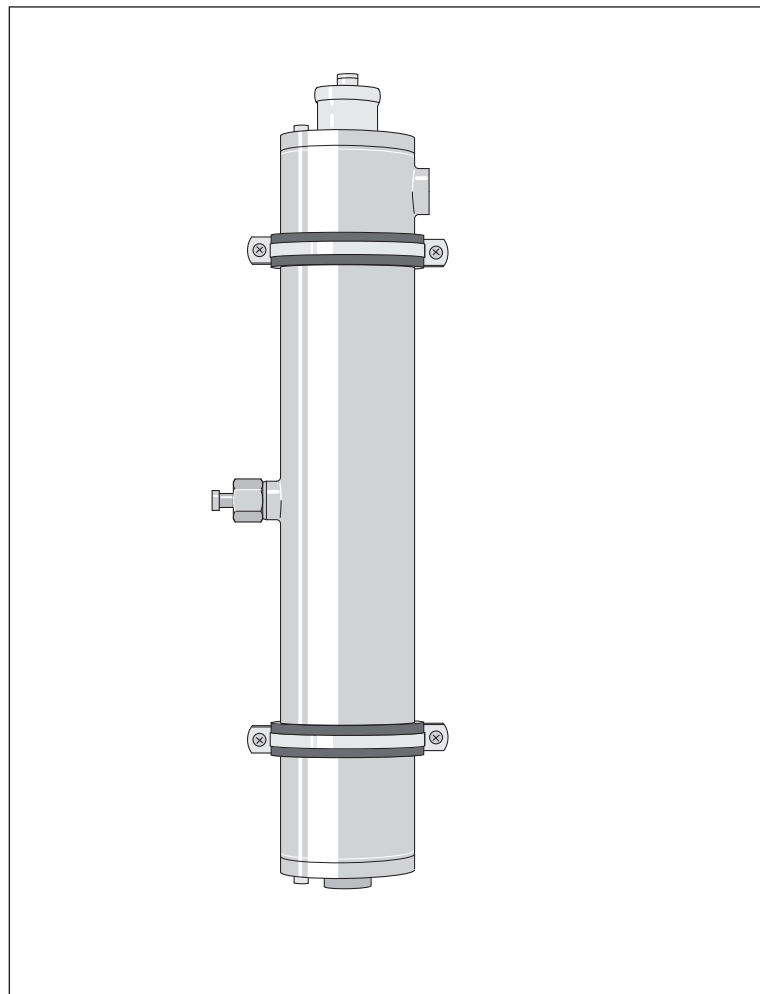


Operating Instructions

Dulcodes D, K and W

UV-Systems



Please affix the type identification label here!

Please completely read through the operating instructions first! Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

User Information

These operating instructions contain a continuous text description of the product,

- lists,
- instructions

and safety information identified with pictographs:



WARNING!

Disregard of the safety information may result in mortal danger or the risk of serious physical injury!



CAUTION!

Disregard of the safety information may result in the risk of minor physical injury and damage to property!



ATTENTION!

Disregard of the safety information may result in the risk of damage to property!

NOTE!

Information on disposal.

IMPORTANT!

Working information.

Impressum:

Operating Instructions – Dulcodes D, K and W UV-Systems

Translation of the original operating instruction

© ProMaqua GmbH, 2008

Address:

ProMaqua GmbH

Maaßstraße 32/1

69123 Heidelberg

Germany

info@prominent.com

www.prominent.com

Subject to technical modifications.

1	Application/Use	5
2	Safety Information	5
3	Function	6
4	Control	6
4.1	Display	7
4.2	Function Keys	7
4.3	Operating Status Display and Parameter Setting	8
4.3.1	Trend Display	9
4.3.2	Changing Enable Code	10
4.3.3	Setting Language	10
4.3.4	Activating/Deactivating Ballast Bus (does not apply to Dulcodes 75 W)	10
4.3.5	Setting UV Lamp Current (does not apply to Dulcodes 75 W)	11
4.3.6	Sensor Signal Display	11
4.3.7	Sensor Calibration	12
4.3.8	Setting Trend Display Range	12
4.3.9	Setting Warning Threshold	12
4.3.10	Setting Warning Threshold	13
4.3.11	Analogue Output Sensor Signal Assigning Standard Signal	13
4.3.12	Activating Pump Control	14
4.3.13	Setting Start-Up Flushing Time	14
4.3.14	Setting Maximum Clear Flushing Time	15
4.3.15	Setting Lamp Afterglow	15
4.3.16	Setting Standstill and Intermittent Flushing Time	15
4.3.17	Setting Minimum Mains Voltage	16
4.3.18	Pause Function	16
4.3.19	Displaying/Resetting Counters	16
4.3.20	System Behaviour in the Case of Fault	16
4.3.21	Alarm Signalling Relay	17
4.3.22	Fault Switched Input	17
5	Assembly and Installation	18
5.1	Radiation Chamber	18
5.1.1	Installation	18
5.1.2	Affixing Warning Sign	18
5.1.3	Hydraulic Connections	20
5.2	Control Cabinet and Control	20
5.2.1	Installation	20
5.2.2	Electrical Connections	20
5.2.3	Opening Control Unit	20
5.3	Installing Lamp Protective Tubes	22
5.4	Installing and Connecting UV Lamps	22

6	Start-Up	23
6.1	Checking the Radiation Chamber for Leaks and Venting	23
6.2	Switching On Disinfection System	23
6.3	Calibrating UV-C Sensor	23
7	Maintenance	23
7.1	Cleaning Lamp Protective Tubes	24
7.2	Changing UV lamps	26
7.3	Calibrating UV-C Sensor	27
7.4	Replacing Filter Mats	28
7.5	Troubleshooting	28
8	Annex	31
	Spare part drawings	31
	Spare Parts List	32
	Terminal Connection Diagram – Dulcodes D, K and W	33
	EC Declaration of Conformity	34
	Operation Log for Dulcodes UV Disinfection System	35
9	Technical Data	36
9.1	Performance Data	36
10	Electrical Data	37

1 Application/Use

Dulcodes UV disinfection systems serve the purpose of disinfecting

- Drinking water
- Service water and
- Swimming pool water.

