust the time intervals in which the measured values are entered into the log book.

5.10.8 Control

You can set the controller operating modes here.

5.10.8.1 No control

To save energy, the lamp output can be reduced with new UV lamps, and with UV systems operating with a flow rate lower than the maximum permissible flow. There is no control in this operating mode.

The lamp power can be adjusted manually between 50 ... 100% of the nominal electrical power. If during operation, the output of the UV lamp falls and the sensor signal reaches or falls below the warning threshold, the lamp power should be increased incrementally up to the maximum permissible value. The minimum radiation intensity and warning threshold must be set manually.

5.10.8.2 Manual control

In *'Manual control'* operating mode, specify the setpoint of the sensor signal by inputting the values:

- Flow,
- UV transmission,
- Target dose.

The control calculates the required radiation intensity (sensor signal) from the input values. Consequently, there is automatic control of the UV system to changing operating conditions, such as lamp ageing, variations in water quality etc.

5.10.8.3 Flow Control

In *'Flow control'* operating mode, the lamp output is additionally determined by the external command variable of a 0/4 ... 20 mA signal from a flow meter. The following values also need to be entered:

- UV transmission,
- Target dose.

The control calculates the required radiation intensity (sensor signal) from the values entered and the current flow signal. Consequently, there is automatic control of the UV system to changing operating conditions, such as lamp ageing, variations in water quality etc.

5.10.8.4 Control combined chlorine

Functions in similar way to the "Flow control" operating mode, but the external command variable is provided by the concentration of combined chlorine.

5.10.9 Analogue output XA1

The signal from the UV sensor can also be recorded for documentation purposes using a recorder. To do so, connect the recorder to the standard output of the control.

You can select between a standard signal of 0... 20 mA and 4 ... 20 mA:

- 0 or 4 mA corresponds to the sensor signal 0 W/m^2.
- The 20 mA can be assigned to any maximum W/m² value (0 W/m² ... 999 W/m²).

5.10.10 Analogue input XE2

The analogue input XE2 is permanently related to the flow. You may select 0 ... 20 mA or 4 ... 20 mA.

The measured value is displayed in the secondary display and in the log book, and is also archived on the SD card.

5.10.11 Analogue input XE3

Analogue input XE3 may be used for turbidity measurement or measuring the combined chlorine. You may select 0 ... 20 mA or 4 ... 20 mA. When using inputs for combined chlorine you may select this input to set the setpoint of the sensor signal.

The measured value is displayed in the secondary display and in the log book, and is also archived on the SD card.

5.10.12 Temperature input XE4

Maximum operating temperature

To achieve sufficient rinsing of the UV system, the rinse valve must be of sufficient size.

In order to prevent the maximum temperature from being reached during activation of the rinse process, the water temperature in the display must be set to a significantly lower temperature than the maximum permissible operating temperature.

To prevent overheating of the UV system if there is no or inadequate flow through the UV system, when the maximum operating temperature is reached, the rinse valve is opened. If the maximal permissible water temperature does not fall by approx. 5 °C or if the water temperature increases to the maximum temperature within the maximum permissible *'rinse time in the event of excessive temperature'*, the control switches off the UV lamp and switches to fault mode.

5.10.13 Minimum mains voltage

Modifications to the minimum mains voltage may only be carried out by the manufacturer.

Monitoring the mains voltage prevents uncontrolled failure of the UV system and the UV lamps due to insufficient mains voltage. If the mains voltage drops to the minimum value, the control switches to undervoltage mode and the UV system is shut down in a controlled manner. If the mains voltage exceeds the permissible minimum value again, the UV system starts up again automatically.

5.10.14 Other inputs and outputs

5.10.14.1 Pause

The UV system can be switched on and off by opening and shutting an external contact that is connected to the pause input of the controller. It is possible to select whether the UV system starts up with an open or closed pause contact. The pause contact is at pause. The UV system starts up when the pause contact is open.

5.10.14.2 External fault switch input

The 'EXTERNAL FAULT' switch input is bridged when the system is delivered. When the bridge is removed without connecting a fault signalling device, the controller switches to fault mode. The UV system can then no longer be operated.

When a fault signalling device is connected, remove the bridge as otherwise no fault will be reported.

An external fault signalling device can be connected to the *'EXTERNAL FAULT'* switch input such as e. g. a flow detector.

5.10.14.3 Signal relay operation

A signalling device can be connected to the signal relay operation. If the UV system has reached normal operating mode, the signal relay operation is activated.

5.10.14.4 Alarm signal relay

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

6 Assembly and Installation

- **User qualification, mechanical installation:** trained and qualified personnel, see *Chapter 2.2 'Users' qualifications' on page 8*
- **User qualification, electrical Installation:** Electrical technician, see *Chapter 2.2 'Users' qualifications' on page 8*

6.1 Reactor

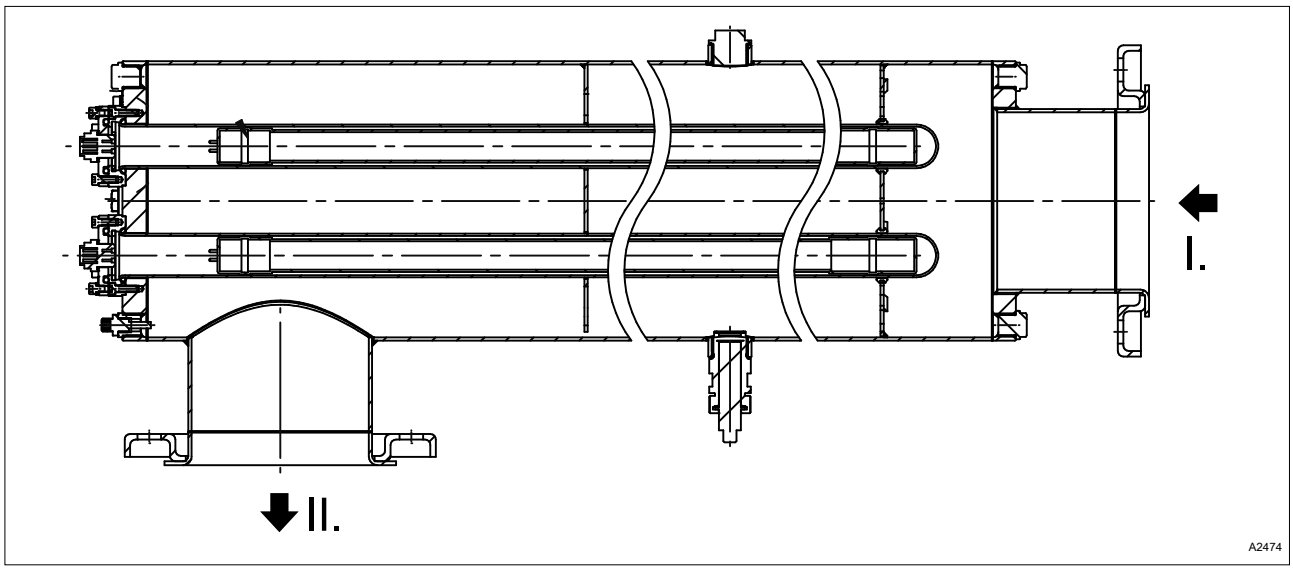

Fig. 6: Reactor

I. Inlet
II. Outlet

6.1.1 Assembly

Fitting position

NOTICE!

Maintenance work

Leave adequate room for maintenance work.

The required clearance for maintenance work, e. g. replacing lamp protection tubes and working on the wiper system, can be found in the measurement sheet.

Fix the reactor in place with appropriate fixing material (pipe clamp, frame). The fitting position can in principle be chosen at random and, if required, can be adapted to conditions on site. With UV systems equipped with a wiper, ensure that the wiper can be serviced easily.

6.1.2 Attaching the Warning Sign and Nameplate to the Reactor

NOTICE!

Attach the self-adhesive warning label supplied to the reactor so that it is clearly visible.

→ Attach the “Caution UV radiation” warning sign and the “160° opening angle” label directly adjacent to the sensor connector.

6.1.3 Hydraulic Connections

CAUTION!
Installation regulations
Possibility of incorrect assembly.

Carry out hydraulic connection of the reactor in accordance with the applicable general guidelines and local installation regulations.

.

Information for appropriate installation

- *Provide valves upstream and downstream of the reactor to shut off the reactor for maintenance work.*
- *It is also recommended with reactors, which are regularly cleaned by filling them with a cleaning solution, that the water drain connector and the vent screw are replaced by appropriate valves.*
- *With larger reactors, it is recommended that they are filled through the water drain opening using an appropriate acid-resistant pump.*
- *If the reactor is filled with a pump, it is also useful to circulate the cleaning solution through the vent opening. This shortens the cleaning time and achieves a better result.*

6.2 Control Cabinet and Control

6.2.1 Assembly

NOTICE!
Do not lay power cables (lamp cable, mains power line etc.) and signal cables (sensor connector cables etc.) together.

Fit the control cabinet or the mounting panel with control and electronic ballast to the wall or a suitable frame so that the UV lamp and UV sensor can be connected to the cables provided.

6.2.2 Electrical connections

WARNING!

Electrical connections

Possible consequence: Fatal or very serious injuries.

- Please observe all generally applicable guidelines and local installation regulations.
- Only carry out installation work on the UV system if it is disconnected from the mains power supply.
- Connect a protective earth conductor to the reactor and to the reactor cover. Ensure a continuous power supply by means of a suitable fault current protection.
- Only an authorised electrical technician may open the control cabinet!
- Do not lengthen the connecting cable for the UV lamp or the UV sensor cable.
- The electrical installation must be carried out by an authorised electrical technician using the documents supplied (wiring diagram).

6.2.3 Fitting the temperature sensor

Screw the temperature sensor, which monitors the water temperature, into the thread provided for this on the front of the reactor.

1. Screw the temperature sensor into the thread until hand-tight.
2. Attach the connecting cable and fix in place.

6.2.4 Assembly and connection of the limit switch

NOTICE!

Without the limit switch, the wiper motor will not detect its end positions. This leads to failure of the wiper.

The limit switch is used to monitor the wiper motor.

1. Screw the limit switch into the threaded sleeve provided on the reactor cover.
2. Lightly tighten the locking nut.
3. Connect the limit switch using the angled plug.

6.2.5 Connecting the UV Sensor

Only use food-safe lubricant.
The quartz window must not come into contact with lubricant.

1. Guide the O-ring over the thread of the UV sensor up to the sealing groove.
2. Grease the thread of the UV sensor.
3. Screw in the UV sensor and lightly tighten.
4. Connect the UV sensor using the sensor connection cable.

6.3 Fitting the UV Lamp Protection Tube

6.3.1 Fitting the UV lamp protection tube without the wiper

1. Loosen the bracket of the UV lamp protection tube with an Allen key and remove it.
2. Carefully pull the transport protection (grey plastic pipe) completely out of the reactor.
3. Use the transport protection as an insertion aid. Guide the grey plastic tube into the UV lamp protection tube until only around 30 cm of the plastic tube is projecting.
4. Carefully push the UV lamp protection tube until it reaches its stop position in the reactor.
5. Push a new O-ring onto the end of the UV lamp protection tube.
6.

CAUTION!
- Check the UV lamp protection tube for damage before fitting.
  - Never re-fit a damaged UV lamp protection tube.
- Ensure that the UV lamp protection tube is sitting correctly.

6.3.2 Fitting the UV Lamp Protection Tube with Automatic Wiper

1. Loosen the bracket of the UV lamp protection tube with an Allen key and remove it.
2. Move the wiper into the service position, service menu: Wiper positions.
3. Carefully push the UV lamp protection tube into the reactor.
4. Push a new O-ring onto the end of the UV lamp protection tube.
5. Carefully push the UV lamp protection tube until it reaches its stop position in the reactor.

6. 

CAUTION!

- Check the UV lamp protection tube for damage before fitting.
  - Never re-fit a damaged UV lamp protection tube.
- Ensure that the UV lamp protection tube is sitting correctly.

7. Screw the UV lamp protection tube tightly into the reactor cover.

⇨ 

Leak test

Following this, check the leak-tightness of the UV system.

6.4 Assembly and connection of the UV lamps

WARNING!

Electrical installation

Cause: Danger from electrical voltage.

Possible consequence: Fatal or very serious injuries.

Measure: Prior to assembly and connection of the UV lamps, switch off the master switch or pull the mains plug out of the socket.

WARNING!

UV-C radiation

Cause: Danger from ⚠ UV radiation.

Consequence: UV radiation is harmful to the eyes and skin.

Measure: Only start up the UV lamps when they are properly installed.

NOTICE!

Premature UV lamp failure

Never touch the UV lamp glass with bare hands.

Fingerprints burn into the glass and can result in premature failure. Use a cloth moistened with alcohol to clean off fingerprints from the lamp before installation.

Install the UV system in accordance with all pertinent regulations prior to commissioning

With free-standing UV systems, attach the connecting plug with lamp cover to the UV lamp before the UV lamp is inserted into the lamp protective tube.

1. Place the O-ring into the groove provided on the lamp protection tube holder.
2. Insert the UV lamp into the UV lamp protection tube and allow it to project out approx. 100 mm.
3. Attach the connector plug with lamp cover to the UV lamp.
4. Insert the UV lamp fully into the lamp protection tube
5. Place the UV lamp cover onto the UV lamp protection tube.

   Use an Allen key to screw in the fixing bolts provided and tighten.
6. Attach the pin plug with the lamp connection cable to the socket on the cover of the lamp and fix in place with the knurled nut.

6.5 Assembly and installation of the wiper motor (optional)

1. Push the enclosed protective cover (14) over the wiper rod.
2. Connect the wiper motor to the adapter plate using the mounting kit.

7 Commissioning

- **User qualification, commissioning:** trained user, see *Chapter 2.2 'Users' qualifications' on page 8*

Avoid frequent switching operations

Avoid short switching intervals and switching operations. Frequent switching operations can have a negative effect on the service life of the UV lamp.

7.1 Check the control system programming

WARNING!

Insufficient water treatment

The UV transmission of the water must be known before commissioning the UV system.

Please read the technical data sheet for your UV system

Ensure that:

- the maximum permissible water flow rate is not exceeded and
- the UV transmission does not fall below the permissible level,
  - as otherwise adequate treatment of the water cannot be guaranteed because the radiation dose is too low.

NOTICE!

Warning threshold

Failure to set the warning thresholds in accordance with the data sheet will lead to warning alerts being given prematurely or late.

Minimum irradiation intensity

It is especially important to check whether the minimum radiation intensity is set in accordance with the information in the accompanying data sheet. If the minimum radiation intensity is undershot on a regular basis or is permanently undershot, then either the max. flow should be reduced or a water pretreatment process must be installed upstream in order to improve the water transmission value of the UV system.

7.2 Leak testing and ventilation of the reactor

1. Open the bleed valve on the reactor.
2. Slowly open the shut-off valve upstream of the reactor.
3. Fill the reactor until water emerges from the bleed valve.
4. Close the bleed valve.
5. Check the reactor for leaks.
6. Open the shut-off valve downstream of the reactor (only necessary with a manual shut-off valve).

7.3 Switching on the UV System

In commissioning status, the UV system's continuous display shows the *'Warm-up phase'* message.

The following symbols appear in the status display:

- A downward arrow indicates that the warning threshold has not been reached.
- Two downward arrows indicate that the minimum radiation intensity has not been reached.
- The disc symbol indicates that a SD card has been inserted.

The following information appears in the secondary display on an ongoing basis:

- The remaining warm-up time is displayed.
- If available, the temperature is displayed.
- If available, the measured values for both analogue inputs are displayed.

1. Switch on the UV system using the *[START/STOP]* key. In order to do so, hold down the *[START/STOP]* key for at least 2 seconds

   ⇨ The *'Warm-up phase'* display appears

2. The *'Normal operation'* display appears

   ⇨ Once the UV lamps have ignited, it will take several minutes until the full UV output has been reached.

3. Should an error message appear, evaluate the error message, taking into account chapter *Chapter 9 'Troubleshooting (Faults and Warnings)' on page 75* in this regard.
4. Set the required control type, see *Chapter 7.1 'Check the control system programming' on page 42*
5. Set the minimum radiation intensity and warning threshold in the control, *Chapter 7.1 'Check the control system programming' on page 42*

   ⇨ The UV system is now ready for operation.

7.4 Adjustable functions and parameters

Menu	Property
Display unit	The display unit can only be changed in *'Off'* status.
Transfer pump control	The transfer pump control can only be changed in *'Off'* status.

Menu	Property
Minimum radiation intensity	This menu only appears with UV systems for which no control has been provided.
Warning threshold	This menu only appears with UV systems for which no control has been provided.
Maximum rinsing time	The maximum rinsing time can only be changed in *'Off'* status.
Maximum free rinse time	The maximum rinse-free time can only be changed in *'Off'* status.
Lamp post-burn time	The lamp post-burn time can only be changed in *'Off'* status.
Set date	The date and time can only be changed in *'Off'* status. The European display format is used for both parameters.
Set time	
Measured value recording	The measured value recording shows the time intervals at which the measured values are entered into the log book.
Control	Only with UV systems that support the control function ■ No control ■ Manual control ■ External control
Analogue output XA1	The analogue output is used for issuing the radiation intensity. The analogue output shows the display value as a current signal.
Analogue input XE2	The analogue input XE2 is permanently related to the flow. The analogue input XE2 can be used to control the radiation intensity. The measured value is displayed in the secondary display and in the log book, and is also archived on the SD card.
Analogue input XE3	Various measured values can be assigned to the analogue input XE3. The measured value is displayed in the secondary display and in the log book, and is also archived on the SD card.
Temperature input XE4	The operating temperature is used to monitor the water temperature in the reactor. The setting value is limited by the maximum water temperature, which can only be adjusted in the configuration menu. The measured value is displayed in the secondary display and in the log book, and is also archived on the SD card.

8 Maintenance

8.1 General Information

- **User qualification:** trained user, see *Chapter 2.2 'Users' qualifications' on page 8*

WARNING!

UV-C radiation

Possible consequence: Serious injuries.

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

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

WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries

– Measure: Disconnect the device from the power supply before opening it.
– Disconnect damaged and defective devices or devices that have been tampered with from the power supply.

CAUTION!

General precautionary measures

Ensure that the reactor is at atmospheric pressure before carrying out any maintenance work.

NOTICE!

Maximum permissible service life

Replace the UV lamps at the latest after their maximum permissible service life. Otherwise, the operating safety of the UV system can no longer be guaranteed.

The maximum permissible service life is 14,000 operating hours, unless otherwise stated in the accompanying data sheet.

NOTICE!

Chemical cleaning processes

Note the following with UV systems integrated into chemical cleaning processes (CIP):

- Do not use any corrosive cleaning chemicals, e.g. HCl (hydrochloric acid).
- The maximum temperature of the CIP process may not exceed the following values:
  - 90 °C with alkaline cleaning media.
  - 50 °C with acidic cleaning media.
- Switch off the UV system during the CIP process.

Maintenance of the UV system is limited to cleaning the UV sensor/UV sensor window and replacing the UV lamp at the end of its maximum permissible service life.

An operating log must be maintained to document any maintenance work carried out; a form is included in the Appendix.

8.2 Cleaning with a Wiper

Cleaning with an automatic wiper

In UV systems with automatic wiper, the lamp protection tubed is cleaned in situ according to the set wiper interval (default setting 2 h).

Cleaning with a manual wiper

In UV systems with manual wiper, the UV lamp protection tubes are cleaned in situ as required.

8.3 Cleaning with Cleaning Solution by Filling the UV System

NOTICE!

Handling the cleaning solution

- It is also recommended with reactors, which are regularly cleaned by filling them with a cleaning solution, that the water drain connector and the vent screw are replaced by appropriate valves.
- With larger reactors, it is recommended that they are filled through the water drain opening using an appropriate acid-resistant pump.
- If the reactor is filled with a pump, it is also useful to circulate the cleaning solution through the vent opening.
  - This shortens the cleaning time and achieves a better result.
- 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 filling the reactor with a cleaning solution:

1. Switch off the UV system.
2. Switch off the master switch or disconnect it from the mains power supply.

3. Close the shut-off valves upstream and downstream of the radiation chamber.
4. Drain the reactor.
5. Screw in the water drain screw again and tighten using minimal force.
6. Fill the reactor 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. Empty the reactor and dispose of the cleaning solution in accordance with the applicable regulations.
9. Flush the reactor thoroughly with clean water until all residue of cleaning solution has been removed.
10. Screw in the water drain screw and tighten using minimal force.
11. Slowly open the shut-off valve upstream of the reactor.
12. Fill the reactor until water emerges from the vent screw.
13. Close the air vent screw and tighten it using minimal force.
14. Open the shut-off valve downstream of the reactor, which is only necessary with a manual shut-off valve.
    ⇨ Check the reactor for leaks.
15. Switch on the master switch or connect to the mains power supply.
    ⇨ The UV system is ready for operation again.

8.4 Cleaning the UV lamp protection tube and replacing the wiper element

NOTICE!

Clean the UV lamp protection tubes and replace the wiper element - after 1000 wiper cycles at the latest.

Clean the tube when the UV sensor signal falls below the warning threshold, without this being based on other causes, such as ageing of the UV lamp or significant worsening of the UV transmission, after 1000 wiper cycles at the latest. In addition, the wiper element (if present) must always be replaced.

CAUTION!

Unsuitable cleaning agents

Possible personal injury / material damage to UV systems.

- Do not use any acids that are corrosive or that cause stress cracks, such as hydrochloric acid.
- Read the safety data sheet for the cleaning agent selected.
- Wear protective clothing when cleaning (protective eyewear, protective gloves ...).
- Ensure that no cleaning solution penetrates the UV lamp protection tube.
- When cleaning UV systems, ensure that no cleaning solution enters the pipework.

NOTICE!

Disposal of cleaning agent

Possible environmental hazard.

Dispose of the waste cleaning solution in accordance with the pertinent guidelines and regulations.