The UV disinfection process involves subjecting the water to be disinfected to short-wave UV light. This so-called UV-C radiation has a fast and reliable germicidal and sterilising effect.

Dulcodes UV disinfection systems are turnkey systems ready for connection.

They are available in different versions as defined by the identity code.

The performance data are defined in the datasheet supplied with the Dulcodes UV disinfection system.

Scope of delivery

- Radiation chamber
- UV lamps with corresponding protective tubes
- Control cabinet with electronic ballast control gear
- System control
- UV-C sensor
- Operating instructions and datasheet

2 Safety Information



WARNING!

- **UV-C radiation is harmful to the eyes and skin!**
Place the UV lamps into operation only in their installed state!
Install the UV disinfection system in accordance with regulations and instructions before starting up the UV lamps!
- If not calibrated correctly, a sensor cannot perform its monitoring function.
Under unfavourable circumstances, it is then possible that insufficiently disinfected water may be fed to the consumer.
- In the case of applications with stringent disinfection requirements (e.g. drinking water disinfection), disinfect/sterilise the piping system, e.g. in a high-chlorinating process, prior to initial operation! This is particularly necessary in piping systems that have already been subject to soiling, germs or micro-organisms.
- Make sure that the maximum permissible water flow rate is not exceeded and the UV transmission does not drop below the minimum permissible levels otherwise adequate disinfection can no longer be guaranteed!
- In the event of longer periods of operation of the UV disinfection system without flow, particularly in the case of larger systems, monitor the water temperature and switch off the system!
- The place of installation must be dry and frost-free while ensuring the UV disinfection system is protected from the effects of chemicals, dyeing agents and vapours.
- The ambient temperature and the radiation temperature in the immediate vicinity must not exceed 40°C!
- If the water to be disinfected contains solid particles or turbidity substances, a suitable filter should be installed upstream of the UV disinfection system.
- Make sure that the maximum permissible operating pressure as defined in the datasheet is not exceeded.
- Switch off the master switch or disconnect the power plug before installation and connecting the UV lamps!
- Do not switch on the system before the radiation chamber is filled with water!
- Make sure that the UV lamps are operated with the standard current!

IMPORTANT!

Take note of the technical datasheet supplied with the respective UV disinfection system! Observe the operating instructions provided for special applications, in which the sensor signal is displayed in W/m²!

3 Function

The water to be disinfected flows through the stainless steel radiation chamber past the UV lamps. The UV radiation reliably kills germs and micro organisms.

Operating with high efficiency, the UV low-pressure UV lamps used produce UV-C radiation of the wave length 254 nm which is particularly effective for disinfection and sterilisation purposes. The UV lamps are located in protective tubes made from high-grade quartz with high UV permeability.

The compact design of the radiation chamber, the optimised flow as well as the fitted turbulators ensure uniform radiation of the entire flow of water.

In connection with the UV-C sensor, a control system monitors the UV system. It is installed in the control cabinet for larger UV disinfection systems and mounted on a panel together with the ballast for smaller systems..

Normal operation The UV lamps are ignited after switching on the Dulcodes UV disinfection system. In multi-lamp systems with a data bus to the ballast units, the bus is activated prior to ignition. This procedure can take several seconds depending on the size of the system.
After ignition, the lamps require several minutes until they reach operating temperature.

The UV-C sensor monitors the UV lamps: The flushing valve for start-up flushing opens as soon as the UV-C output exceeds the warning threshold.

The flushing valve also opens if the warning threshold is not reached within the maximum permissible warm-up time. If the warning threshold is still not reached within the maximum clear flushing time, the control will shut down the UV disinfection system and assume flow mode.

The shut-off valve opens after start-up flushing.
The UV system assumes normal operation.

Normal operation The UV-C sensor still monitors the UV-C output during normal operation:

UV-C output drops below the warning threshold:
A warning is triggered.

UV-C output drops below the warning threshold:
The shut-off valve closes and the flushing valve opens.
If the warning threshold is no longer exceeded within the maximum clear flushing time, the control will shut down the UV disinfection system and assume flow mode.

All UV lamps are monitored to ensure they are operating correctly. If a lamp fails, the shut-off valve closes, the control shuts down the UV disinfection system and assumes flow mode.

Intermittent flushing When intermittent flushing mode is active, after the maximum downtime, the flushing valve opens for the intermittent flushing time.

Switching off When the UV disinfection system is switched off, the shut-off valve closes and the UV lamps are switched off. If an afterglow period is required for the lamps, the lamps will be switched off after the afterglow period has elapsed.

4 Control

Version Since the electronics and software are subject to a continuous improvement process, the version number was introduced as a means of identification. This number must be specified in the event of complaints. The number can be shown on the display.

Presettings (defaults The control of the Dulcodes UV disinfection system is preset on leaving the factory. With the exception of sensor calibration, it is therefore not necessary to change the settings for many applications.

IMPORTANT!

The settings can be changed only with the UV system switched off. Exception: Sensor calibration and lamp current setting.

4.1 Display

In operating mode

A graphic display is provided.
Display of operating status
Warnings are indicated by flashing arrows and messages
A flashing error message draws attention to faults.

In programming mode

Flashing indication of variable numerical values or data

IMPORTANT!

The display will revert to the normal display corresponding to the respective operating status 5 minutes after the last time a key was pressed.

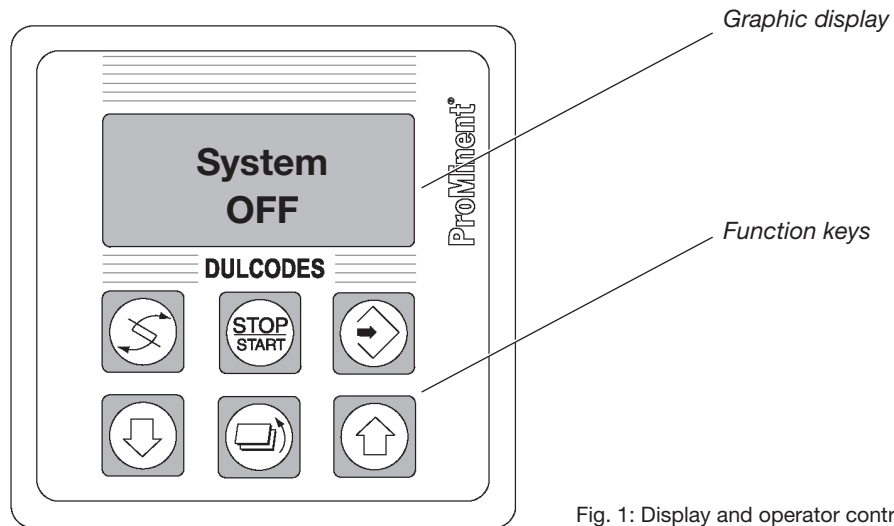


Fig. 1: Display and operator control unit

4.2 Function Keys

START/STOP



To switch the UV disinfection system ON and OFF

CHANGE



In operating mode: Change display window
In programming mode: Change adjustable parameters

BACK



Move one level back in menu

DOWN



In programming mode: Decrease an indicated numerical value
Change a data item

UP



In programming mode: Increase an indicated numerical value
Change a data item

ENTER



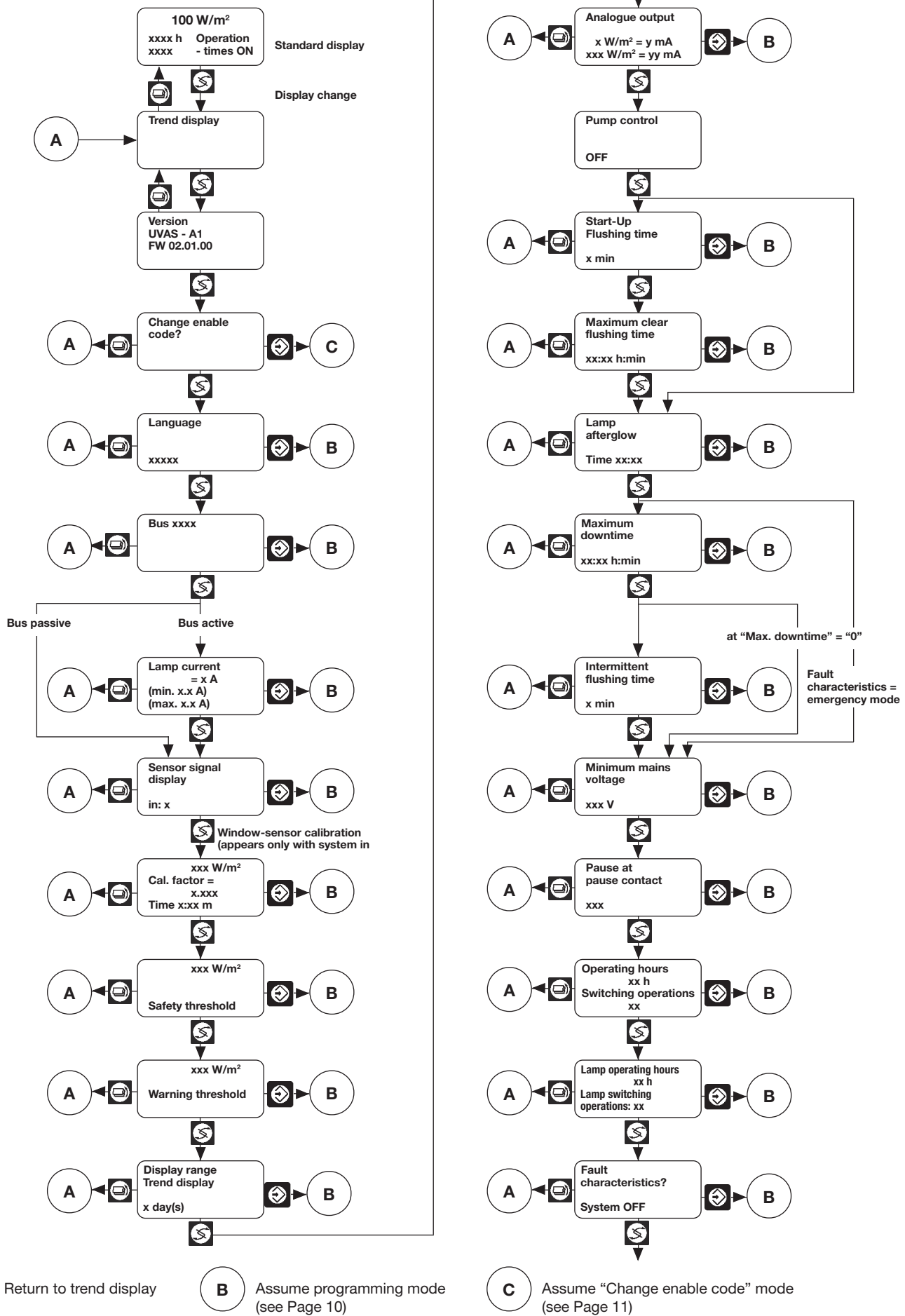
In operating mode: Change to programming mode
Acknowledge a fault
In programming mode: Accept a set value or condition