Read the safety data sheet for the cleaning agent selected.

An annual clean 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 manually when dismantled or can be cleaned by filling the reactor with a cleaning solution.

8.5 Dismantling and Cleaning the UV Lamp Protection Tube and Sensor

WARNING!

UV-C radiation

Possible consequence: Serious injuries.

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

- Only start up the UV lamp ⚠ when it is properly installed.
- Install the UV lamp into the UV system in accordance with the regulations prior to commissioning.

WARNING!
Live parts!
Possible consequence: Fatal or very serious injuries.

- Measure: Disconnect the device from the power supply before opening it.
- Disconnect damaged and defective devices or devices that have been tampered with from the mains power supply.

CAUTION!
Fingerprints on the UV lamp
Possible consequence: Premature failure of the UV lamp.

- Only touch the glass of the UV lamp when wearing 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 it.
- Then wipe the UV lamp with a soft, dry cloth.

Cleaning the UV sensor
Clean the UV sensor every time you clean the UV lamp protection tube.

Cleaning after dismantling the UV lamp protection tube

1. Switch off the UV system.
2. Position the wiper: activate the wiper in the control in the *'Service'* > *'Position wiper'* menu.
   ⇨ The wiper moves into the service position.
3. Close the shut-off valves upstream and downstream of the reactor.
4. Switch off the main switch or disconnect from the mains power supply.
5. Empty the reactor.
6. Depending on the system size, now first remove the wiper motor.
7. Remove the safety switch of the UV lamp cover.

WARNING!
Hot UV lamp
Possible consequence: Skin burns.

Measure: Switch off the UV system 5 minutes before carrying out maintenance work.

8. Use an Allen key to loosen the fixing bolts of the UV lamp cover and remove the UV lamp cover and the UV lamp.
9. Place the UV lamp cover and the UV lamp fully to one side.

10. Loosen the UV lamp protection tube with a face spanner and remove it, placing it on the holes, not on the threads.
11. Carefully fully remove the UV lamp protection tube from the reactor and place on a suitable clean surface.

    Use the insertion aid for this (grey plastic tube). Guide the grey plastic tube into the UV lamp protection tube until only around 30 cm of the plastic tube is projecting.
12. Remove the O-ring from the lamp protection tube.
13. 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.
14. Rinse the UV lamp protection tube with clean water and dry thoroughly with a soft cloth.

Cleaning the UV sensor

15. Loosen the sensor connection cable from the UV sensor.
16. Rotate the UV sensor out of the reactor.
17. Clean the quartz window with a cloth that has been saturated with cleaning solution until the coating has been removed without leaving a trace.
18. Rinse the quartz window with clean water and dry with a soft cloth.
19. Fit a new O-ring.
20. Screw in the UV sensor again and tighten using minimal force.
21. Connect the sensor connection cable to the UV sensor.

Fitting the UV lamp protection tube

22. Use the transport protection as an insertion aid. Guide the grey plastic tube into the UV lamp protection tube until only around 30 cm of the plastic tube is projecting.
23. Carefully push the UV lamp protection tube until it reaches its stop position in the reactor.
24. 

CAUTION!

Check the UV lamp protection tube for damage before fitting

- Never re-fit a damaged UV lamp protection tube.
- Ensure that the lamp protection tube is sitting correctly.

Push a new O-ring onto the end of the UV lamp protection tube.

Condition of the O-ring

Check whether the O-ring on the UV lamp protection tube bracket is seated in the groove provided. Ensure that the sealing surfaces on which the O-ring sits are completely smooth and clean.

25. Screw the UV lamp protection tube into the reactor cover.

Leak test

Following this, check the leak-tightness of the UV system.

26. Attach the connector plug with lamp cover to the UV lamp.
27. Insert the UV lamp fully into the lamp protection tube
28. Place the UV lamp cover onto the UV lamp protection tube.

    Use an Allen key to screw in the fixing bolts provided and tighten.
29. Attach the pin plug with the lamp connection cable to the socket on the cover of the lamp and fix in place with the knurled nut.
30. Depending on the system size, first fit the wiper motor.
31. Attach the pin plug with the connection cable for the motor wiper to the wiper motor socket and fix in place with the knurled nut.
32. Connect the cable plugs for the solenoid switch and temperature monitor.
33. Switch on the main switch or connect up to the mains power supply.
34. Slowly open the shut-off valve upstream of the reactor.
35. Open the shut-off valve downstream of the reactor, which is only necessary with a manual shut-off valve.
36. Switch on the UV system.

8.6 Maintaining the wearing parts of the automatic wiper

8.6.1 Tools

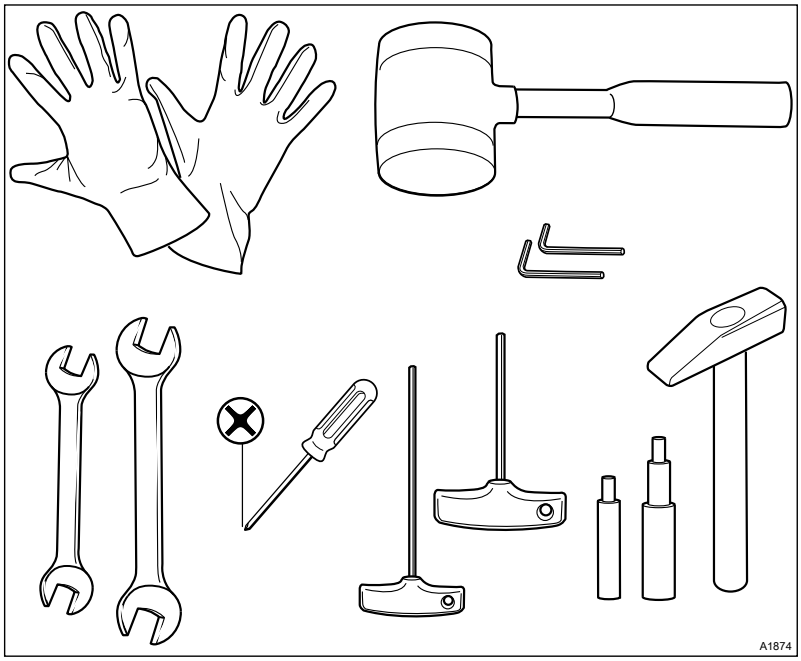

Fig. 7: Tools

Tools:

- 8 mm open-ended spanner
- 9 mm open-ended spanner
- 10 mm open-ended spanner
- 13 mm open-ended spanner
- 16 mm open-ended spanner
- 18 mm open-ended spanner
- 19 mm open-ended spanner
- 22 mm open-ended spanner
- 24 mm open-ended spanner
- 27 mm open-ended spanner
- 32 mm open-ended spanner
- 1.5 mm Allen key
- 2 mm Allen key
- 3 mm Allen key
- 4 mm Allen key
- 5 mm Allen key
- 300 gramme hammer
- Plastic hammer
- Straightedge / calipers
- Screw driver, Philips
- Cotton gloves
- Dulcodes LP special tool (supplied with UV system delivery).

8.6.2 Replace these wearing parts after 1000 wiper cycles, earlier if necessary

Spare parts kit

This chapter describes all the working steps needed to individually or completely replace all the components in the spare parts kit.

There are different spare parts kits depending on the number and type of UV lamps fitted:

- *Part number 1059074: Spare parts kit 2x350 W / motor wiper*
- *Part number 1059075: Spare parts kit 3x350 W / motor wiper*
- *Part number 1074886: Spare parts kit 4x350 W / motor wiper*

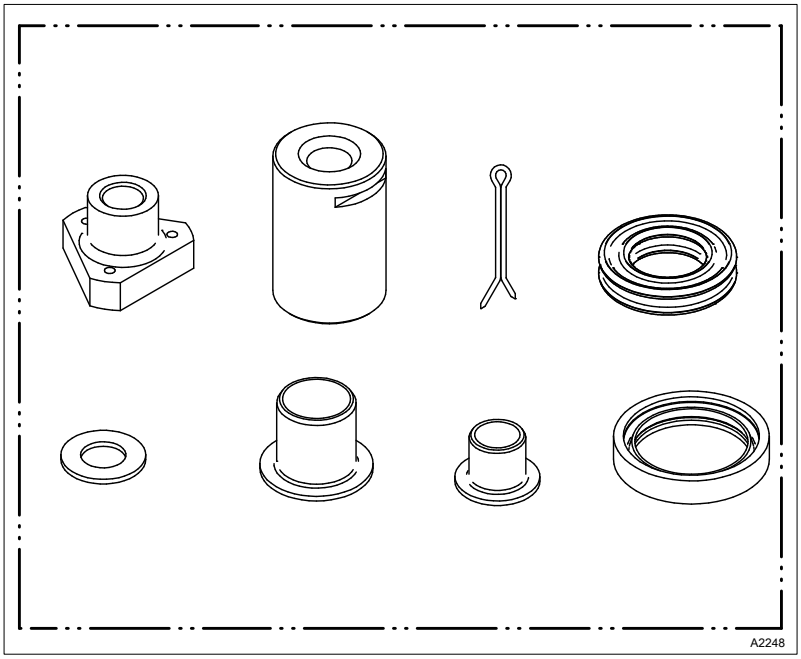

Fig. 8: Replace these wearing parts after 1000 wiper cycles, earlier if necessary. The number of components varies depending on the type of the spare parts kit.

8.6.3 Instructions: Replacing the wearing parts

WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries

- Measure: Disconnect the device from the power supply before opening it.
- Disconnect damaged and defective devices or devices that have been tampered with from the mains power supply.
- Do not modify the fitted UV lamp connection cable without authorisation.

WARNING!

Consequence: Serious injuries.

UV-C radiation is harmful to the eyes and skin

– Only start up the UV lamp when it is properly installed.
– Install the UV lamp into the UV system in accordance with the regulations prior to commissioning.

CAUTION!

Fingerprints on the UV lamp

Possible consequence: Premature failure of the UV lamp

– Only touch the glass of the UV lamp when wearing 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 it.
– Then wipe the UV lamp with a soft, dry cloth.

CAUTION!

High weight components

Since individual parts in the UV system exceed the limit values for lifting and carrying, we recommend the use of a suitable lifting aid. Observe the national and company regulations relating to "lifting and carrying" while doing this.

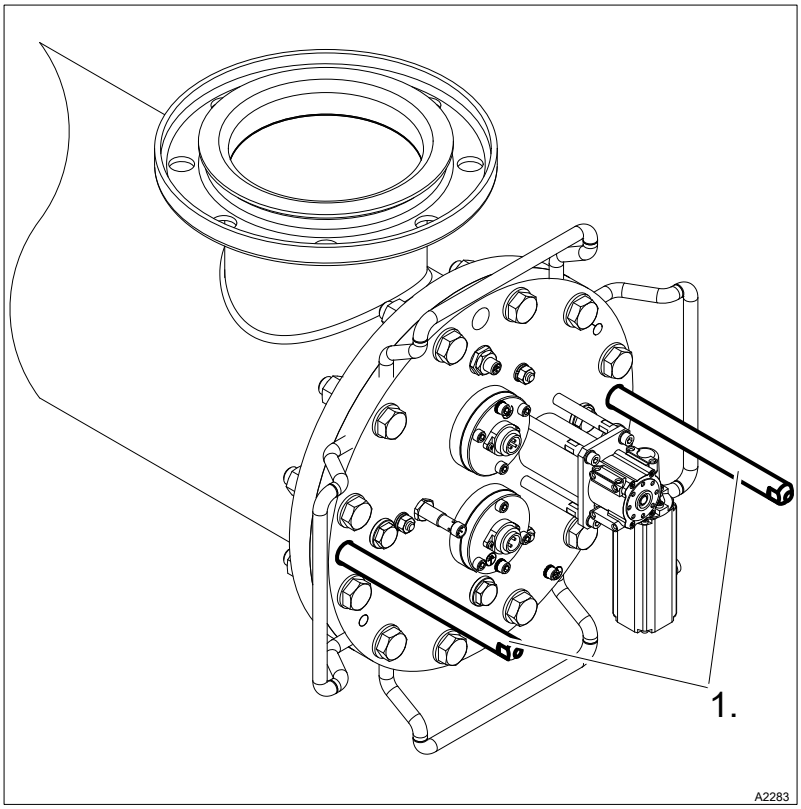

Fig. 9: Assembly aids (1.) 2 units.

The two assembly aids provided can be used to facilitate the assembly process if required. These assembly aids are screwed into the reactor threads and guide the reactor cover during assembly.

1. Move the wiper into the end position by activating a wiper cycle manually and then switch the UV system off once the wiper has reached the end position.

   ⇨ The wiper is then located at the extreme end of the spindle.

Dismantling

2. Use the START/STOP key to switch off the UV system. Switch the main switch off or disconnect the mains plug from the power supply.
3. Close the shut-off valves upstream and downstream of the reactor.
4. Drain the reactor by removing the upper and lower sealing stoppers.

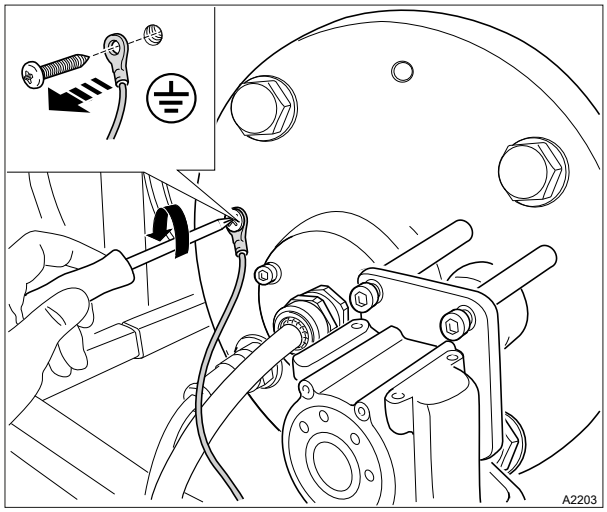

Fig. 10: Earthing cable

5. Remove the earthing cables

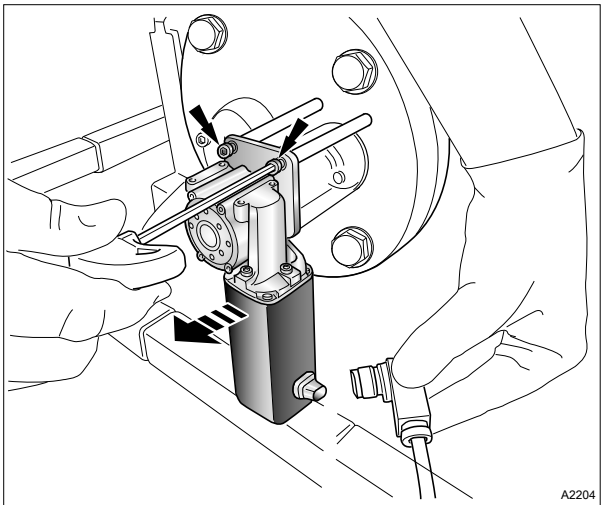

Fig. 11: Flange plate

6. Dismantle the flange plate with the wiper motor.

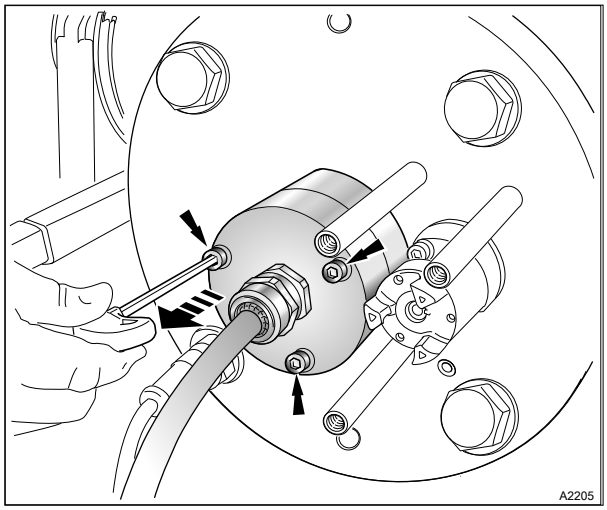

Fig. 12: UV lamp cover

7. Loosen the fixing bolts on the UV lamp cover.
8. Remove the UV lamp cover and the UV lamp.

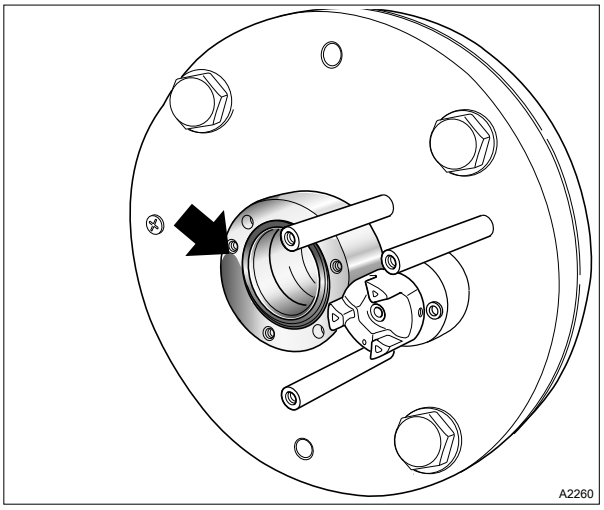

Fig. 13: Bracket (arrow) for UV lamp protection tube

9. Loosen the bracket (arrow) with an Allen key and remove the bracket (arrow) for the UV lamp protection tube.

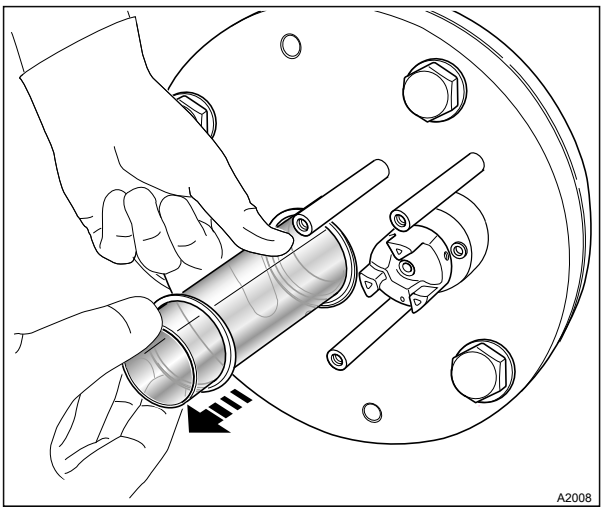

Fig. 14: UV lamp protection tube

10. Remove the UV lamp protection tube from the reactor.

11. Rinse the UV lamp protection tube with clean water and thoroughly dry the UV lamp protection tube with a soft cloth. Chemically clean the UV lamp protection tube if necessary.