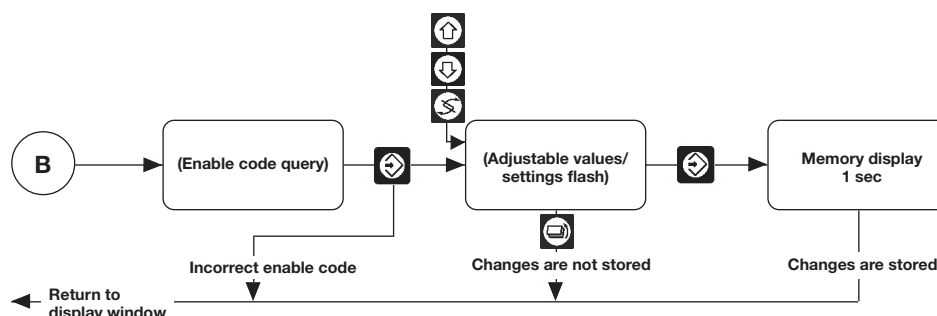
IMPORTANT!

Press and hold the START/STOP key for at least 2 seconds.

The display will revert to the normal display corresponding to the respective operating status 5 minutes after the last time a key was pressed.

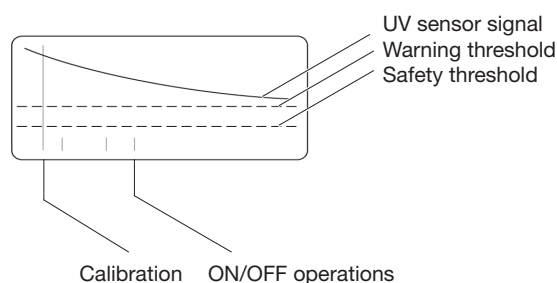
4.3 Operating Status Display and Parameter Setting



**IMPORTANT!**

Once the enable code has been entered correctly, it is no longer necessary to re-enter the code during further programming procedures. The flashing values or settings appear directly when the ENTER key is pressed.

The enable is deleted automatically 5 minutes after the last time a key is pressed or after returning to the trend or standard display.

4.3.1 Trend Display

The trend display serves the purpose of monitoring the lamp ageing process, the formation of a coating on the protective tubes or changes in the water quality.

The progression of the UV sensor signal is displayed in a time window. Horizontal lines denote the warning threshold and warning threshold. The short vertical lines indicate switch-on operations of the UV disinfection system. The display range of the UV sensor signal is between 0 W/m₂ (or %) and the value that was assigned to the analogue output value of 20 mA (see 4.3.11). The time window is adjustable (see 4.3.8) and provides a continuous display: After the selected time has elapsed, the oldest value is deleted and the new value displayed.

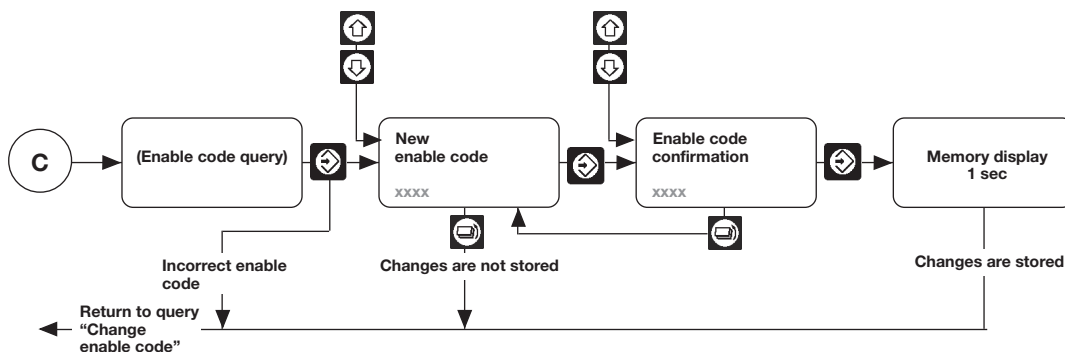
IMPORTANT!

- Each calibration of the UV-C sensor is documented by a solid vertical line in the trend display.
- The content of the trend display is deleted when the display range is changed and when the operating counter is reset.

<i>Presetting</i>	Time window:	100 days
	Maximum value of sensor signal:	400 W/m ²

4.3.2 Changing Enable Code

To prevent unauthorised changes to the settings, the system control has an enable code for programming mode. This code can be freely selected by the operator. Programming mode is still disabled after changing the enable code. The disable is cancelled only after entering the new enable code.



IMPORTANT!

Note down the enable code! Parameters can be set only after entering the correct enable code.

The default enable code does not provide protection against unauthorised changes.

Default 5000

4.3.3 Setting Language

Language

German

It is possible to choose between various languages:
German, English, French, Spanish

Default German

4.3.4 Activating/Deactivating Ballast Bus (does not apply to Dulcodes 75 W)

Bus passive

Bus active
10 lamps
EVG#001
EVG identifier

The ballasts for the high-flux lamps (e.g. 80 W lamps, 130 W lamps, 230 W lamps) are equipped with a bus interface. The UV lamps are ignited and switched off and their operation monitored via this bus interface. The lamp current can also be varied.

With the system switched on, the number of ballasts can be indicated when the bus is active. The serial number of the individual ballasts can be checked with the UP and DOWN keys.

IMPORTANT!

The bus must be switched to active in UV disinfection systems that feature ballasts with a bus interface. The lamps cannot be ignited when the bus is set to passive.

Default Active for systems equipped with ballasts with a bus interface otherwise passive.
(Dulcodes 75 W)

4.3.5 Setting UV Lamp Current (does not apply to Dulcodes 75 W)

Lamp current
= 2 A
(min. 1.2 A)
(max. 2.3 A)

The lamp current can be freely selected within a defined range in connection with ballasts that feature a bus interface. This adjustment makes it possible to adapt the UV lamps to specific operating conditions.

The lamp current is also adjustable in operating and flushing modes.

The permissible limits for the lamp current are not monitored when the system is switched off.

If a lamp current is set outside the permissible limits, the error message "Lamp Current" will appear after switching on the system and initialising the bus.

IMPORTANT!

The lamps are to be operated with standard current. Any deviation is appropriate and permitted only in very few exceptional cases.

The range of the permissible lamp current as well as the standard current is defined in the datasheet provided.

Two standard currents are specified for UV disinfection systems that are suitable for hot water disinfection: i.e. for hot and for cold water applications.



ATTENTION!

Operation of the UV lamps with a current outside the permissible range can lead to premature failure:

- **The lamp current set too high causes overheating of the lamps and a reduction in the UV-C output.**
- **A lamp current set too low can cause a marked reduction in the UV-C output.**

Water temperatures < 8 °C

If there is a slight reduction in the UV output from the UV lamps at water temperatures < 8 °C, the UV output can be increased by slightly increasing the lamp current by 0.1 to 0.3 A above the standard current.

End of effective life

The UV-C output of lamps close to the end of their effective life can be slightly extended by increasing the lamp current by 0.2 to 0.4 A above the standard current.

Default

2 A

4.3.6 Sensor Signal Display

Sensor signal display

in: W/m²

The UV-C sensor monitors the UV-C output.

A drop in the sensor signal can be caused by:

- A coating forming on the lamp protective tubes
- Distinct deterioration in the UV transmission of the water
- Reduction in UV-C output of the lamps due to lamp ageing.

It is possible to choose between an absolute display in W/m² and a relative display of the sensor signal in %.

Default

W/m²

Observe the separately available supplementary instructions for special applications, in which the sensor signal is displayed in %!

4.3.7 Sensor Calibration

100 W/m²
Cal. factor =
1.000
Time 5:00

The UV-C sensor is calibrated at the factory and does not need recalibration.

4.3.8 Setting Trend Display Range

Display range
Trend display

100 day(s)

The recording time of the sensor signal for the trend display can be adjusted. The value (in days) is interpreted as a time window and therefore guarantees a continuous display: After the selected time has elapsed, the oldest value is deleted and the new value displayed.

Default 100 days

4.3.9 Setting Warning Threshold

50.0 W/m²

Safety
threshold

Reliable water treatment is no longer ensured if the UV-C output decreases to such an extent that the sensor signal drops below the warning threshold. In this case, the shut-off valve, if fitted, is closed. This situation is indicated by two flashing arrows on the display.

A signalling device can be connected to the WARNING THRESHOLD signalling relay of the control. The relay is closed when the warning threshold is undershot.



WARNING!

After changing a UV lamp, check the safety and warning threshold and readjust if necessary!

Adequate disinfection is ensured only when the warning threshold is set correctly.

IMPORTANT!

The warning threshold must be below the warning threshold. It is not possible to set this threshold outside the warning threshold.

Observe the supplementary instructions for special applications, in which the sensor signal is displayed in %!

- Switch on the system with the Start/Stop key
- Wait until the UV lamps develop their full power output, i.e. the UV-C sensor signal is stable
- Read off the indicated UV-C intensity and note down
- Switch off the system with the Start/Stop key
- Set the warning threshold to 50 % of the read-off UV-C intensity
Example: Read UV-C intensity: 100 W/m²
Therefore: Warning threshold = 100 W/m² 0.50 = 50.0 W/m²
- Now set the warning threshold (see Section 4.3.10 "Setting Warning Threshold").

4.3.10 Setting Warning Threshold

55.0 W/m²

Warning threshold

A warning is triggered if the UV-C output decreases to such an extent that the sensor signal drops below the warning threshold. The lamp protection tubes should be cleaned or the lamps replaced or the water quality improved by suitable preparation in order to avoid the signal dropping below the warning threshold. The signal dropping below the warning threshold is indicated by a flashing arrow on the display.

A signalling device can be connected to the WARNING THRESHOLD signalling relay of the control. The relay is closed when the warning threshold is undershot.



WARNING!

After changing a UV lamp, check the safety and warning threshold and readjust if necessary!

IMPORTANT!