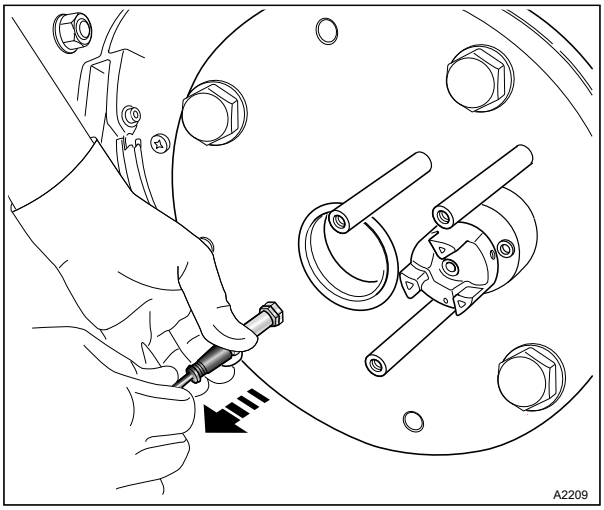

Fig. 15: Wiper limit switch

12. Remove the cable from the wiper limit switch.

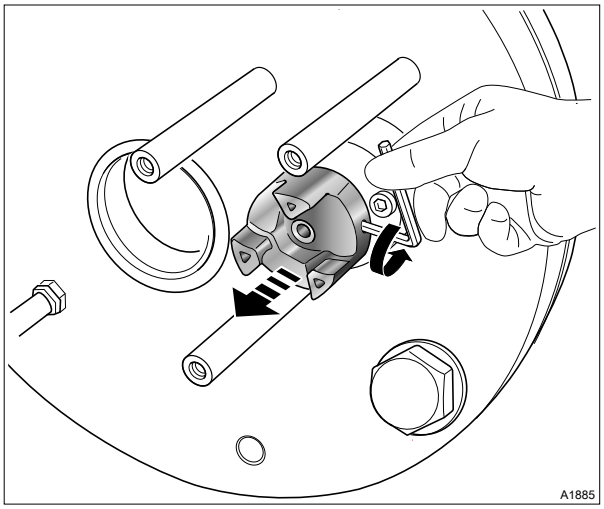

Fig. 16: Coupling / Splint

13. Remove the coupling and remove the splint.

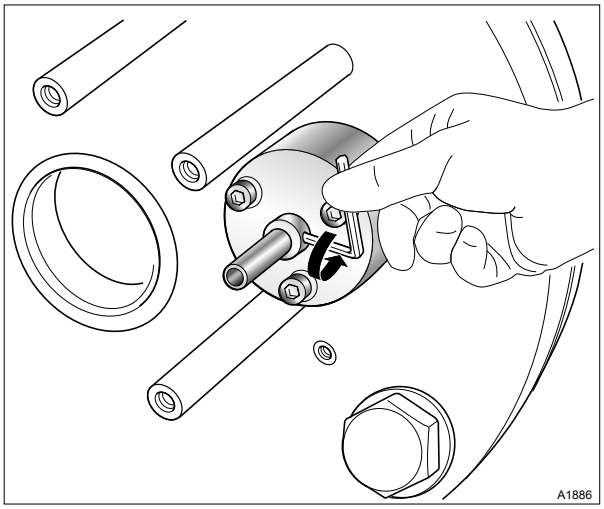

Fig. 17: Spacer ring / Slip washer

14. Remove the spacer ring and the slip washer.

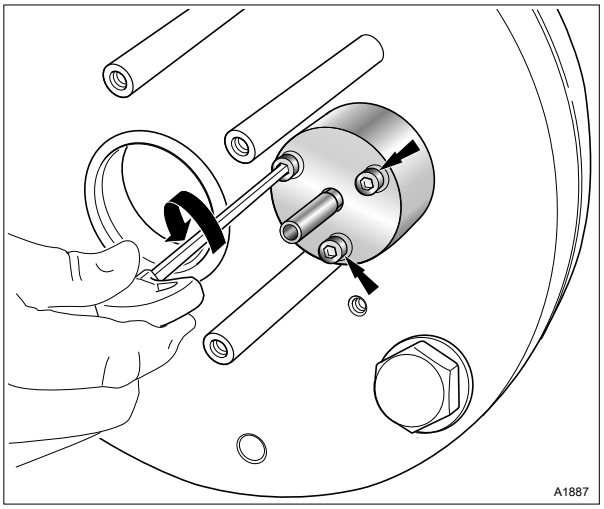

Fig. 18: Bearing cover

15. Unscrew the screws on the bearing cover.

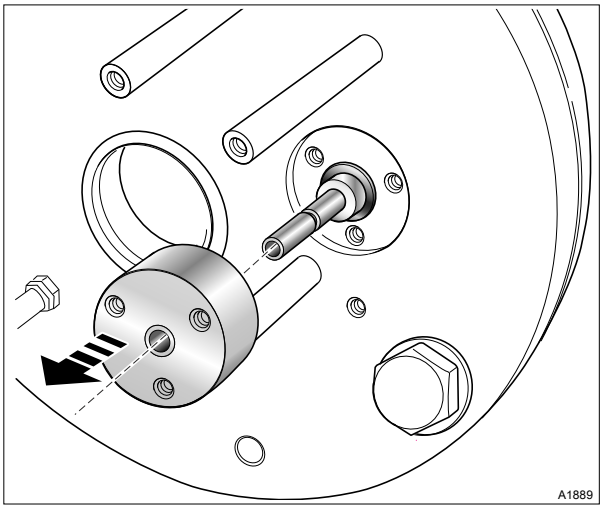

Fig. 19: Bearing cover

16. Remove the bearing cover from the reactor cover.

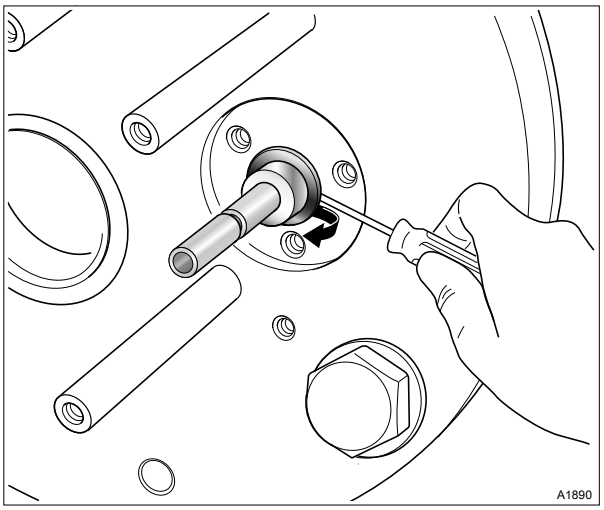

Fig. 20: X-ring

17. Remove the old X-ring and clean all components.

18. Grease the new X-ring using CARBAFLO® 2371 and insert the new X-ring into the reactor cover.

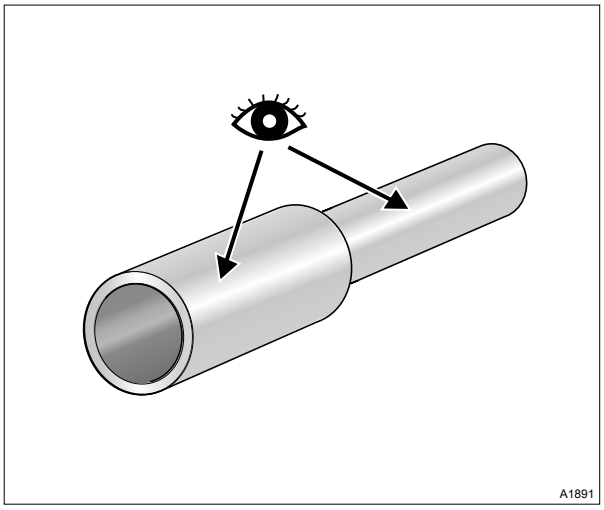

Fig. 21: Checking

19. Check and if necessary replace the adapter shaft. The shaft should not have any grooves or unevenness.

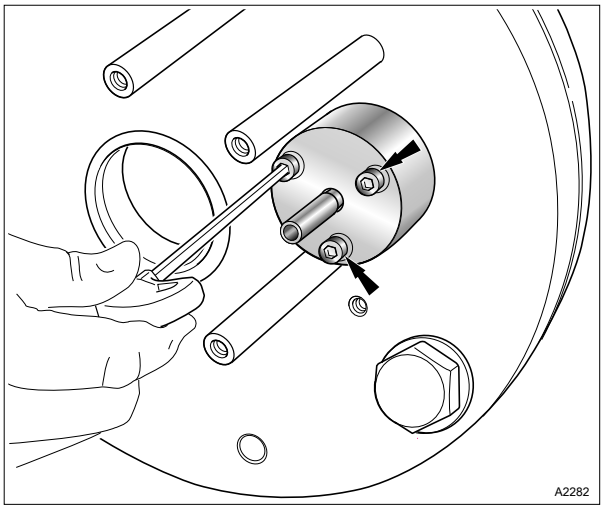

Fig. 22: Bearing cover / reactor cover

20. Fix the bearing cover to the reactor cover.

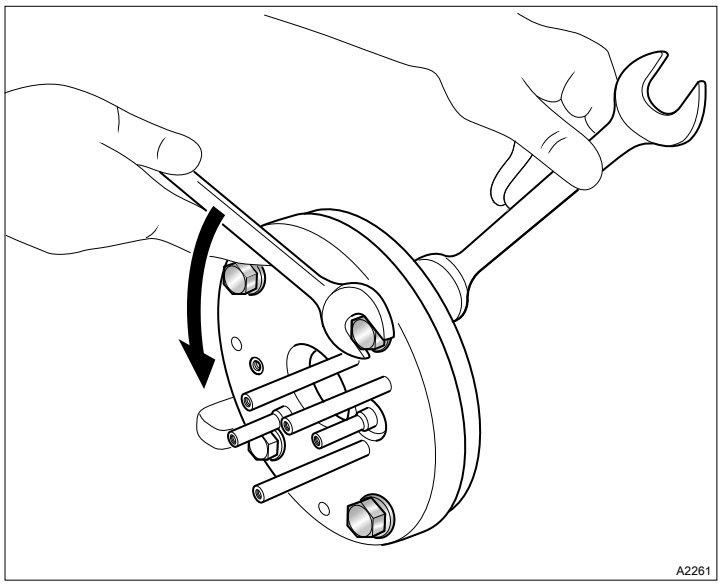

Fig. 23: Screws / reactor cover

21. Remove the reactor cover screws.

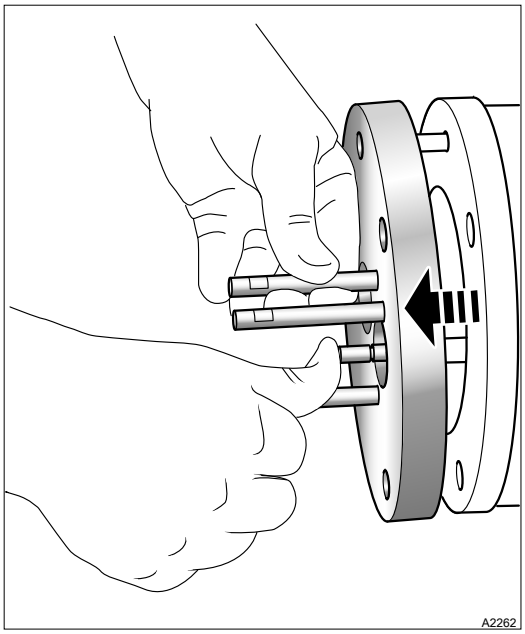

Fig. 24: Reactor cover

22. Remove the reactor cover with the wiper unit.

23. Remove the wiper assembly with the spindle, using a lifting device for this purpose if necessary.

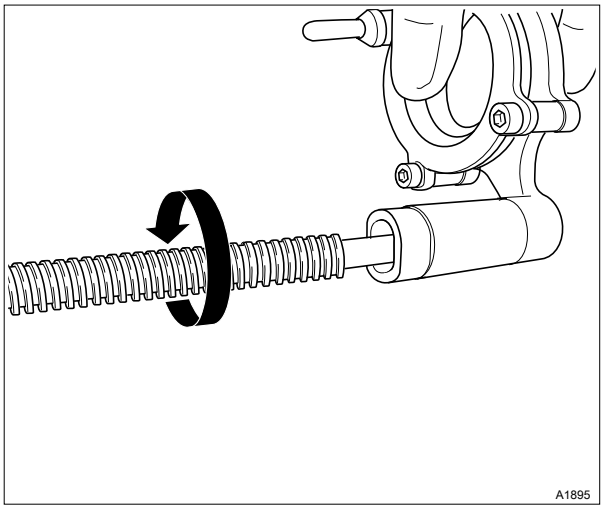

Fig. 25: Wiper spindle

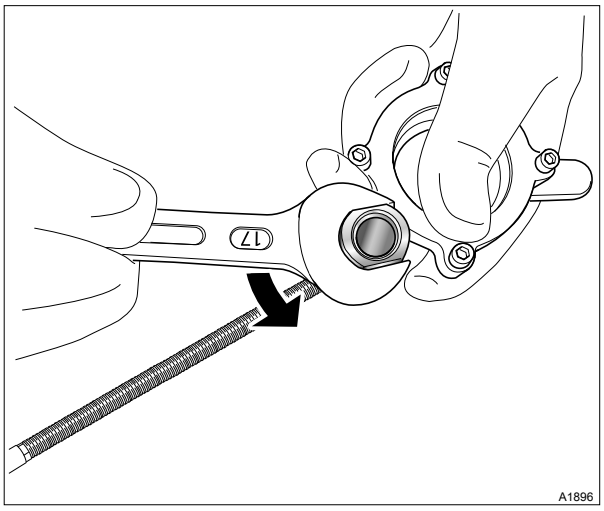

Fig. 26: Wiper spindle

24. Remove the wiper assembly from the wiper spindle.

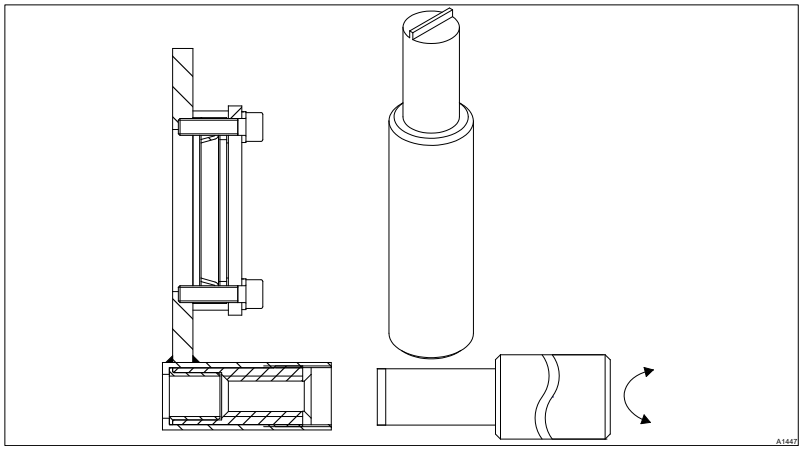

Fig. 27: Tool for the threaded sleeve in the wiper mounting, part number 1037738

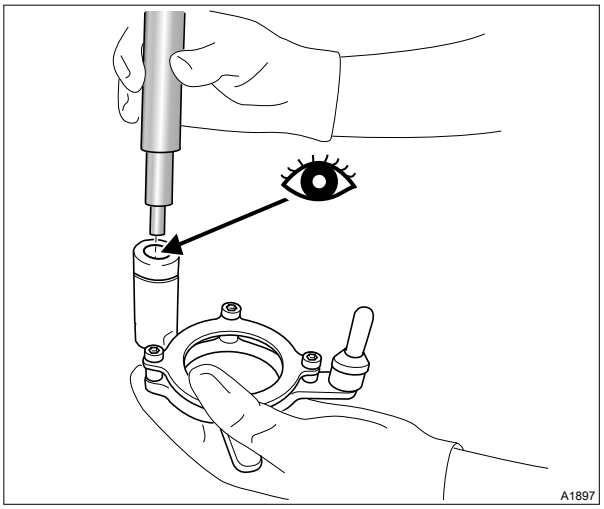

Fig. 28: Checking the threaded sleeve

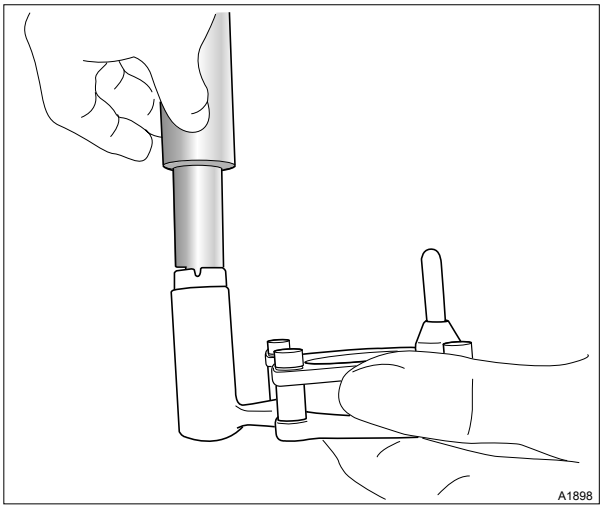

Fig. 29: Unscrewing the threaded sleeve

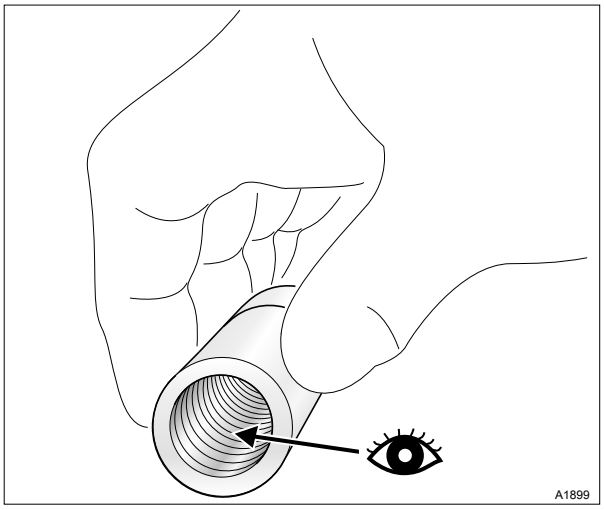

Fig. 30: Checking the threaded sleeve

25. Check and if necessary replace the threaded sleeve in the wiper mounting.

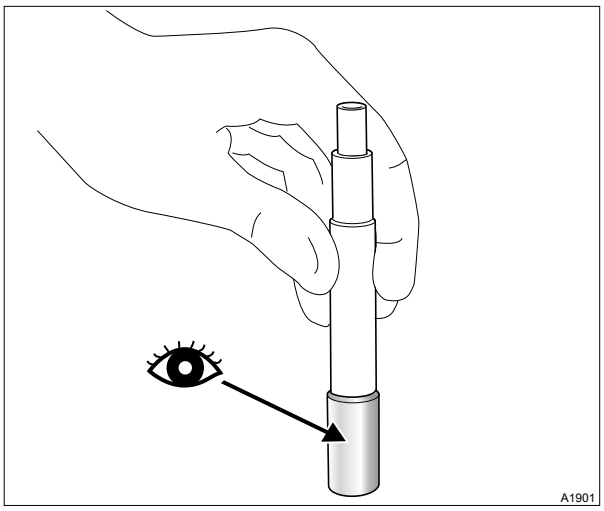

Fig. 31: Plastic slide bearing

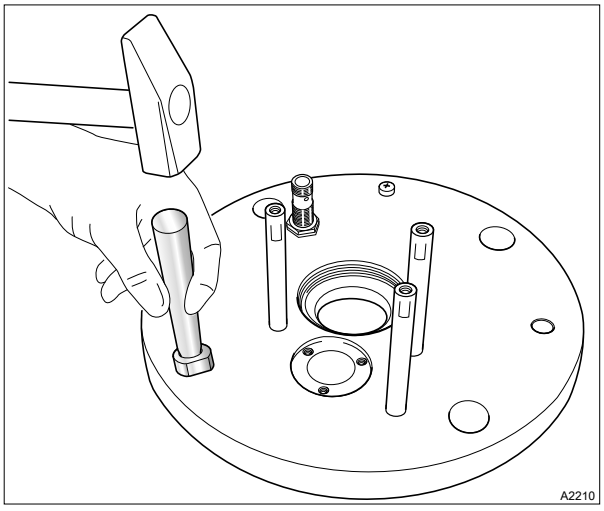

Fig. 32: Plastic slide bearing

26. Check and if necessary replace the plastic slide bearings.

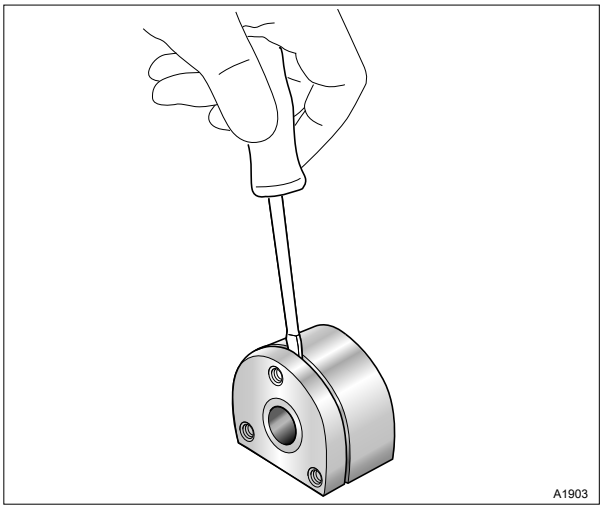

Fig. 33: Bearing cover

27. Open the bearing cover to obtain access to the slide bearing.

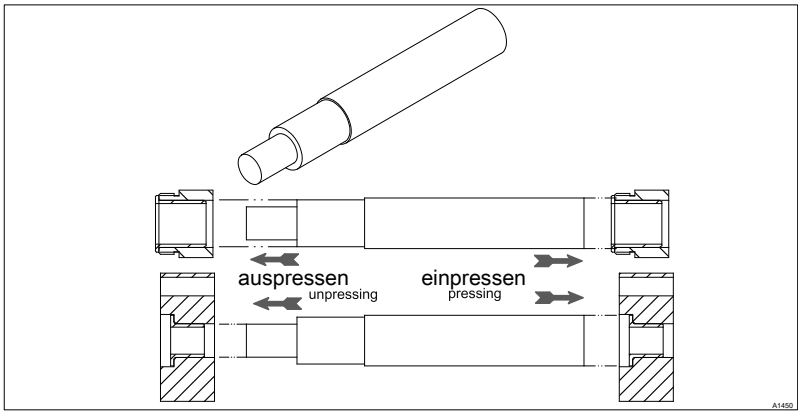

Fig. 34: Tool for pressing the plastic slide bearings in and out, part number 1036907

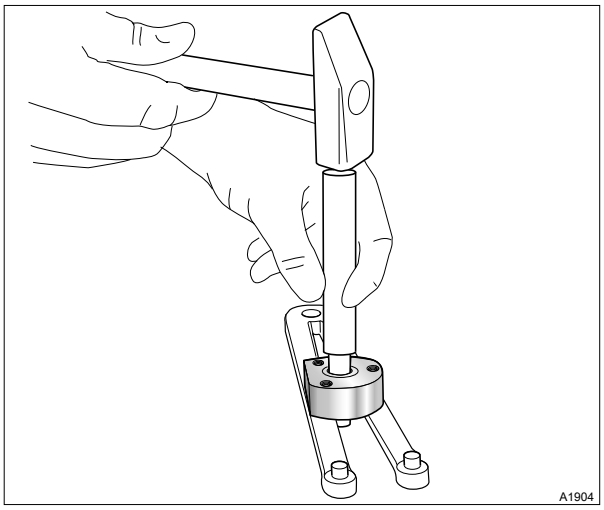

Fig. 35: Bearing cover, slide bearing

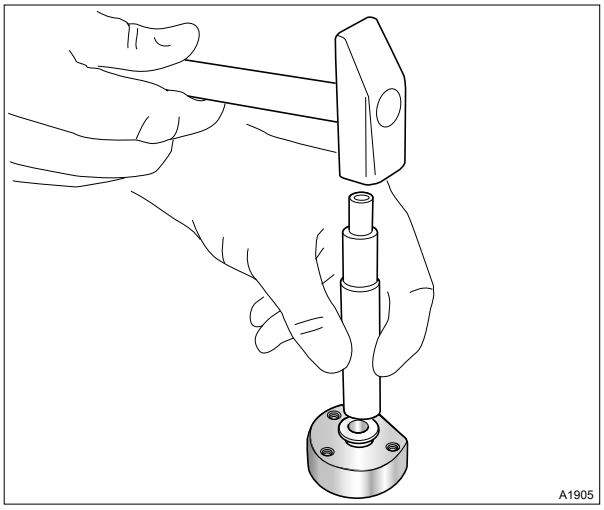

Fig. 36: Bearing cover, slide bearing

28. Replace the slide bearing of the bearing cover.

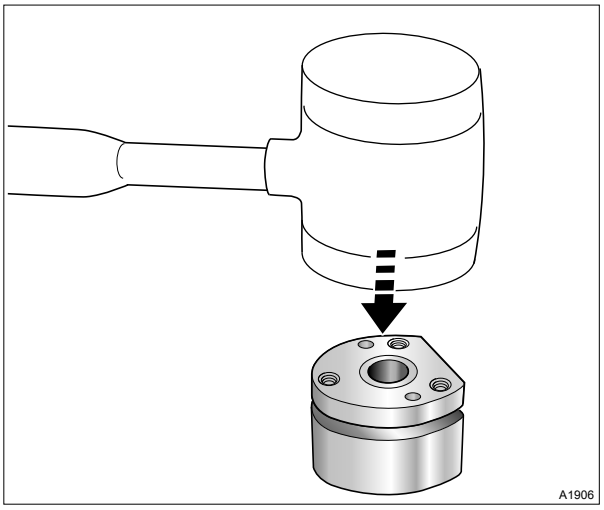

Fig. 37: Bearing cover

29. Close the bearing cover.

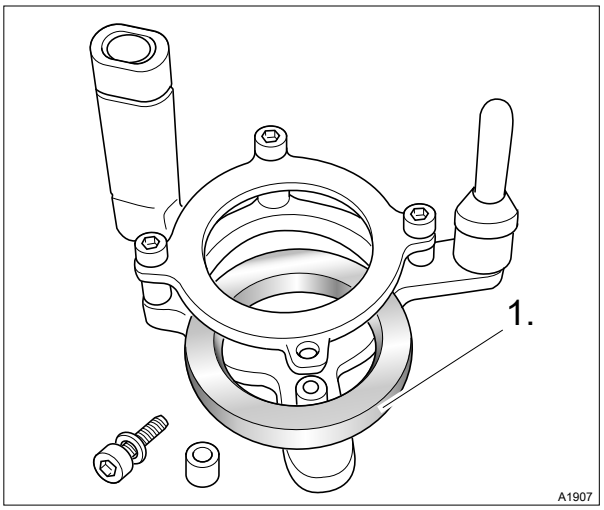

Fig. 38: Wiper element (1)

30. Check and if necessary replace the wiper element (1).

    The wiper lip points away from the reactor cover, to facilitate insertion of the UV lamp protection tube.