The warning threshold must be above the warning threshold.

It is not possible to set the warning threshold below the warning threshold.

Observe the supplementary instructions for special applications, in which the sensor signal is displayed in %!

Preconditions:

- The stable UV-C intensity of the UV lamps was noted down
 - The warning threshold was set (see Section 4.3.9 “Setting Warning Threshold”).
- Set the warning threshold to 110 % of the set warning threshold.

Example: Set warning threshold: 50 W/m²

Therefore: Warning threshold = 50 W/m² 1.10 = 55.0 W/m²

The procedure for setting the warning threshold and warning threshold is now completed, the system is ready for operation and can be switched on with the Start/Stop key.

4.3.11 Analogue Output Sensor Signal Assigning Standard Signal

Analogue output

0 W/m² = 0 mA
400 W/m² = 20 mA

The signal from the UV-C sensor can be recorded on a plotter for documentation purposes. The plotter is to be connected to the standard output of the control for this purpose.

It is possible to choose between a standard signal of 0 to 20 mA and 4 to 20 mA:

- 0 or 4 mA corresponds to the sensor signal 0 W/m²
- 20 mA can be assigned to any value.

IMPORTANT!

The sensor signal value assigned to 20 mA simultaneously serves as the maximum value of the trend display.

Set this sensor signal value to 125 % of the maximum value to ensure the trend display (see 4.3.1) can never “overflow”.

Default 0 W/m² = 0 mA
400 W/m² = 20 mA (depending on settings)

4.3.12 Activating Pump Control

Pump control

ON

The pump control must be activated in order to drive a delivery pump with the pump relay.

The pump relay is in dropped-out state when the system is switched off and remains in dropped-out state with the pump control "OFF" even when the system is running.

When the system is switched on with the pump control ON, the system will exit the warm-up phase on exceeding the warning threshold. The pump relay picks up.

The pump relay drops out when the system is switched off or when the system assumes pause state.

If the warning threshold is undershot during operation or if a UV lamp fails, the pump relay will drop out and the system assumes flow mode.

Default OFF



ATTENTION!

The UV disinfection system may be operated only with the radiation chamber completely filled with water. With the radiation chamber empty or only partially filled there is the risk of damaging the UV lamps and radiation chamber. Particular care must therefore be taken to ensure that the radiation chamber cannot run empty while the pump is switched off.

IMPORTANT!

Start-up, clear and intermittent flushing are not possible with the pump control "ON". The corresponding programming windows are therefore blanked out.

IMPORTANT!

Since, in most cases, the delivery pump has a certain afterrunning period, the lamp after-glow time should be set to at least 1 minute in applications requiring a high degree of disinfection reliability.

4.3.13 Setting Start-Up Flushing Time

Start-Up
Flushing time

1 min

The aim of start-up flushing is to ensure that only perfectly treated water flows to the consumer. The automatic flushing valve (if fitted) for start-up flushing opens as soon as the UV lamps have reached operating temperature after ignition and the sensor signal is above the warning threshold. Only then does the shut-off valve open.

IMPORTANT!

A start-up flushing period of 1 minute is sufficient in the majority of cases.
The start-up flushing period can be set to 0 min if no flushing valve is installed.

Default 1 min

4.3.14 Setting Maximum Clear Flushing Time

**Maximum clear
flushing time**

00:01 h:min

Clear flushing is mainly used for drinking water disinfection where maximum clear flushing times of more than 10 hours are often implemented. The shut-off valve will close and the flushing valve open if in bodies of water that have only weak natural filtering properties, the UV transmission in ground water or spring water deteriorates after heavy rainfall to such an extent that the UV-C sensor signal drops below the warning threshold. Normal operation of the UV disinfection system will be restored as soon as the water quality has improved. The UV disinfection system will switch to flow mode if the UV-C sensor signal does not rise above the warning threshold again within the maximum clear flushing time.

Default 1 min

4.3.15 Setting Lamp Afterglow

**Lamp
afterglow**

OFF

In large UV disinfection systems for drinking water disinfection it is possible that a longer period of time may elapse until the shut-off valve closes or the water flow is otherwise interrupted. In this case, the lamp afterglow function prevents water that has not been properly disinfected from reaching the consumer while the UV disinfection system is switched off.

A lamp afterglow period of 1 minute is sufficient in the majority of cases.

Default OFF

4.3.16 Setting Standstill and Intermittent Flushing Time

**Maximum
standstill time**

00:00 h:min

**Intermittent
flushing time**

0 min

Standstill flushing is used particularly for the own supply of drinking water. Long periods of time without tapping off water can be assumed in connection with UV disinfection systems in self-supply applications. In such cases, standstill flushing is recommended in order to avoid impermissible overheating and radiation of the water.

If a flow control instrument whose contact closes on exceeding a minimum flow rate is connected to the FLOW switched input of the control, the flushing valve will be opened for the intermittent flushing period if no water is tapped off within the maximum standstill period.

If no flow control instrument is connected to the FLOW switched input of the control, i.e. the input is open, the flushing valve will open for the set intermittent flushing time after the maximum standstill period (periodic flushing).

A maximum standstill flushing period of 5 hours is set in most cases. An intermittent flushing time of 1 minute is normally sufficient.

No intermittent flushing occurs if the maximum standstill period is set to 00:00.

Default 00:00 h:min
1 min

4.3.17 Setting Minimum Mains Voltage

Minimum mains voltage

180 V

Monitoring the mains voltage prevents uncontrolled failure of the UV disinfection system and of the lamps due to excessively low mains voltage. If the mains voltage drops below the minimum value, the control assumes the undervoltage state and shuts down the system. The system automatically resumes operation when the mains voltage exceeds its permissible minimum value again.