    ⇨ When assembled, the wiper element should be mounted so it floats and can move.

Replacing the wiper locknut and slide bearing after 5 years

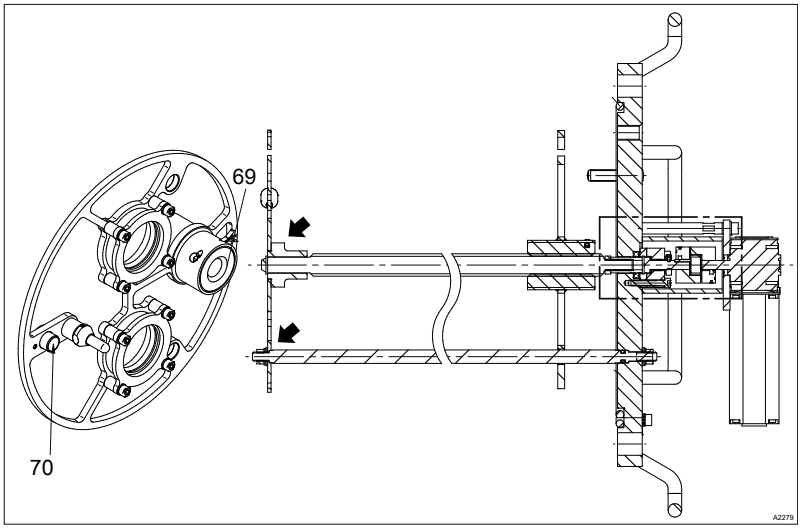

Fig. 39: Wiper locknut (69) and slide bearing (70)

31. Remove the splint securing the wiper locknut (69).

    Replace the wiper locknut (69) and insert a new splint.

32. Replace the slide bearing (70).

Reassembling the unit

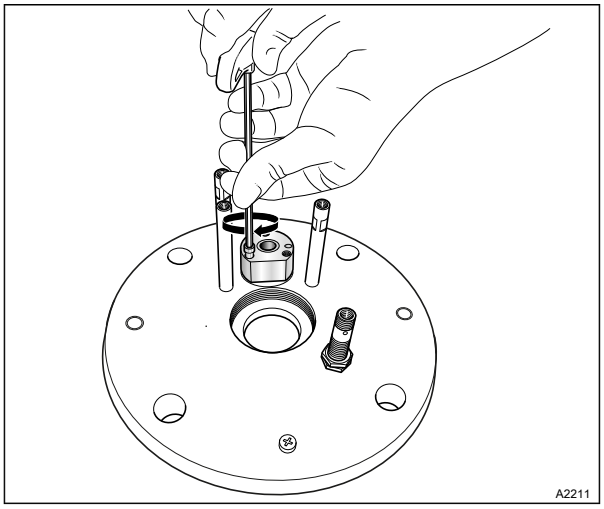

Fig. 40: Bearing cover / reactor cover

33. Screw the bearing cover to the reactor cover using the screws.

    ⇨ The flat area points towards the UV lamp

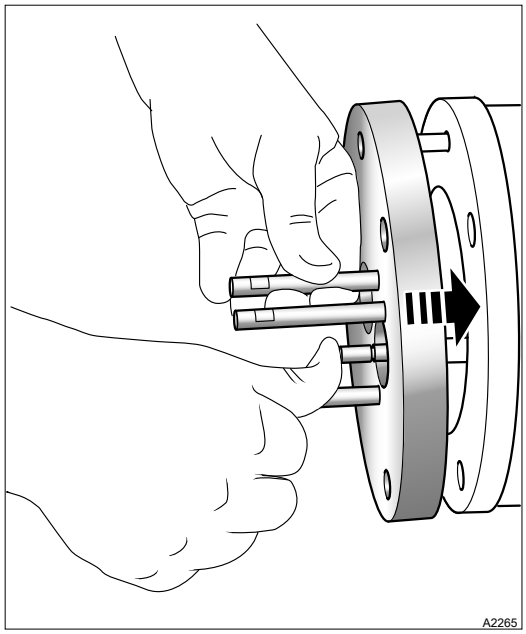

Fig. 41: Reactor cover

34. Slide the reactor cover with the wiper rod onto the reactor, using a lifting device for this purpose if necessary.

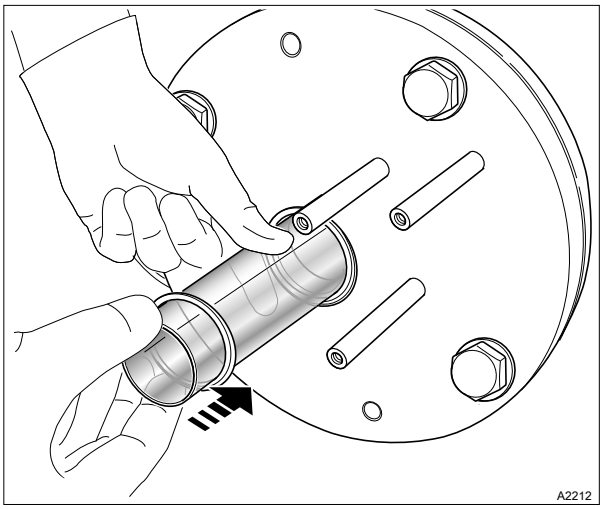

Fig. 42: UV lamp protection tube / O-ring

35. Fit the UV lamp protection tube using a new O-ring. Screw the UV lamp protection tube bracket into the reactor cover until hand-tight.

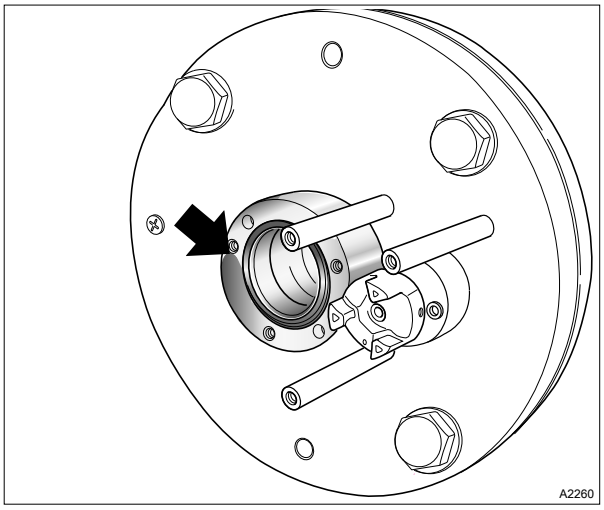

Fig. 43: Bracket (arrow) for UV lamp protection tube

36. Screw down the UV lamp protection tube bracket (arrow).

37. Fit the UV lamp.

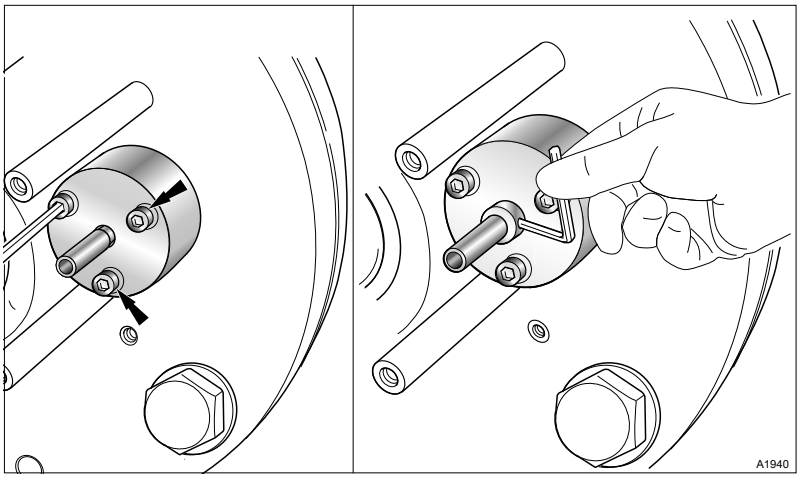

Fig. 44: Coupling

38. Attach the slip washer, the spacer ring and feather key and fit the coupling

    Secure the spacer ring. Place the coupling on gently, do not tighten the screw firmly.

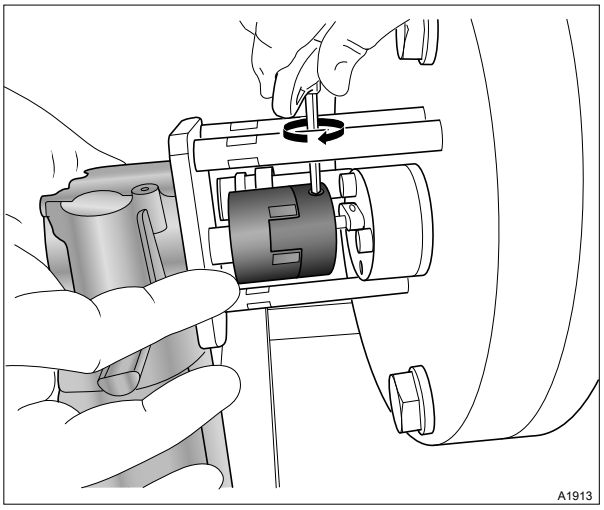

Fig. 45: Wiper motor onto the coupling

39. Place the wiper motor onto the coupling

    Position the coupling and tighten the screw.

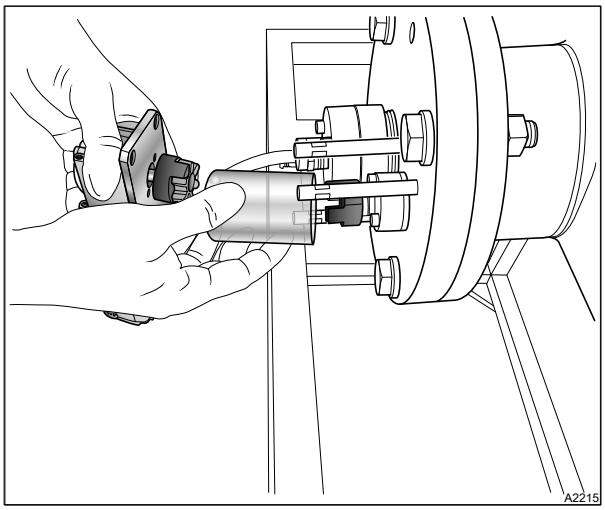

Fig. 46: Protective cover over the coupling

40. Remove the wiper motor, push the protective cover over the coupling. Then push the wiper motor onto the coupling again and fix the wiper motor in place.

41. Connect up all electrical connections.

42. Seal the reactor by screwing in the upper and lower sealing stoppers.

Restart the UV system

43. Slowly open the shut-off valves upstream and downstream of the reactor, fill the reactor with water and vent the reactor as necessary.

44. Switch the main switch on and/or connect the mains plug to the power supply.

45. Switch the UV system on.

46. Assemble the UV system in reverse order.

    ⇨ Note the information in the operating instructions.

8.7 Replacing the lamp

WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries.

- Measure: Disconnect the device from the power supply before opening it.
- Disconnect damaged and defective devices or devices that have been tampered with from the mains power supply.

WARNING!

UV-C radiation

Possible consequence: Serious injuries.

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

- Only start up the UV lamp ⚠ when it is properly installed.
- Install the UV lamp into the UV system in accordance with the regulations prior to commissioning.

WARNING!

Insufficient treatment efficiency

Possible consequence: Illness.

Please read the Technical Data Sheet accompanying your UV system.

- Replace the UV lamps with new lamps at the very latest when:
  - The UV sensor signal approaches the minimum radiation intensity without this being due to other causes, such as the formation of a coating on the UV lamp protection tubes or a serious deterioration of the UV-transmission.
  - The operating life of the UV lamp is approaching the maximum service life of the lamp or has exceeded it.

CAUTION!

Fingerprints on the UV lamp

Possible consequence: Premature failure of the UV lamp.

- Only touch the glass of the UV lamp when wearing 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 it.
- Then wipe the UV lamp with a soft, dry cloth.

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 they can be disposed of together with used fluorescent tubes.

1. Deactivate the UV system.
2. Switch off the master switch or disconnect it from the mains power supply.
3. Close the shut-off valves upstream and downstream of the reactor.
4. Loosen the fixing bolts of the lamp cover using an Allen key, remove the lamp cover and pull out the lamp by approximately 100 mm.
5. Loosen the UV lamp at the cable clamp with the aid of a slotted head screw driver.
6. Fully remove the UV lamp and place it to one side.
7. Check whether the O-ring on the UV lamp protection tube bracket is in the groove provided – ensure that the sealing surfaces of the O-rings are completely smooth and clean.
8. Fix the UV lamp to the cable clamp with the aid of a slotted head screw driver.
9. Insert the UV lamp fully into the UV lamp protection tube.
10. Place the UV lamp cover onto the UV lamp protection tube bracket and, using the fixing bolts provided, screw in and tighten with an Allen key.
11. Switch on the main switch or connect up to the mains power supply.
12. Switch on the UV system.
13. Slowly open the shut-off valve upstream of the reactor.
14. Open the shut-off valve downstream of the reactor (only necessary with a manual shut-off valve).
15. Delete the lamp data in the controller.

WARNING!

Insufficient treatment efficiency

Possible consequence: Death or illness.

Check minimum radiation intensity and warning threshold.

Check and, if necessary, reset the minimum radiation intensity and warning threshold when the UV lamp is replaced.

Only a correctly adjusted minimum radiation intensity will guarantee adequate treatment.

8.8 Calibrating the UV sensor

Calibrate the UV sensor according to the instructions in Chapter
↳ *Chapter 5.9.1 'Calibration factor' on page 25*.

9 Troubleshooting (Faults and Warnings)

The display can be in W/m² or J/m² depending on the setting.

The display in the *[Fault]* state

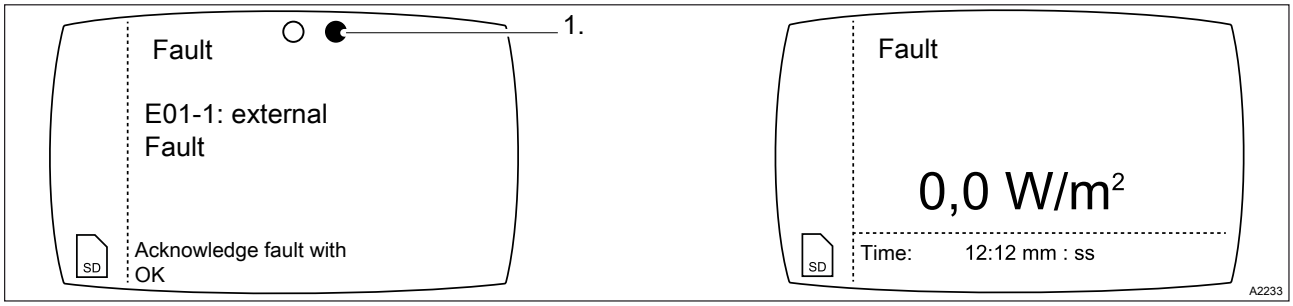

Fig. 47: Fault ➔ Acknowledge [OK] ➔ UV system [Off] (0.0 W/m²) / Lamp cool-down period countdown

1.	The two dots indicate that there is a second display for this fault and that you can move to it with the *[i]*key.

LED	Function
Red LED	The system is in fault mode
Yellow LED	The system has warning messages
Green LED	The system is in operation
SD	The SD card is in its socket and is active.

9.1 Warning messages

Tab. 3: Warning messages

Warning message	Possible cause	Remedy
Wiper is faulty.	No response from the pulse counter	Check cabling
	The limit switch for the home position of the wiper motor does not switch	Check wiper motor (electrical and hydraulic) and replace if necessary Perform a functional check of the limit switch and replace the limit switch if necessary Check the position of the wiper and the limit switch on the wiper mechanism
Wiper motor defective	The wiper motor produces a fault message, which may have the following causes: ■ Excessive temperature ■ Undervoltage ■ Power limitation ■ Lock protection in controlled mode	With a pending warning, the UV system continues to operate without the wiper being triggered.
Temperature sensor missing.	No temperature sensor connected.	Connect temperature sensor.
	Temperature sensor defective.	Replace temperature sensor.
	Temperature sensor cable connection defective.	Check and repair cable connection.
Undervoltage threshold undershot.	Power supply unstable.	Check and repair power supply.
		Dimension power supply adequately.
Mains voltage too low.	Power supply unstable. Mains voltage below the minimum required voltage.	Check and repair power supply.
		Dimension power supply adequately.
SD card not inserted.	SD card not in slot.	Insert SD card into the slot.
	SD card defective.	Replace SD card.
SD card is locked.	The slider on the SD card is set to "LOCK".	Unlock SD card.
	SD card defective.	Replace SD card.
SD card is full.	SD card memory is full.	Back up the data externally and clear the SD card memory.
	SD card defective.	Replace SD card.
The operating time of UV lamp X has expired.	The maximum permissible usage period of UV lamp X has been reached.	Replace UV lamp.
Warning threshold not reached 🡻	The sensor signal is below the warning threshold:	
	Lamp output too low	Increase lamp output. For UV systems with manual step control, increase the output with the rotary dial.
	Deposit formation on the lamp protection tube and/or the UVC sensor	Trigger wiper cycle; clean lamp protection tube and/or UV sensor if necessary

Warning message	Possible cause	Remedy
	Deterioration of the UV transmission of the water to be treated	Improve water quality by suitable pretreatment
	UV lamp at the end of its service life	Replace UV lamp
	UV sensor not calibrated	Check UV sensor and if necessary, calibrate or replace UV sensor
XE2: Current < 4 mA	The current at the signal input is below 3.6 mA.	Check and repair cable connection.
XE3: Current < 4 mA		Check and repair connected measuring devices.
Temperature too high	The maximum set operating temperature is exceeded.	Water temperature is above the maximum set temperature. A flushing process is triggered. If the temperature does not decrease within the water cooling time of 5 min., the UV system enters Fault status.

9.2 Fault messages

Acknowledging a fault message

The UV system is immediately switched off in the event of a fault. You can acknowledge this fault with the [OK] button.

Once you have acknowledged a fault, the UV system switches from the [Fault] mode to [Off] mode. Before starting up the UV system, check whether any troubleshooting measures implemented have been successful. A restart makes sense only if all fault-related errors have been rectified.

Tab. 4: Fault messages

Fault messages	Possible cause	Remedy
E01-1: External fault	The "External fault" digital input responds.	Eliminate cause of external fault.
	No external fault indicating device connected.	Bridge contacts at fault input.
E02-1: Excessive temperature	The maximum permissible water temperature of 65°C has been exceeded.	Lower water temperature of the process.
E03-1: Water cooling-down time has been exceeded	The maximum set operating temperature continues to be exceeded after automatic flushing process.	Lower water temperature of the process.
E04-1: Radiation intensity too low	The sensor signal is below the minimum radiation intensity:	
	Lamp output too low.	Increase lamp output.
	Deposit formation on the lamp protection tube and/or the UV sensor/sensor window.	Trigger wiper cycle; clean lamp protection tube and/or UV sensor/sensor window.
	Deterioration of the UV transmission of the water to be treated.	Improve water quality by suitable pretreatment.
	UV lamp at the end of its service life.	Replace UV lamp.
	UV sensor not calibrated.	Check UV sensor and if necessary, calibrate or replace UV sensor.
	Faulty setting of the warning threshold or minimum radiation intensity.	Check warning threshold or minimum radiation intensity and adjust if necessary.
	Electronic ballast defective.	Replace electronic ballast.
	Electrical contact problems.	Check terminals in the control cabinet, lamp connection terminals and lamp cable and repair if necessary.

***X = Number of components, e. g. UV lamp number 5.**

****EB = Electronic ballast.**

Fault messages	Possible cause	Remedy
E08-1: UV sensor < 10 mV	Sensor voltage less than the minimum permissible sensor voltage:	
	UV sensor defective.	Replace UV sensor.
	Electrical contact problems.	Check terminals in the control cabinet and sensor cables and repair if necessary.
E06-1: XE2: Flow < 4 mA	Signal input activated as controller variable.	No device connected to signal input. Cable break.
	The current at the signal input is below 3.6 mA.	External device or UV controller mA input incorrectly configured.
E07-1: XE2: Setpoint < 4 mA	Signal input activated as controller variable.	No device connected to signal input. Cable break.
	The current at the signal input is below 3.6 mA.	External device or UV controller mA input incorrectly configured.
E01-2: Fault in EB** X*	Supply voltage at EB** X* outside the permissible range.	Check supply voltage and stabilise if necessary.
		Check cabling and repair if necessary.
E02-2: Fault in EB** X*	Fault in UV lamp X*.	Check cabling and repair if necessary.
		Replace UV lamp.
		Replace EB**.
E03-2: Earth leakage at EB** X*	Earth leakage at EB** X*.	Check cabling and repair if necesary.
		Replace EB**.
E04-2: Temperature at EB** X*	Maximum permissible temperature at EB** exceeded.	Check fan for EB** X* cooling and repair if necessary.
		Check fan fuse and repair if necessary.
E05-2: Time out at EB** X*	No communication between UV system controller module and EB** X*.	Check cabling between controller module and EB** X* and repair if necessary.
		Replace EB** X*.
		Replace controller module.

***X = Number of components, e. g. UV lamp number 5.**

****EB = Electronic ballast.**

10 Technical data

Performance data

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

Type	Number of lamps	Lamp power	Connected power
1x230 W	1	260 W	310 W
1x350 W	1	370 W	430 W
2x350 W	2	2x370 W	835 W
3x230 W	3	3x260 W	825 W
3x350 W	3	3x370 W	1240 W
4x350 W	4	4x370 W	1645 W
6x350 W	6	6x370 W	2455 W

Type	Minimum clearance for maintenance work	Empty weight / Operating weight Reactor	Volume in litres Gross Net
1x230 W	1065 mm	19 kg / 32 kg	14.8 / 13.5
1x350 W	1465 mm	30 kg / 60 kg	30.8 / 29.0
2x350 W	1465 mm	56 kg / 128 kg	72.4 / 68.8
3x230 W	1065 mm	65 kg / 139 kg	82.6 / 78.8
3x350 W	1570 mm	84 kg / 219 kg	135.9 / 130.4
4x350 W	1570 mm	96 kg / 259 kg	164.3 / 156.7
6x350 W	1570 mm	137 kg / 347 kg	213.4 / 201.9

Permissible operating temperatures:

- Water temperature: 2 ... 40 °C
- Ambient temperature: 5 ... 40 °C

Requirements of the water to be treated:

- Maximum temperature: 40 °C
- Maximum operating pressure: 10 bar
- No corrosive or abrasive properties, chloride content < 250 ppm
- No tendency for sedimentation

10.1 Setting data

Refer to *Chapter 5.4 'Adjustable parameters / access code' on page 20*

10.2 Control Cabinet

Wiring diagram provided

A system-specific wiring diagram (appendix) is supplied with the UV system. In the event of any differences between the operating instructions and system-specific wiring diagram, the system-specific wiring diagram applies.

Fuses

Fuse	Current strength	Function
F6	1.6 ampere / time-delay	For internal electronics modules.
F4	3.1 ampere / time-delay	For connected relay GN.
F2	3.1 ampere / time-delay	For 3 connected outputs.

Control Cabinet

Tab. 5: Nominal voltage

230 V AC ± 10%
50/60 Hz

Tab. 6: Contact inputs (XK2, XK3, XK4):

for contacts or switching transistors:
Output voltage: maximum 9 V
Contact resistance open > 100 kOhm / contact resistance closed < 100 kOhm

Tab. 7: Output relay, feeding, XR3

Type of contact: N/O
Load capacity: 90 ... 253 V AC / 3 A / maximum 690 VA
Provide RC protection circuits with inductive loads!

Tab. 8: Relay outputs XR1:

Type of contact: N/O, potential-free
Load capacity: 90 ... 253 V AC / 3 A / maximum 690 VA
Load type: Ohmic and inductive loads (up to power factor (cos phi) = 0.4)

Tab. 9: Alarm relay XR2:

Type of contact: Changeover contact, potential-free
Load capacity: 90 - 253 V AC / 3 A / maximum 690 VA
Provide RC protection circuits with inductive loads!

Tab. 10: Standard signal output mA (-X3:7 ... -X3.8):

0/4...20 mA, potential-free
Maximum load: 450 Ohm at 21.5 mA

Tab. 11: Degree of protection:

Degree of protection: IP 66

11 Dimensional drawing

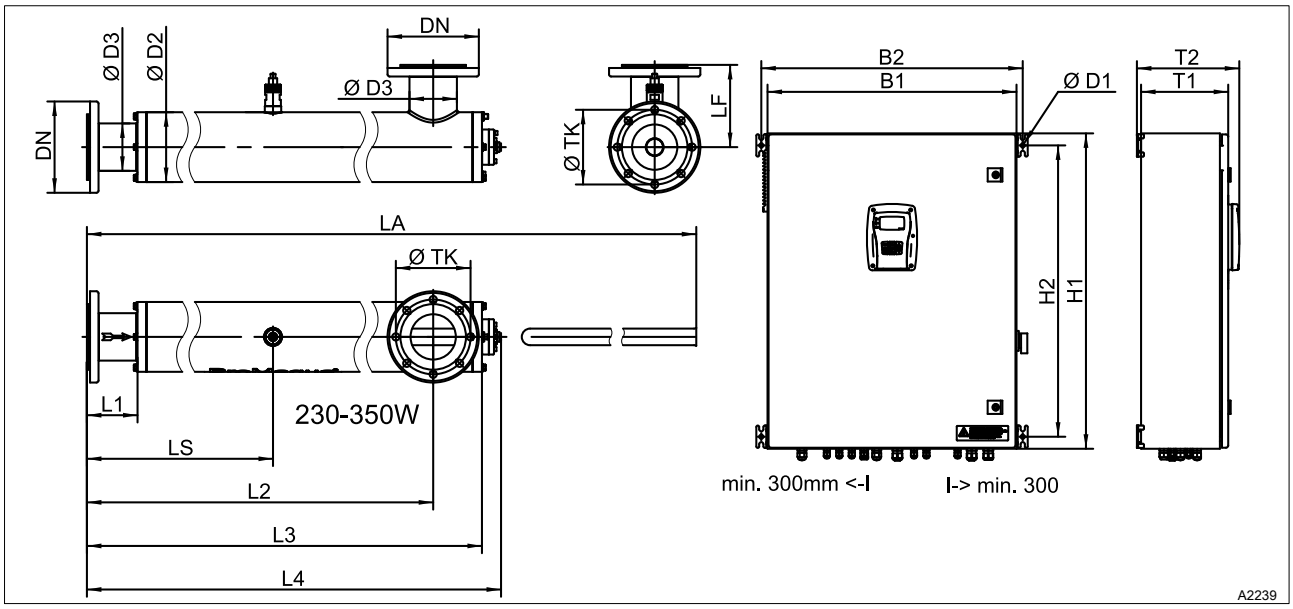

Fig. 48: Dimensional drawing of Dulcodes LP 1x230 W ... 6x350 W.

11.1 Dulcodes LP 1x230 W ... 6x350 W, PN10/DIN EN 1092-1

Tab. 12: Dimensional drawing of Dulcodes LP 1x230 W ... 6x350 W, PN10/DIN EN 1092-1

Type	1x230 W	1x350 W	2x350 W	3x230 W	3x350 W	4x350 W	6x350 W
DN	80	100	150	150	200	200	250
B1	600	600	600	600	600	760	760
B2	630	630	630	630	630	790	790
H1	760	760	760	760	760	760	760
H2	702	702	702	702	702	702	702
T1	210	210	210	210	210	300	300
T2	247	247	247	247	247	337	337
Ø D1	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Ø D2	139.7	168.3	256	323.9	323.9	355.6	406.4
Ø D3	88.9	114.3	168.3	168.3	219.1	219.1	273
Ø TK	160	180	240	240	295	295	350
L1	67	122	122	101	130	130	130
L2	1053.5	1522.5	1495.5	1040.5	1715	1715	1688
L3	1151	1640	1640	1185	1885	1885	1885
L4	1190	1679	1679	1224	1924	1924	1924
LS	609	881	881	643	1007	1007	1007
All dimensions in millimetres.							

Type	1x230 W	1x350 W	2x350 W	3x230 W	3x350 W	4x350 W	6x350 W
LF	138.5	198	242	276	276	292	317
LA	2215	3105	3105	2250	3450	3450	3450
All dimensions in millimetres.							

11.2 Dulcodes LP 1x230 W ... 6x350 W, ANSI flange

Tab. 13: Dimensional drawing of Dulcodes LP 1x230 W ... 6x350 W, ANSI flange

Type	1x230 W	1x350 W	2x350 W	3x230 W	3x350 W	4x350 W	6x350 W
DN	3"	6"	6"	8"	8"	8"	10"
n	4	8	8	8	8	8	12
Ø TK	6"	9.5"	9.5"	11.75"	11.75"	11.75"	14.25"
Ø I	0.75"	0.88"	0.88"	0.88"	0.88"	0.88"	1"
b	0.94"	0.94"	0.94"	0.94"	0.94"	0.94"	1.02"
B1	23.62"	23.62"	23.62"	23.62"	23.62"	29.92"	29.92"
B2	24.8"	24.8"	24.8"	24.8"	24.8"	31.1"	31.1"
H1	29.92"	29.92"	29.92"	29.92"	29.92"	29.92"	29.92"
H2	27.64"	27.64"	27.64"	27.64"	27.64"	27.64"	27.64"
T1	8.27"	8.27"	8.27"	8.27"	8.27"	11.81"	11.81"
T2	9.72"	9.72"	9.72"	9.72"	9.72"	13.27"	13.27"
Ø D1	0.4"	0.4"	0.4"	0.4"	0.4"	0.4"	0.4"
Ø D2	5.5"	6.63"	10.08"	12.75"	12.75"	14"	16"
Ø D3	3.5"	4.5"	6.63"	6.63"	8.63"	8.63"	10.75"
HS	1.65"	1.73"	1.73"	1.69"	1.69"	1.81"	1.69"
L1	2.64"	4.8"	4.8"	4"	5.12"	4.92"	5.12"
L2	41.48"	59.94"	58.88"	40.96"	67.52"	67.32"	66.46"
L3	45.31"	64.57"	64.57"	46.65"	74.21"	74.02"	74.21"
L4	46.85"	66.10"	66.10"	48.19"	75.75"	75.55"	75.75"
LS	23.98"	34.69"	34.68"	25.32"	39.65"	39.45"	39.65"
LF	5.45"	7.8"	9.53"	10.87"	10.87"	11.5"	12.48"
LA	87.2"	122.24"	122.24"	88.58"	135.83"	135.63"	135.83"
All dimensions in inches.							

11.3 Dulcodes LP 1x230 W ... 6x350 W, PN16 flange

Tab. 14: Dimensional drawing of Dulcodes LP 1x230 W ... 6x350 W, standard flange

Type	1x230 W	1x350 W	2x350 W	3x230 W	3x350 W	4x350 W	6x350 W
DN	80	100	150	150	200	200	250
n	8	8	8	8	12	12	12
B1	600	600	600	600	600	760	760
B2	630	630	630	630	630	790	790
H1	760	760	760	760	760	760	760
H2	702	702	702	702	702	702	702
T1	210	210	210	210	210	300	300
T2	247	247	247	247	247	337	337
Ø D1	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Ø D2	139.7	168.3	256	323.9	323.9	355.6	406.4
Ø D3	88.9	114.3	168.3	168.3	219.1	219.1	273
HS	42	44	44	43	43	46	43
Ø TK	160	180	240	240	295	295	355
L1	67	122	122	101	130	125	130
L2	1053.5	1522.5	1495.5	1040.5	1715	1710	1688
L3	1151	1640	1640	1185	1885	1880	1887
L4	1190	1679	1679	1224	1924	1919	1922
LS	609	881	881	643	1007	1002	1007
LF	138.5	198	242	276	276	292	333
LA	2215	3105	3105	2250	3450	3445	3452
All dimensions in millimetres.							

11.4 Dimensional drawing Dulcodes LP 1 ... 4x350W with automatic wiper

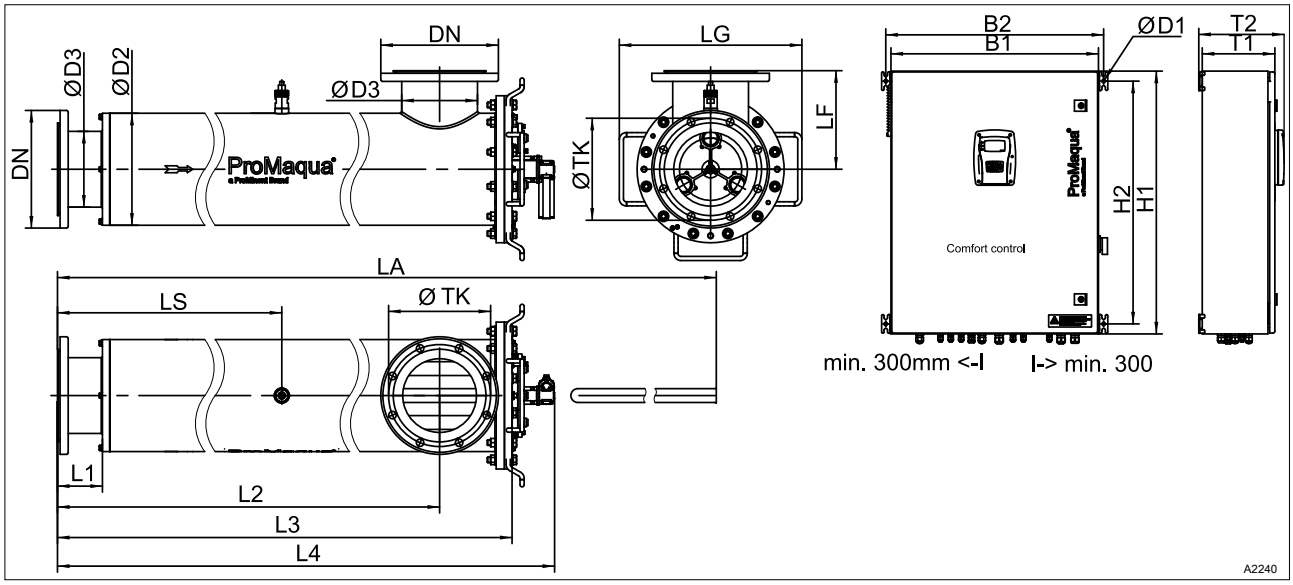

Fig. 49: Dimensional drawing Dulcodes LP 1 ... 4x350W. with automatic wiper

Tab. 15: Dimensional drawing Dulcodes LP 1 ... 4x350W with automatic wiper

Type	1x350W	2x350W	3x350W	4x350W
DN	100	150	200	200
B1	600	600	600	760
B2	630	630	630	790
H1	760	760	760	760
H2	702	702	702	702
T1	210	210	210	300
T2	247	247	247	337
Ø D1	10.2	10.2	10.2	10.2
Ø D2	---	256	323.9	355.6
Ø D3	---	168.3	219.1	219.1
Ø TK	---	240	295	295
L1	---	122	130	130
L2	---	1495.5	1715	1715
L3	---	1677.5	1924.5	1926.5
L4	---	1800.5	2047.5	2049.5
LG	---	448	528	560
LS	---	881	1007	1007
LF	---	249	285	301
LA	---	3148	3495	3497

12 Appendix

12.1 Spare parts, UV system without wiper

12.1.1 Spare parts, 230 W, single lamp system without wiper

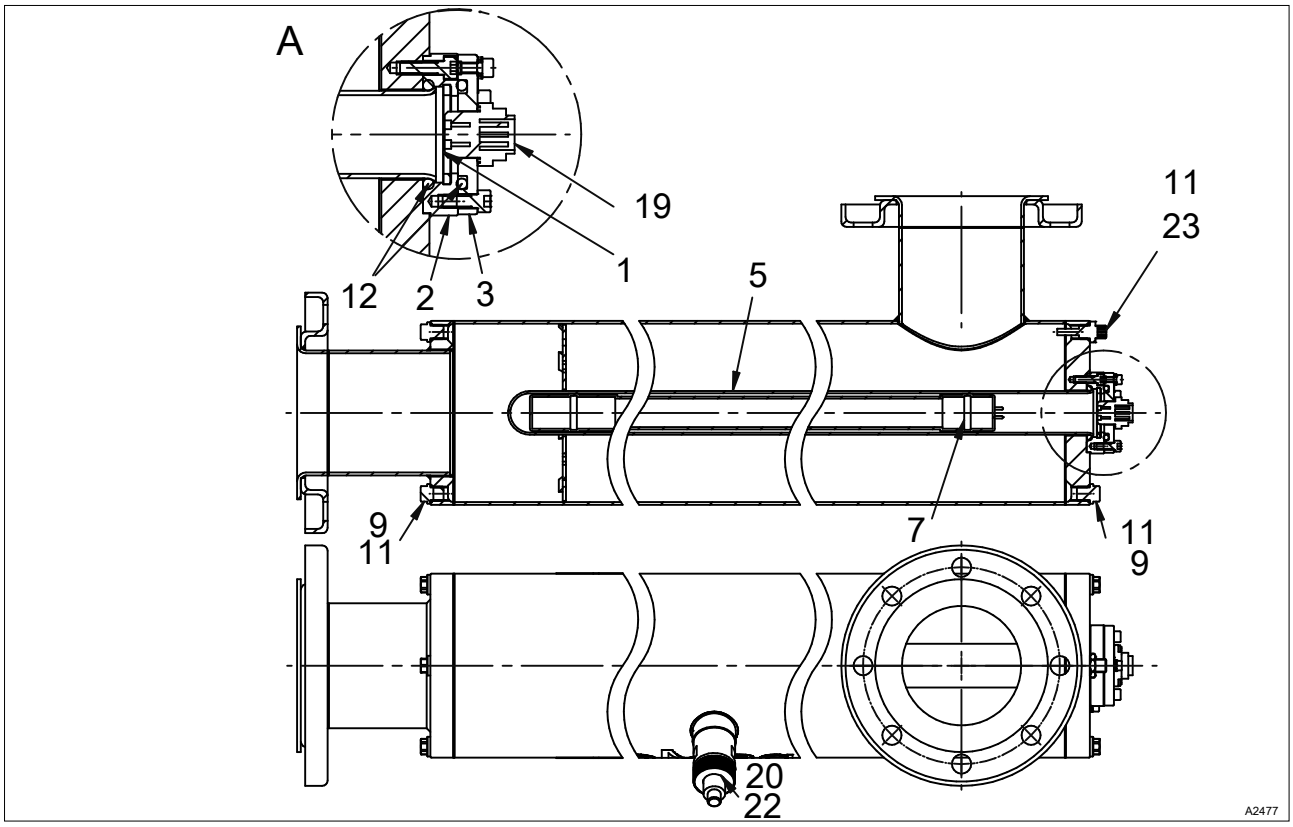

Fig. 50: Spare parts, 230 W, single lamp system without wiper

Tab. 16: Spare parts list, 230 W, single lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9, 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3, PTFE REI	1035074	As necessary	1
5	Lamp protection tube with seal	1058838	3 years	1
7	UV lamp, 230 W	1061752	14,000 hours	1
9	Locking screw, DIN 910, G 1/4A	1002752	As necessary	1
11	O-ring/M 10.50 - 1.50, EPDM/P	1001356	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9, 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
30	Lamp cover with plug, UV-LP 230 + 350	1075127	As necessary	1

12.1.2 Spare parts, 1x350 W, single lamp system without wiper

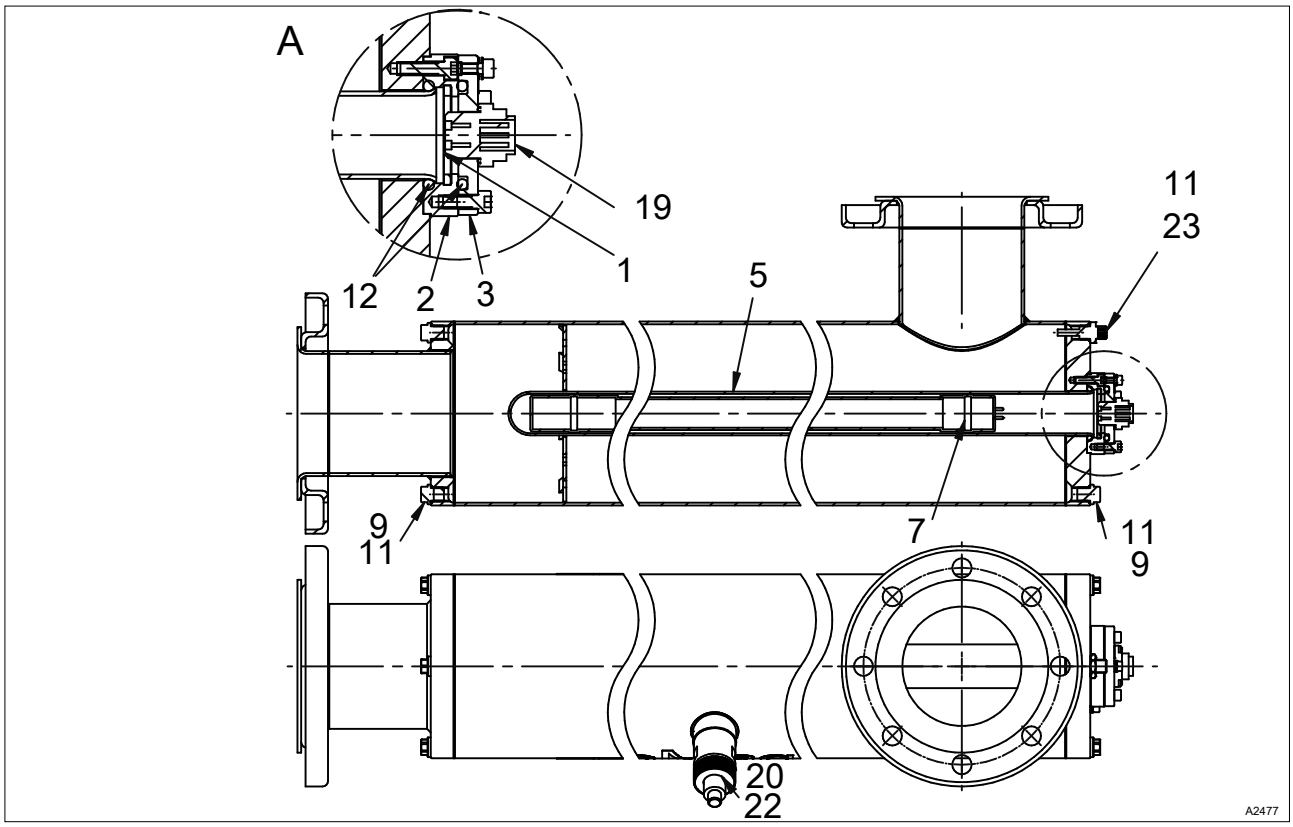

Fig. 51: Spare parts, 350 W, single lamp system without wiper

Tab. 17: Spare parts list, 1x350 W, lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9, 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049344	3 years	1
7	UV lamp, 350 W	1061418	14,000 hours	1
9	Locking screw, DIN 910, G 1/4A	1002752	As necessary	1
11	O-ring/M 10.50 - 1.50, EPDM/P	1001356	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
30	Lamp cover with plug, UV-LP 230 + 350	1075127	As necessary	1