ATTENTION!
Changing the minimum mains voltage is permitted only after consultation with the Service Department.

Default 180 V

4.3.18 Pause Function

Pause at
pause contact

closed

The UV disinfection system can be switched on and off by closing and opening an external contact that is connected to the pause input of the control.
It is possible to select whether the UV disinfection system starts operation with the pause contact open or closed.

Default Pause with pause contact closed.
UV disinfection system starts operation with pause contact open.

4.3.19 Displaying/Resetting Counters

Operating hours
400 h

Switching operations
25

Lamp operating hours
400 h

Lamp switching operations
25

The OPERATING HOURS and SWITCHING OPERATIONS counters cannot be reset.
The LAMP OPERATING HOURS and SWITCHING OPERATIONS counters can be reset.

4.3.20 System Behaviour in the Case of Fault

System behaviour
in the case of fault

System OFF

The UV disinfection system is normally shut down in the event of a fault. In special applications, however, it may be appropriate to allow the system to continue operation with restricted output (emergency operation).

**WARNING!**

- The disinfection output of the UV system is drastically reduced in emergency mode.
- Emergency mode is not permitted in connection with applications with demanding requirements in terms of disinfection output such as in drinking water disinfection or comparable applications.
- Distinctly reduced output levels can be expected in applications where emergency operation of the UV system is permitted.
- In emergency mode, a shut-off valve (if fitted) opens immediately after pressing the START/STOP key and not after exceeding the warning threshold. There is no monitoring as to whether the UV lamps have heated up to operating temperature and provide adequate UV output. If necessary, the water flow should be turned off manually (manual shut-off valve, switching off the delivery pump manually, etc.) for 5 to 10 minutes after switching on emergency mode.
- Before enabling emergency mode in the program menu and before switching on emergency mode, the system operator must check to ensure that danger to persons and property by the drastically reduced system output is ruled out.
- ProMinent shall reject any warranty claims or claims for compensation in the event of damage during emergency operation of the UV system.

A special code is required for the purpose of reprogramming the system behaviour in the event of faults. This code can only be obtained from ProMinent on request. After entering the special code, emergency mode can then be selected under system behaviour in the event of faults. If emergency mode is selected in response to a fault, as before, the system will assume flow mode in the event of a lamp failing or if the warning threshold is undershot after the clear flushing time has elapsed. The system then assumes emergency mode by pressing the CHANGE key on the display. The fault is therefore not confirmed with the ENTER key.

Emergency mode can also be triggered by closing the FLOW switched input.

Automatic transition to emergency mode can be achieved by bypassing the input.

The UV lamps are ignited, the shut-off valve is opened and the pump relay picks up in emergency mode. The alarm relay (fault signalling relay), however, remains dropped out, i.e. lamp failure and the sensor signal are no longer monitored. The signalling relay for WARNING THRESHOLD and WARNING THRESHOLD undershot remains dropped out.

IMPORTANT!

Intermittent flushing is not possible in systems where emergency mode has been enabled. The programming windows for max. standstill period and intermittent flushing time are therefore blanked out.

Since the pump relay picks up in emergency mode even with the pump control OFF, the pump relay can be used for the purpose of signalling emergency mode in systems with the pump control set to OFF. In systems with the pump control set to ON, emergency mode can be identified by the fact that the pump relay is still picked up although the alarm relay has dropped out.

4.3.21 Alarm Signalling Relay

A signalling device can be connected to the ALARM signalling relay. The relay drops out in the event of a fault or power failure.

4.3.22 Fault Switched Input

An external fault-signalling device such as an overtemperature switch can be connected to the FAULT switched input.

IMPORTANT!

The FAULT switched input is bypassed on delivery. If the jumper is removed without connecting a fault signalling device, the control will assume flow mode and it will no longer be possible to operate the UV disinfection system.

**ATTENTION!**

Remove the jumper when connecting a fault-signalling device otherwise no fault/malfunction will be signalled.

5 Assembly and Installation

Please take note of the following safety information prior to installation:



WARNING!

Make sure that

- the maximum permissible water flow rate is not exceeded and
- the UV transmission does not drop below the minimum permissible levels otherwise adequate disinfection will no longer be guaranteed!

The maximum permissible water flow rate is defined in the supplied datasheet.

It is an integral function of the required radiation exposure level and of the minimum permissible UV transmission of the water to be disinfected.



ATTENTION!

- The place of installation must be dry and frost-free while ensuring the UV disinfection system is protected from the effects of chemicals, dyeing agents and vapours.
- The ambient temperature and the radiation temperature in the immediate vicinity must not exceed 40 °C!
- If the water to be disinfected contains solid particles or turbidity substances, a suitable filter should be installed upstream of the UV disinfection system.
- Make sure that the maximum permissible operating pressure as defined in the datasheet is not exceeded.

IMPORTANT!

Despite the use of modern lamp ballasts with protective lamp ignition, the UV system should be operated such as to avoid frequently switching the UV lamps on and off.

5.1 Radiation Chamber

The design of the radiation chamber is defined in the datasheet provided:
Vertical wall-mounted, reclined or upright versions.

5.1.1 Installation



ATTENTION!

- Only the type of installation defined in the datasheet is permitted.
- Leave sufficient space for maintenance and servicing work!
The necessary clearance is defined in the datasheet provided.