12.1.3 Spare parts, 2x350 W, twin lamp system without wiper

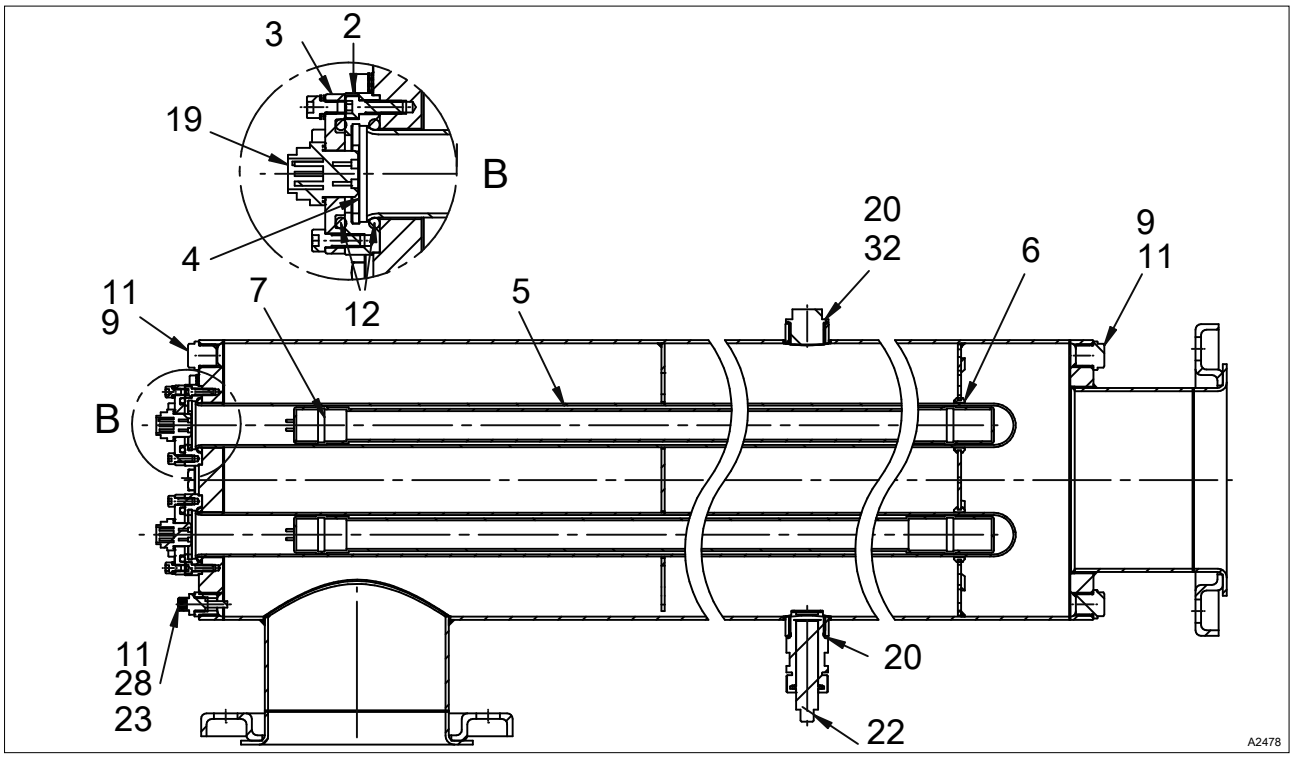

Fig. 52: Spare parts, 2x350 W, twin lamp system without wiper

Tab. 18: Spare parts list, 2x350 W, twin lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9, 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049344	3 years	1
6	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
7	UV lamp 350 W	1061418	14,000 hours	1
9	Locking screw, DIN 910, G 1/2A	1005818	As necessary	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000 G1/4"	1059076	As necessary	1
28	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
30	Lamp cover with plug, UV-LP 230 + 350	1075127	As necessary	2
32	Locking screw, IN 910 G 1A	1005766	As necessary	1

12.1.4 Spare parts, 3x230 W, three lamp system without wiper

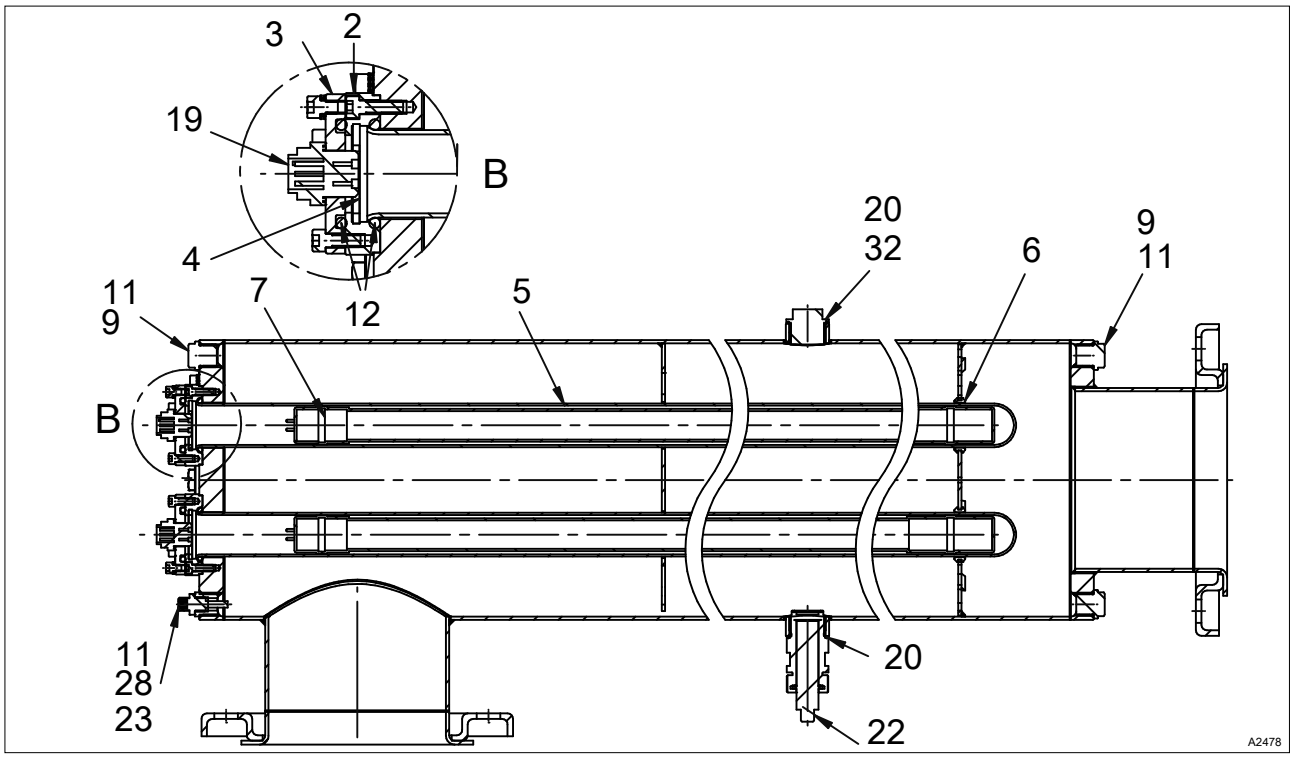

Fig. 53: Spare parts, 3x230 W, three lamp system without wiper

Tab. 19: Spare parts list, 3x230 W, three lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9, 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1058838	3 years	1
6	Bearing ring, ∅50x10 PTFE	1049345	As necessary	1
7	UV lamp, 230 W	1061752	14,000 hours	1
9	Locking screw, DIN 910 G 1/2A	1005818	As necessary	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
28	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
30	Lamp cover with plug, UV-LP 230 + 350	1075127	As necessary	3
32	Locking screw, DIN 910 G 1A	1005766	As necessary	1

12.1.5 Spare parts, 3x350 W, three lamp system without wiper

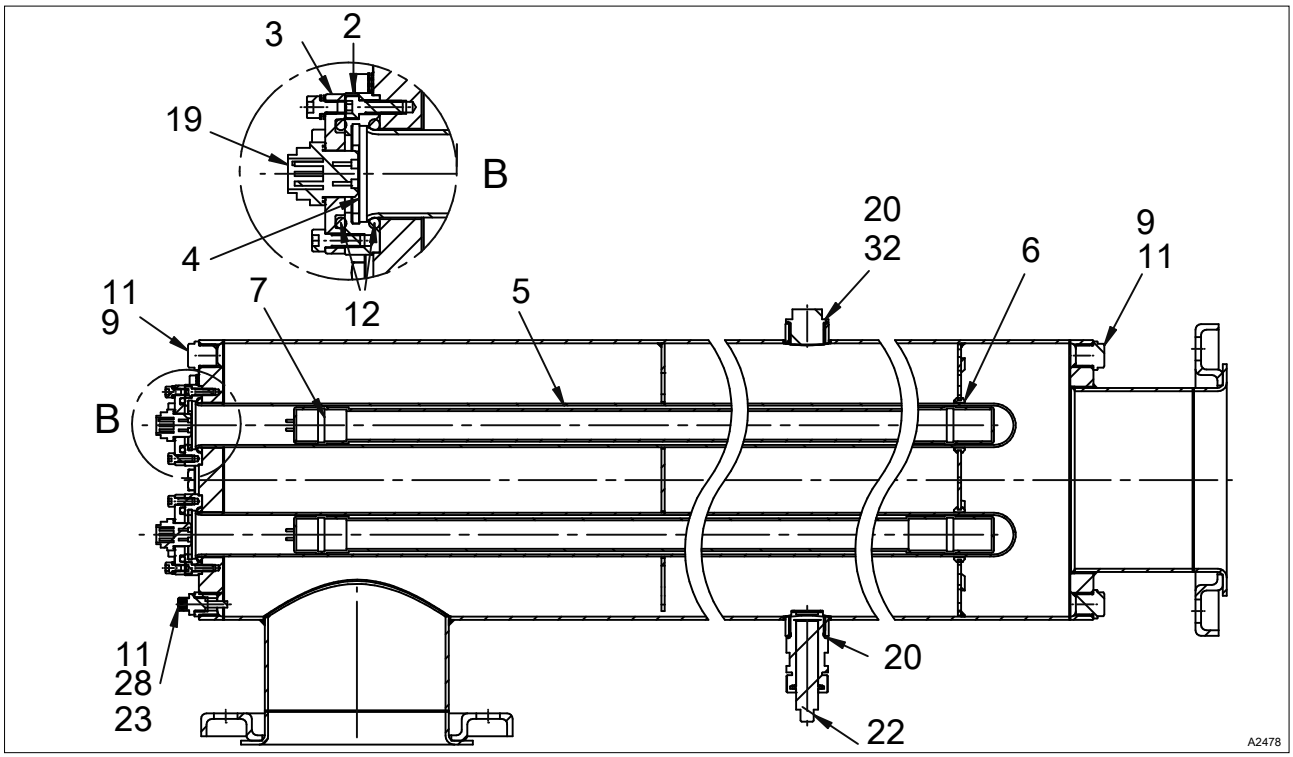

Fig. 54: Spare parts, 3x350 W, three lamp system without wiper

Tab. 20: Spare parts list, 3x350 W, three lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9, 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049350	3 years	1
6	Bearing ring, ∅50x10 PTFE	1049345	As necessary	1
7	UV lamp, 350 W	1061418	14,000 hours	1
9	Locking screw, DIN 910 G 1/2A	1005818	As necessary	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
28	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
30	Lamp cover with plug, UV-LP 3...6x350	1075128	As necessary	1
32	Locking screw, DIN 910 G 1A	1005766	As necessary	1

12.1.6 Spare parts, 4x350 W, four lamp system without wiper

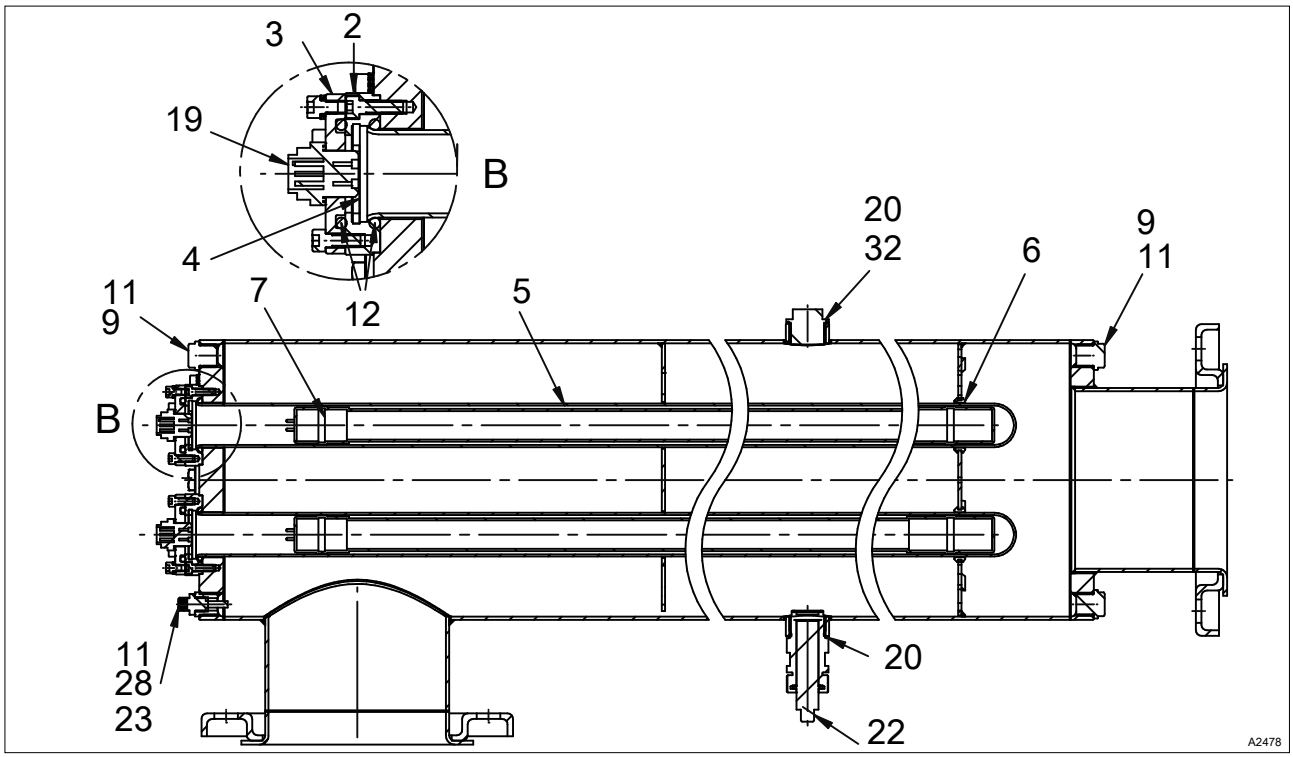

Fig. 55: Spare parts, 4x350 W, four lamp system without wiper

Tab. 21: Spare parts list, 4x350 W, four lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049350	3 years	1
6	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
7	UV lamp, 350 W	1061418	14,000 hours	1
9	Locking screw, DIN 910 G 1/2A	1005818	As necessary	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
28	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
30	Lamp cover with plug, UV-LP 3...6x350	1075128	As necessary	1
32	Locking screw, DIN 910 G 1A	1005766	As necessary	1

12.1.7 Spare parts, 6x350 W, six lamp system without wiper

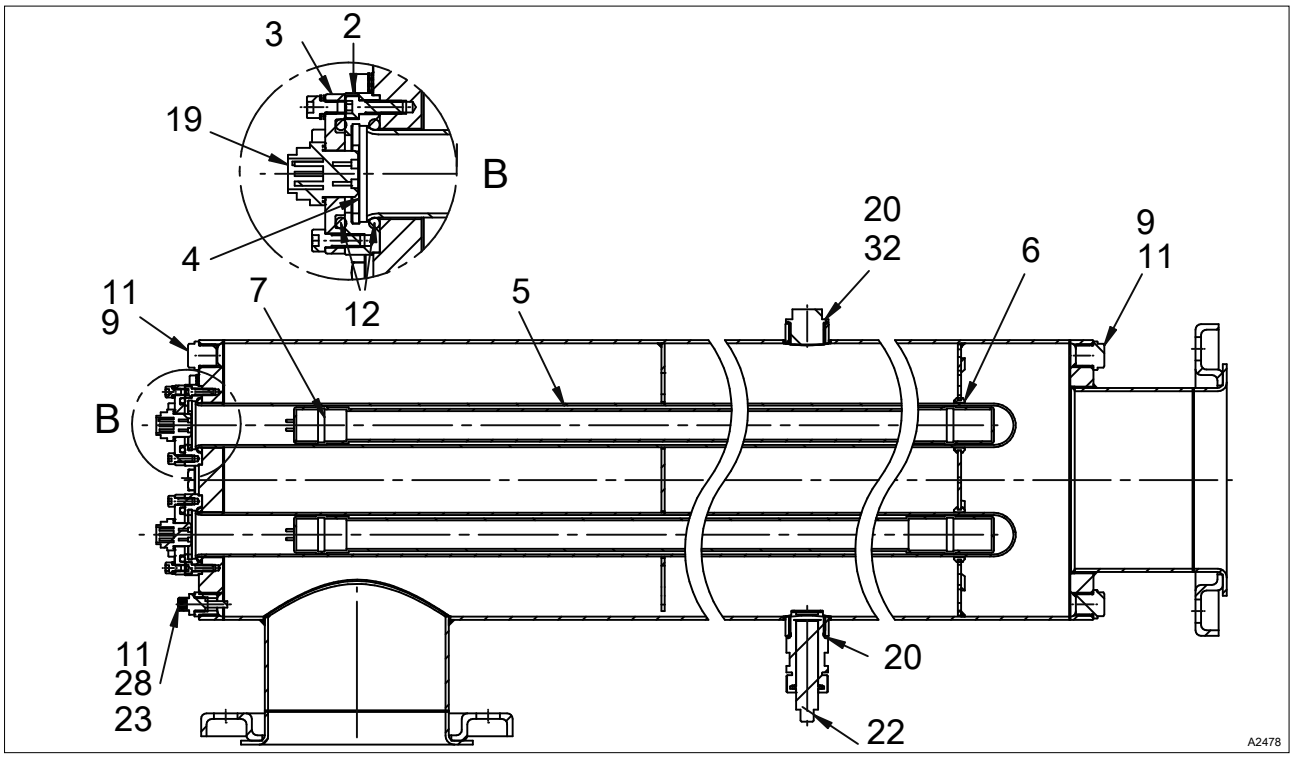

Fig. 56: Spare parts, 6x350 W, six lamp system without wiper

Tab. 22: Spare parts list, 6x350 W, six lamp system without wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, ∅74x16 1.4404	1049341	As necessary	1
3	Lamp cover, ∅73x9 1.4404	1049343	As necessary	1
4	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049350	3 years	1
6	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
7	UV lamp, 350 W	1061418	14,000 hours	1
9	Locking screw, DIN 910 G 1/2A	1005818	As necessary	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
19	Flange plug, PG9 3+PE Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
22	UVC sensor, G 1”	1075544	As necessary	1
23	Temperature sensor PT1000 G1/4"	1059076	As necessary	1
28	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
30	Lamp cover with plug, UV-LP 3...6x350	1075128	As necessary	1
32	Locking screw, DIN 910 G 1A	1005766	As necessary	1

12.2 Spare parts, single lamp system with wiper

12.2.1 Spare parts diagram, single lamp system with wiper

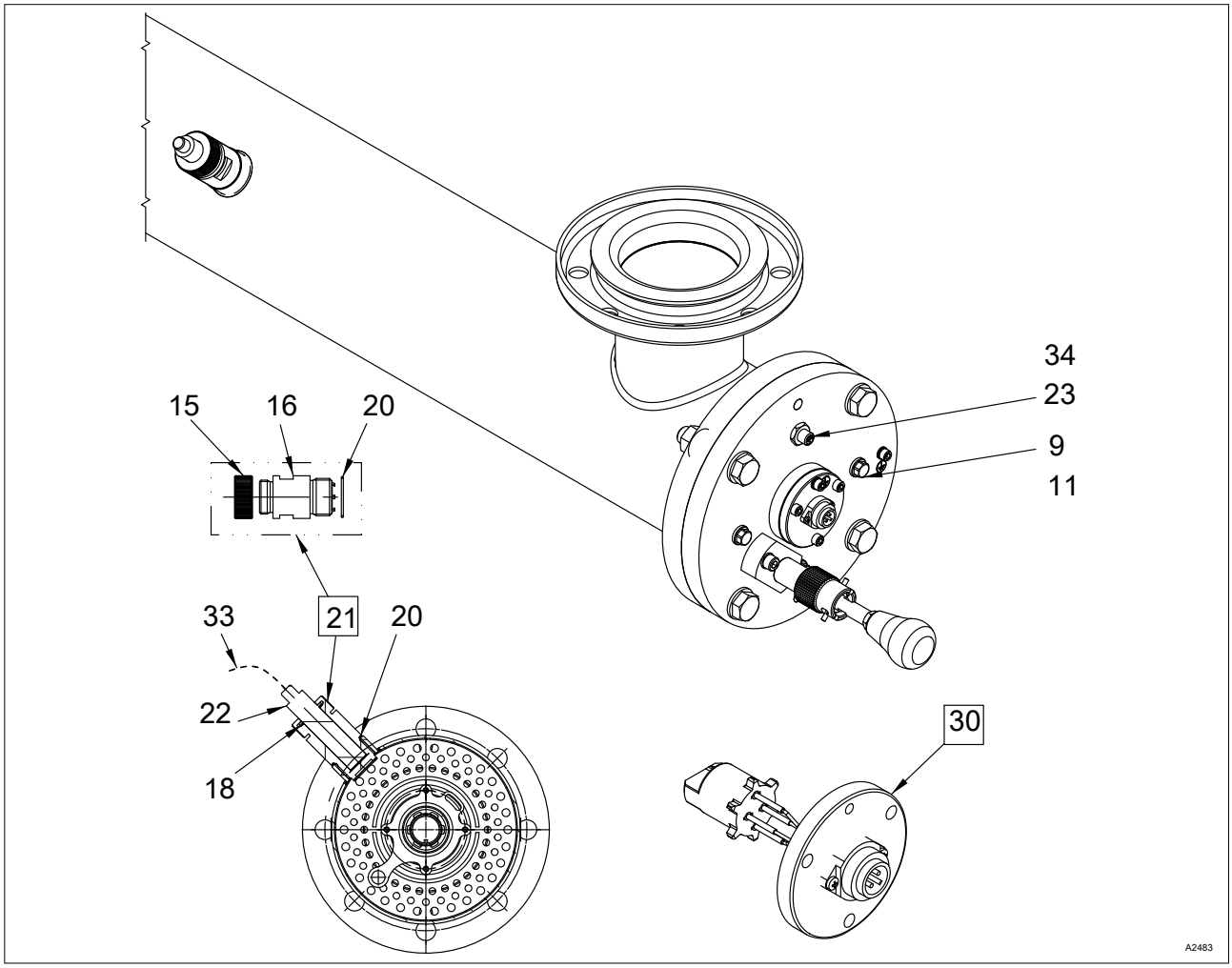

Fig. 57: Spare parts diagram, single lamp system with wiper

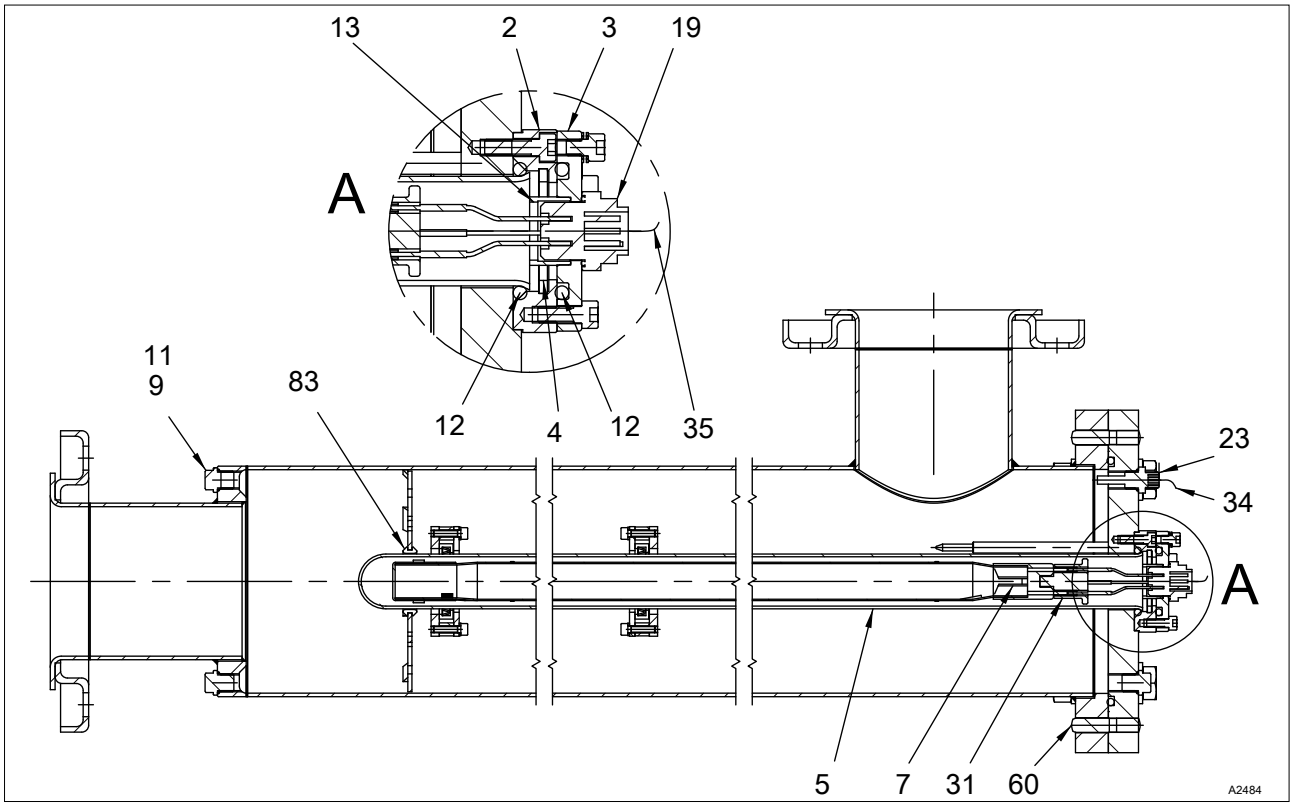

Fig. 58: Spare parts diagram, single lamp system with wiper

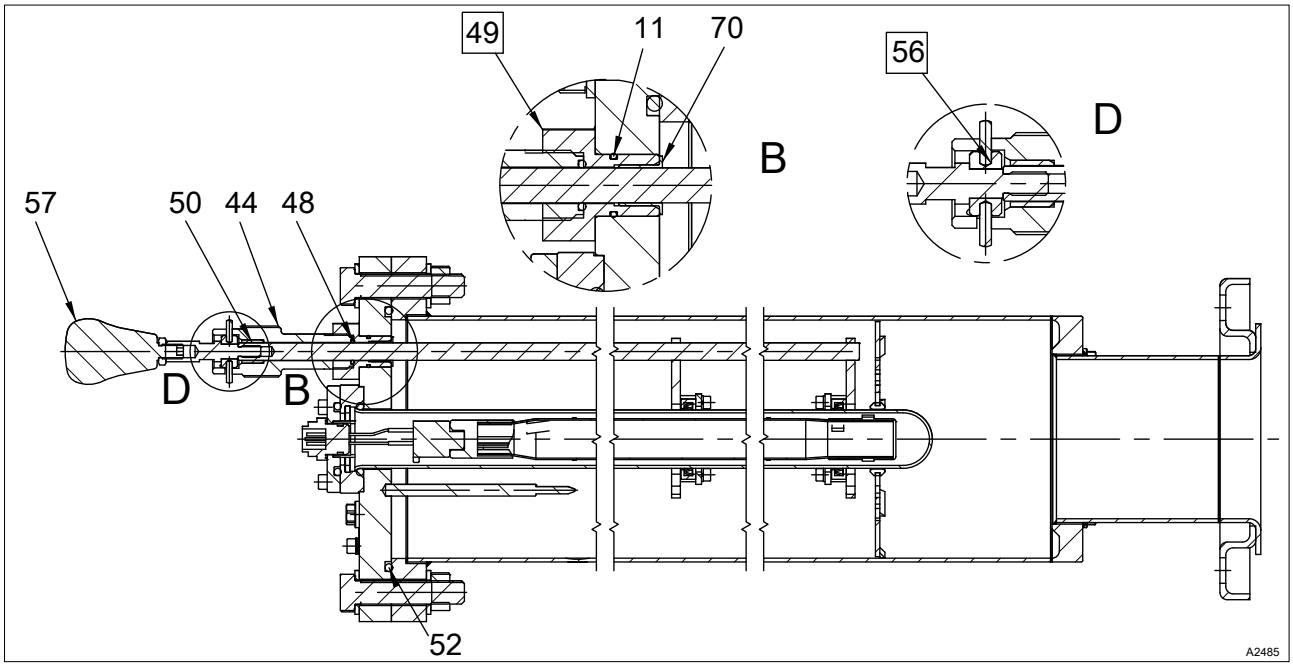

Fig. 59: Spare parts diagram, single lamp system with wiper

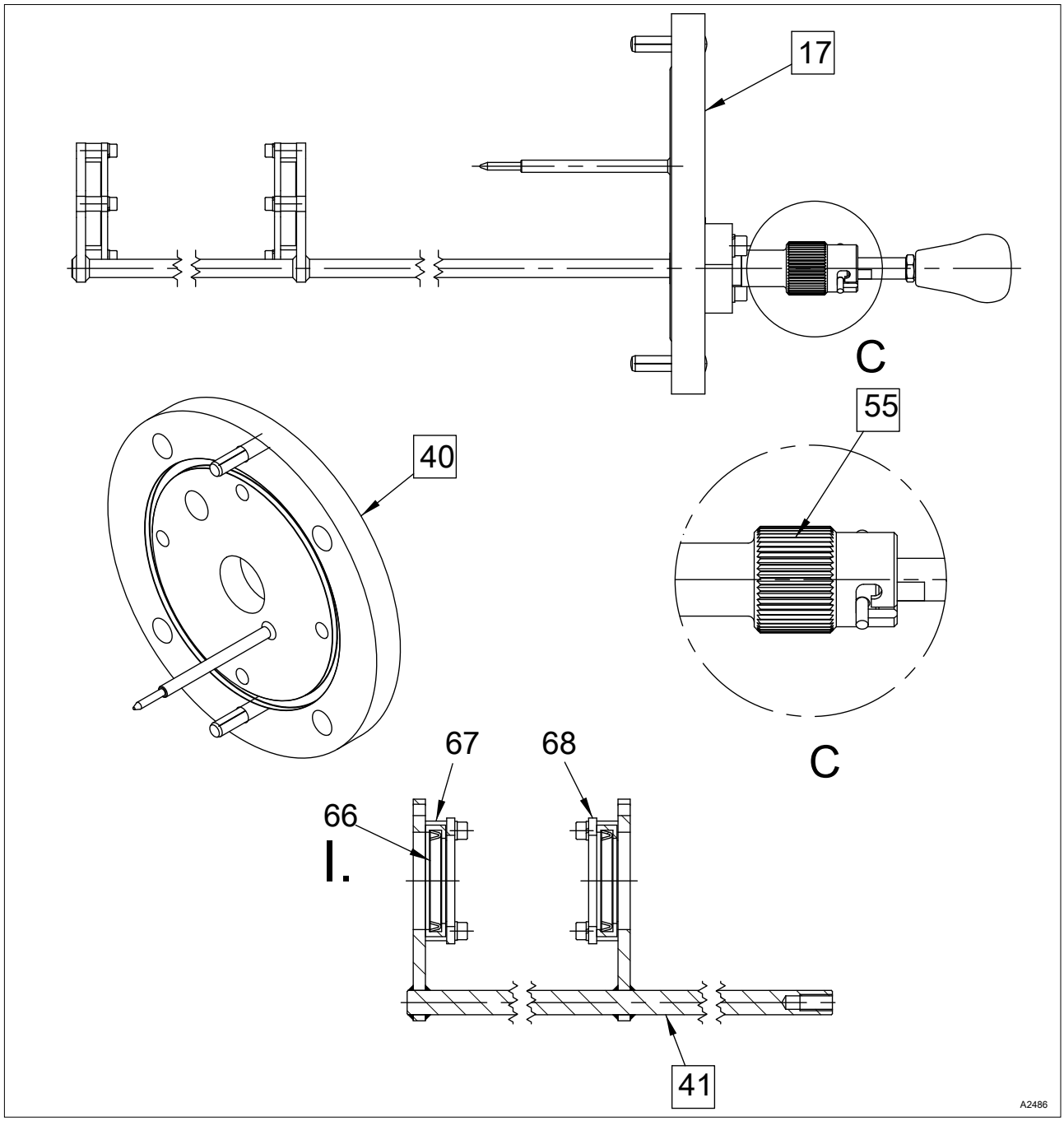

Fig. 60: Spare parts diagram, single lamp system with wiper

12.2.2 Spare parts list, single lamp system with wiper

No.	Description	Spare parts number	Replacement interval	No.
2	Lamp holder, Ø74x16, 1.4404	1049341	As necessary	1
3	Lamp cover, Ø73x9, 1.4404	1049343	As necessary	1
4	Retainer Ø48.5/39x3, PTFE	1035074	As necessary	1
5	Lamp protection tube with seal	1049344	3 years	1
7	UV lamp 350 W, Vario-Flux®	1061418	14,000 hours	1
9	Locking screw, DIN 910, G 1/4A	1002752	As necessary	1
11	O-ring/M, 10.50 - 1.50, EPDM/P	1001356	After each opening	1
11	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
12	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
13	Socket, Ø25x1.9x15, PVDF	1075109	As necessary	1
17	Wiper rod complete, UV-LP	1075593	As necessary	1
19	Flange plug, PG9 3+PE, Series 69	1017625	As necessary	1
20	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	As necessary	1
22	UVC-U sensor, NDLP G1”, 1.4404	1075544	As necessary	1
23 .	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
30	Lamp cover with plug, UV-LP, 230+	1075127	As necessary	1
33	Sensor connection cable, UV-LP, 13 m	1062315	As necessary	1
33	Sensor connection cable, UV-LP, 4.5 m	1062303	As necessary	1
33	Sensor connection cable, UV-LP, 9 m	1062314	As necessary	1
34	PT1000 connection cable, UV-LP, 13 m	1075611	As necessary	1
35	Lamp cable with cable socket, 12.5 m	1062319	As necessary	1
35	Lamp cable with cable socket, 4 m	1062317	As necessary	1
35	Lamp cable with cable socket, 8.5 m	1062318	As necessary	1

No.	Description	Spare parts number	Replacement interval	No.
40	Chamber cover complete, UV-LP, 1x350	1075596	As necessary	1
41	Wiper rod complete, UV-LP	1075643	As necessary	1
44	Clamping screw for wiper rod	1027928	As necessary	1
48	O-ring 11.91 - 2.62, EPDM	790410	After each opening	1
49	Bearing flange complete, for wiper rod	1027944	As necessary	1
50	Socket, Ø16x1.8x15, PVDF	1027926	As necessary	1
52	O-ring 170.82 - 5.33, EPDM	1075595	After each opening	1
55	Clamping screw complete, for wiper rod	1027975	As necessary	1
56	Fixing socket with pins for UVR	1027930	As necessary	1
57	Rotating mushroom knob GN 597.1-45	1027877	As necessary	1
58	Guide bolt for UVR, M8/M10x65	1027931	As necessary	1
60	Slotted pin, DIN 1473, 10x50	1028016	As necessary	1
66	Wiper element for UVR/S/A	1027879	As necessary	1
67	Spacer ring for UVR, Ø9.5x10.5	1027933	As necessary	1
68	Support ring for UVR/S/A, Ø62/45x4,	1028100	As necessary	1
70	Slide bearing 12x14/20x15, Iglidu®	1027848	As necessary	1
83	Bearing ring, Ø50x10, PTFE	1049345	As necessary	1

12.3 Spare parts, 2 ... 4x350 W, multiple lamp system with wiper

12.3.1 Spare part diagram, 2 ... 4x350 W, multiple lamp system with wiper

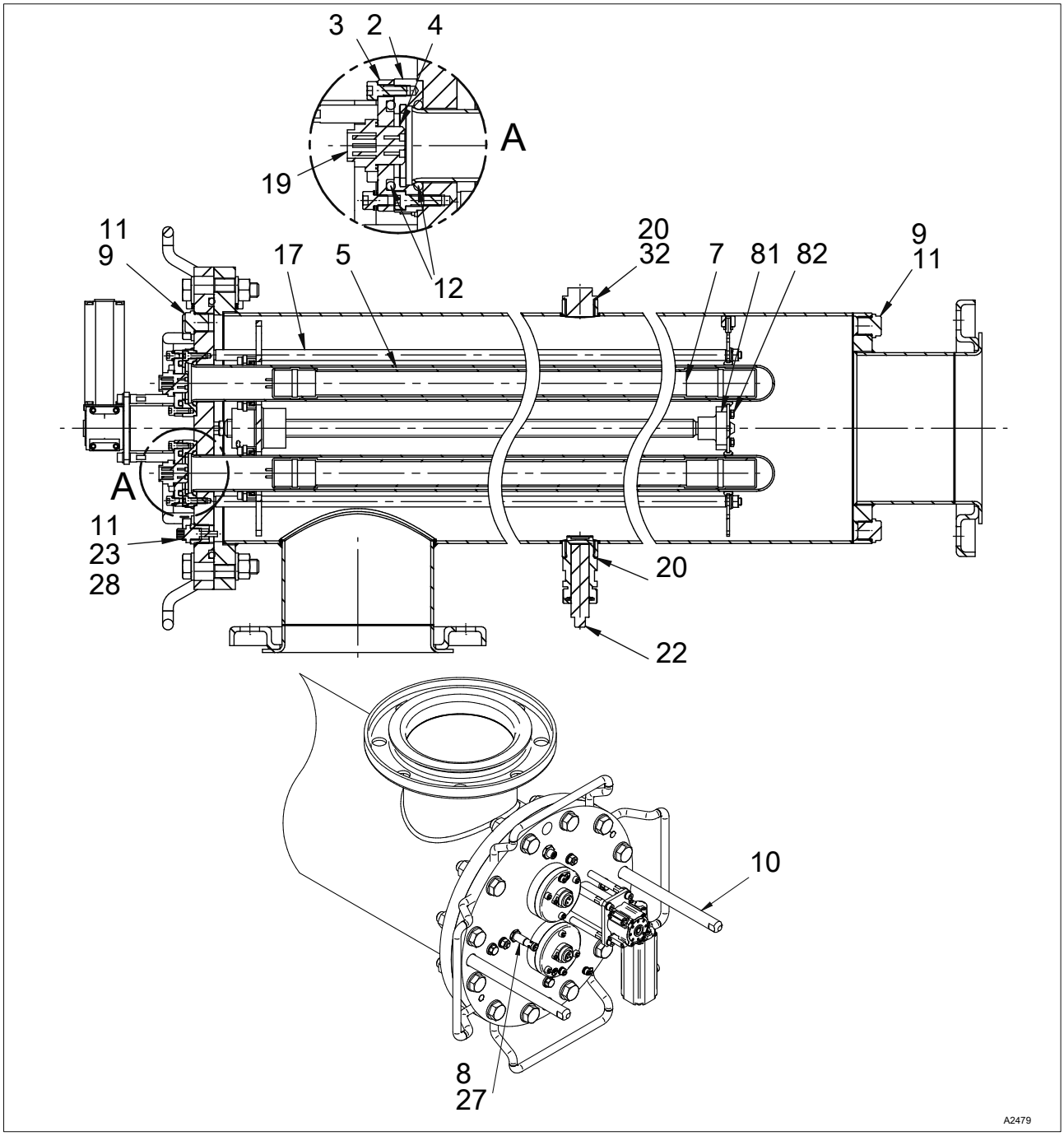

Fig. 61: Spare part diagram, 2 ... 4x350 W, multiple lamp system with wiper

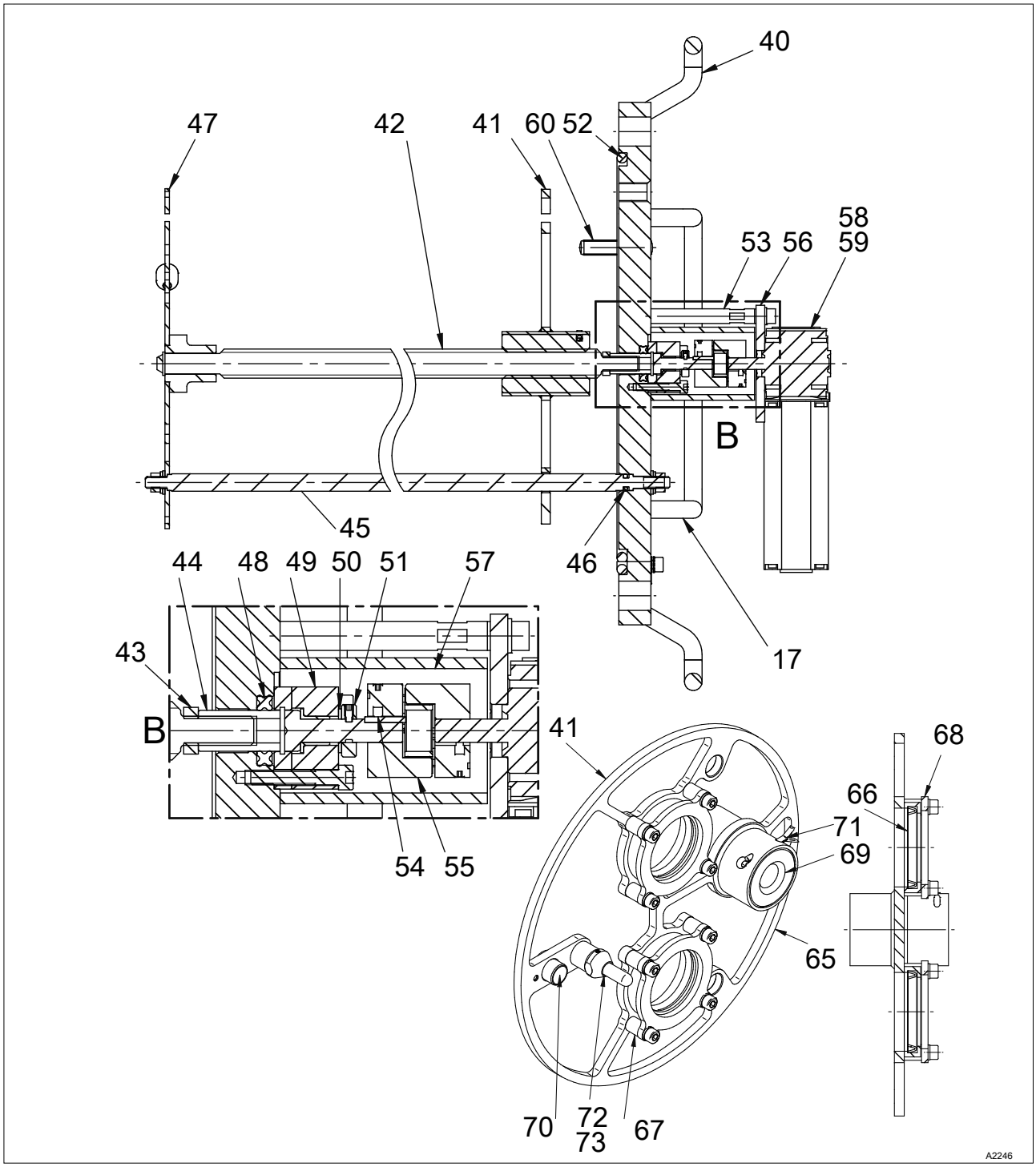

Fig. 62: Spare part diagram, 2 ... 4x350 W, multiple lamp system with wiper

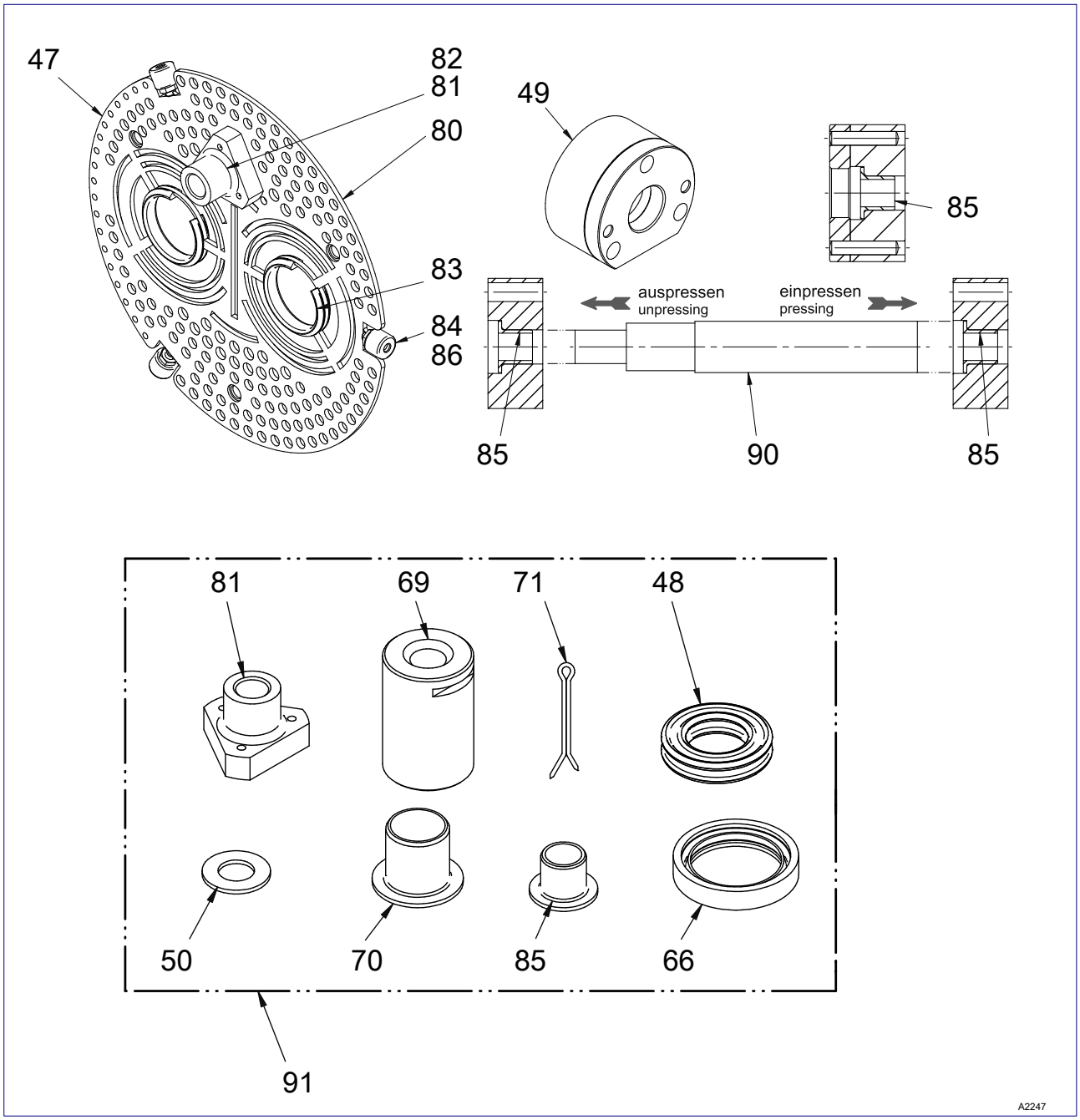

Fig. 63: Spare part diagram, 2 ... 4x350 W, multiple lamp system with wiper

12.3.2 Spare parts list, 2x350 W, twin lamp system with wiper

Tab. 23: Spare parts list, 2x350 W, twin lamp system with wiper

No.	Description	Spare parts number	Replacement interval	No.
002	Lamp holder, ∅74x16 1.4404	1049341	As necessary	1
003	Lamp cover, ∅73x9 1.4404	1049343	As necessary	1
004	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
005	Lamp protection tube with seal, Ø4	1049344	3 years	1
007	UV lamp, 350 W	1061418	14,000 hours	1
008	Magnetic sensor, MC60-12GM50	1009357	As necessary	1
009	Locking screw, DIN 910, G 1/2A	1005818	As necessary	1
010	Assembly bar, ∅18x250 1.4404	1041209	As necessary	1
011	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
012	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
017	Wiper rod complete, UV-LP	1051753	As necessary	1
019	Flange plug, PG9 3+PE Series 69	1017625	As necessary	1
020	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
022	UV sensor G 1.	1075544	As necessary	1
023	Temperature sensor, PT1000 G1/4"	1059076	As necessary	1
027	Angled cable socket, M12x1 3x0.34 mm^2	1009479	As necessary	1
028	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
030	Lamp cover with plug, UV-LP 230 + 350	1075127	As necessary	1
031	Socket with leads	1075083	As necessary	1
032	Locking screw, DIN 910 G 1A	1005766	As necessary	1
040	Reactor cover complete, UV-LP complete, 2x M	1051832	As necessary	1
041	Wiper unit complete, UV-LP 2x	1051849	As necessary	1
042	Drive thread, Tr20 x 4 x 1393,	1051768	As necessary	1
043	Hexagonal nut, DIN 439 M10	1017585	As necessary	1
044	Shaft, ∅14 x 70 M10 1.4404	1049433	As necessary	1
045	Spacer bar, ∅12 x 1423.5 1.440	1051767	As necessary	1
046	O-ring/M 7.30 - 2.40, FPM-B	1059319	After each opening	1
048	X-ring, 13.75x5.3x4.75 70, EPDM 28	1010384	After each opening	1
049	Bearing cover complete, UVS/A	1037028	As necessary	1
050	Slip washer ∅15x1, IGLIDUR® H	1041199	As necessary	1
051	Bearing cover complete, UVR/A	1041183	As necessary	1
052	O-ring 278,77 - 6.99, EPDM	1051766	After each opening	1

No.	Description	Spare parts number	Replacement interval	No.
053	Distance pin, ∅10x82 M6 I/A	1041833	As necessary	1
054	Feather key, DIN 6885, A 2x 2x 14	1042863	As necessary	1
055	Coupling, TX1/10/C/8/8	1041484	As necessary	1
056	Flange plate, gear, UVA 1.44	1041830	As necessary	1
057	Tube, transparent, 50 x 3.7	792778	As necessary	1
058	EC motor with flange plate	1080089	As necessary	1
059	Angled cable socket, M16 12-pin, 10 m	1041453	As necessary	1
060	Slotted pin, DIN 1473, 10x50	1028016	As necessary	1
065	Guide washer complete, UV-LP, 2x	1051851	As necessary	1
066	Wiper element for UVR/S/A	1027879	As necessary	1
067	Spacer ring, ∅9.5x10.5 for UVR1.4	1027933	As necessary	1
068	Holder ring, ∅62/45x4 for UVR/S/A PTF	1028100	As necessary	1
069	Threaded nut, ∅40x60 TR20x4 P	1049428	As necessary	1
070	Slide bearing, 12x14/20x15, IGLIDUR®	1027848	As necessary	1
071	Splint, DIN 94, 4x40 A4	1049429	As necessary	1
072	Retaining bolt for magnet, ∅20	1041793	As necessary	1
073	Magnetic bar, ∅8x40, PTFE	1049430	As necessary	1
080	Baffle plate with threaded rod, complete, UV-LP	1051869	As necessary	1
081	Counter-bearing spindle, ∅50x35 PV	1051868	As necessary	1
082	Tapping screw, DIN 7976, ST 4.8x1	1028585	As necessary	1
083	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
084	Slide bolt, ∅15x12, PTFE	1049426	As necessary	1
085	Slide bearing F 8x10x10, IGLIDUR®	1037033	As necessary	1
086	Hexagonal nut, DIN 439, M 6	467006	As necessary	1
090	Assembly tool for bearing socket, UVS	1036907	As necessary	1
091	Spare parts kit, UVU, 2-lamp, MW	1059074	After 1000 wiper cycles	1

12.3.3 Spare parts list, 3x350 W, three lamp system with wiper

Tab. 24: Spare parts list, 3x350 W, three lamp system with wiper

No.	Description	Spare parts number	Replacement interval	No.
002	Lamp holder,∅74x16 1.4404	1049341	As necessary	1
003	Lamp cover, ∅73x9 1.4404	1049343	As necessary	1
004	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
005	Lamp protection tube with seal, Ø4	1049350	3 years	1
007	UV lamp, 350 W	1061418	14,000 hours	1
008	Magnetic sensor, MC60-12GM50	1009357	As necessary	1
009	Locking screw, DIN 910, G 1/2A	1005818	As necessary	1
010	Assembly bar, ∅18x250 1.4404	1041209	As necessary	1
011	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
012	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
017	Wiper rod complete, UV-LP	1049352	As necessary	1
019	Flange plug, PG9 3+PE Series 69	1017625	As necessary	1
020	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
022	UV sensor G 1.	1075544	As necessary	1
023	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
027	Angled cable socket, M12x1, 3x0.34 mm^2	1009479	As necessary	1
028	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
030	Lamp cover with plug, UV-LP 3...6x350	1075128	As necessary	1
031	Socket with leads	1075098	As necessary	1
032	Locking screw, DIN 910, G 1A	1005766	As necessary	1
040	Reactor cover complete, UV-LP, 3x	1049421	As necessary	1
041	Wiper unit complete, UV-LP 3x	1049427	As necessary	1
042	Drive thread, Tr20 x 4 x 1491,	1049432	As necessary	1
043	Hexagonal nut, DIN 439, M10	1017585	As necessary	1
044	Shaft, ∅14 x 70 M10 1.4404	1049433	As necessary	1
045	Spacer bar, ∅12 x 1521.5 1.440	1049434	As necessary	1
046	O-ring/M 7.30 - 2.40, FPM-B	1059319	After each opening	1
048	X-ring, 13.75x5.3x4.75 70, EPDM 28	1010384	After each opening	1
049	Bearing cover complete, UVS/A	1037028	As necessary	1
050	Slip washer ∅15x1, IGLIDUR® H	1041199	As necessary	1
051	Bearing cover complete, UVR/A	1041183	As necessary	1
052	O-ring 342.27 - 6.99, EPDM	1009038	After each opening	1

No.	Description	Spare parts number	Replacement interval	No.
053	Distance pin ∅10x82, M6 I/A	1041833	As necessary	1
054	Feather key, DIN 6885, A 2x 2x 14	1042863	As necessary	1
055	Coupling, TX1/10/C/8/8	1041484	As necessary	1
056	Flange plate gear, UVA 1.44	1041830	As necessary	1
057	Tube, 50 x 3.7, transparent	792778	As necessary	1
058	EC motor with flange plate	1080089	As necessary	1
059	Angled cable socket, M16 12-pin, 10 m	1041453	As necessary	1
060	Slotted pin, DIN 1473, 10x50	1028016	As necessary	1
065	Guide washer UV-LP complete 3x	1049402	As necessary	1
066	Wiper element for UVR/S/A	1027879	As necessary	1
067	Spacer ring, ∅9.5x10.5 for UVR1.4	1027933	As necessary	1
068	Holder ring, ∅62/45x4 for UVR/S/A PTF	1028100	As necessary	1
069	Threaded nut, ∅40x60, TR20x4 P	1049428	As necessary	1
070	Slide bearing, 12x14/20x15, IGLIDUR®	1027848	As necessary	1
071	Splint, DIN 94, 4x40 A4	1049429	As necessary	1
072	Retaining bolt, ∅20 for magnet	1041793	As necessary	1
073	Magnetic bar, ∅8x40, PTFE	1049430	As necessary	1
080	Baffle plate with threaded rod, complete, UV-LP	1049423	As necessary	1
081	Counter-bearing spindle, ∅50x35, PV	1051868	As necessary	1
082	Tapping screw, DIN 7976, ST 4.8x1	1028585	As necessary	1
083	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
084	Slide bolt, ∅15x12, PTFE	1049426	As necessary	1
085	Slide bearing F 8x10x10, IGLIDUR®	1037033	As necessary	1
086	Hexagonal nut, DIN 439, M 6	467006	As necessary	1
090	Assembly tool for bearing socket, UVS	1036907	As necessary	1
091	Spare parts kit, UVU, 3-lamp, MW	1059075	After 1000 wiper cycles	1

12.3.4 Spare parts list, 4x350 W, four lamp system with wiper

Tab. 25: Spare parts list, 4x350 W, four lamp system with wiper

No.	Description	Spare parts number	Replacement interval	No.
002	Lamp holder,∅74x16 1.4404	1049341	As necessary	1
003	Lamp cover, ∅73x9 1.4404	1049343	As necessary	1
004	Retainer, ∅48.5/39x3 PTFE	1035074	As necessary	1
005	Lamp protection tube with seal, Ø4	1049350	3 years	1
007	UV lamp, 350 W	1061418	14,000 hours	1
008	Magnetic sensor, MC60-12GM50	1009357	As necessary	1
009	Locking screw, DIN 910, G 1/2A	1005818	As necessary	1
010	Assembly bar, ∅18x250 1.4404	1041209	As necessary	1
011	O-ring/M 18.00 - 2.00, EPDM/P	1002279	After each opening	1
012	O-ring/M 40.00 - 5.00, EPDM/P	1023569	After each opening	1
017	Wiper rod complete, UV-LP	1074782	As necessary	1
019	Flange plug, PG9 3+PE Series 69	1017625	As necessary	1
020	O-ring/M, 33.05 - 1.78, EPDM/P	1023570	After each opening	1
022	UV sensor G 1.	1075544	As necessary	1
023	Temperature sensor, PT1000, G1/4"	1059076	As necessary	1
027	Angled cable socket, M12x1, 3x0.34 mm^2	1009479	As necessary	1
028	Hexagonal reducer, R 1/2 -Rp 1/4	1003365	As necessary	1
030	Lamp cover with plug, UV-LP 3...6x350	1075128	As necessary	1
031	Socket with leads	1075098	As necessary	1
032	Locking screw, DIN 910, G 1A	1005766	As necessary	1
040	Reactor cover complete, UV-LP, 4x	1074791	As necessary	1
041	Wiper unit complete, UV-LP 4x	1074813	As necessary	1
042	Drive thread, Tr20 x 4 x 1491,	1049432	As necessary	1
043	Hexagonal nut, DIN 439, M10	1017585	As necessary	1
044	Shaft, ∅14 x 70 M10 1.4404	1049433	As necessary	1
045	Spacer bar, ∅12 x 1521.5 1.440	1049434	As necessary	1
046	O-ring/M 7.30 - 2.40, FPM-B	1059319	After each opening	1
048	X-ring, 13.75x5.3x4.75 70, EPDM 28	1010384	After each opening	1
049	Bearing cover complete, UVS/A	1037028	As necessary	1
050	Slip washer ∅15x1, IGLIDUR® H	1041199	As necessary	1
051	Bearing cover complete, UVR/A	1041183	As necessary	1
052	O-ring 342.27 - 6.99, EPDM	1009038	After each opening	1

No.	Description	Spare parts number	Replacement interval	No.
053	Distance pin ∅10x82, M6 I/A	1041833	As necessary	1
054	Feather key, DIN 6885, A 2x 2x 14	1042863	As necessary	1
055	Coupling, TX1/10/C/8/8	1041484	As necessary	1
056	Flange plate gear, UVA 1.44	1041830	As necessary	1
057	Tube, 50 x 3.7, transparent	792778	As necessary	1
058	EC motor with flange plate	1080089	As necessary	1
059	Angled cable socket, M16 12-pin, 10 m	1041453	As necessary	1
060	Slotted pin, DIN 1473, 10x50	1028016	As necessary	1
065	Guide washer UV-LP complete 4x	1074815	As necessary	1
066	Wiper element for UVR/S/A	1027879	As necessary	1
067	Spacer ring, ∅9.5x10.5 for UVR1.4	1027933	As necessary	1
068	Holder ring, ∅62/45x4 for UVR/S/A PTF	1028100	As necessary	1
069	Threaded nut, ∅40x60, TR20x4 P	1049428	As necessary	1
070	Slide bearing, 12x14/20x15, IGLIDUR®	1027848	As necessary	1
071	Splint, DIN 94, 4x40 A4	1049429	As necessary	1
072	Retaining bolt, ∅20 for magnet	1041793	As necessary	1
073	Magnetic bar, ∅8x40, PTFE	1049430	As necessary	1
080	Baffle plate with threaded rod, complete, UV-LP	1074825	As necessary	1
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083	Bearing ring, ∅50x10, PTFE	1049345	As necessary	1
084	Slide bolt, ∅15x12, PTFE	1049426	As necessary	1
085	Slide bearing F 8x10x10, IGLIDUR®	1037033	As necessary	1
086	Hexagonal nut, DIN 439, M 6	467006	As necessary	1
090	Assembly tool for bearing socket, UVS	1036907	As necessary	1
091	Spare parts kit, UVU, 4-lamp, MW	1074886	After 1000 wiper cycles	1

12.4 Dulcodes UV system operating log

Date	Turn-ons UV lamp	Operating hours UV lamp	Signal display sensor *[%] // [w/m²] // [J/m²]*	UV transmission [%/1 cm]	Flow [m³/h]	Maintenance work performed	Signature

13 Declaration of Conformity

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg, Germany,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the EU Directive, on the basis of its functional concept and design and in the version distributed by us. Any modification to the product not approved by use will invalidate this declaration.

Tab. 26: Extract from the EU Declaration of Conformity for Devices with Motor Wipers

Designation of the product:	Dulcodes UV disinfection system
Product type:	UVCb - - - - - - - - X - - - - - - - - X = 4, 5
Serial number:	See nameplate on the device
Relevant EU directives:	EU Machinery Directive (2006/42/EC) EU-EMC Directive (2014/30/EU) EU Pressure Equipment Directive (204/68/EU Compliance with the protection targets of the Low Voltage Directive 2014/35/EU according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC EU RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN 12100:2010 EN 60204-1:2009 EN 60335-1:2014 EN 60529:2014 EN 61000-3-2:2015 EN 61000-6-2:2006 EN 61000-6-3:2012 (UVCbXXX…, XXX ≠ 04O-06O,) N 61000-6-4:2011 (UVCbXXX…, XXX = 04O-06O)
Applied national standards and other technical specifications in particular:	AD 2000
Date:	Heidelberg, 20.04.2016

The EC Declaration of Conformity is available to download on our homepage.

Tab. 27: Extract from the EU Declaration of Conformity for Devices with Motor Wipers

Designation of the product:	Dulcodes UV disinfection system
Product type:	UVCb X ≠ 4, 5
Serial number:	see nameplate on the device
Relevant EU directives:	EU Low Voltage Directive (2014/35/EU) EU-EMC Directive (2014/30/EU) EU Pressure Equipment Directive (204/68/EU EU RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN 12100:2010 EN 60204-1:2009 EN 60335-1:2014 EN 60529:2014 EN 61000-3-2:2015 EN 61000-6-2:2006 EN 61000-6-3:2012 (UVCbXXX…, XXX ≠ 04O-06O) EN 61000-6-4:2011 (UVCbXXX…, XXX = 04O-06O)
Applied national standards and other technical specifications in particular:	AD 2000
Date:	Heidelberg, 20.04.2016

The EC Declaration of Conformity is available to download on our homepage.

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