Vertical wall mounting

- Using the installation material provided, secure the radiation chamber vertically on a wall or a suitable frame.

Reclined/horizontal

- Using the installation material provided, secure the radiation chamber horizontally on a wall or a suitable frame.

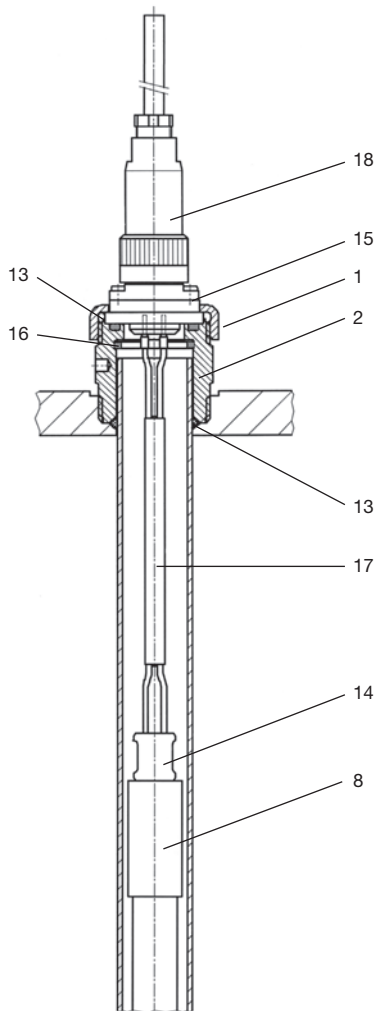
Upright

- Install radiation chamber on the floor.

5.1.2 Affixing Warning Sign

IMPORTANT!

Affix the supplied self-adhesive warning sign such that it is clearly visible on the radiation chamber.



Lamp connection in systems that are equipped with a connector on the lamp cover.

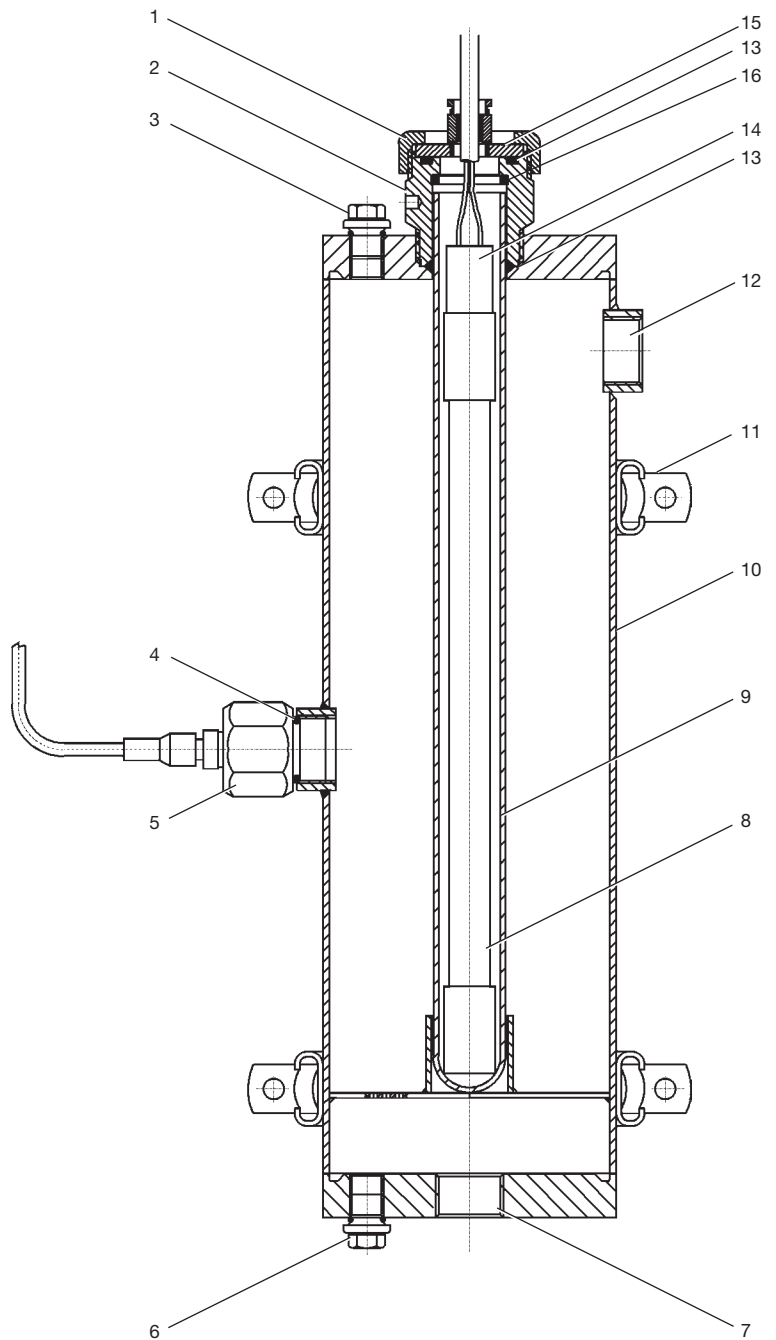


Fig. 2: Construction of the radiation chamber

- 1 Knurled nut
- 2 Retaining fixture for protective tube
- 3 Bleeder screw with O-ring
- 4 O-ring
- 5 UV-C sensor
- 6 Water drain plug with O-ring
- 7 Water inlet
- 8 UV lamp
- 9 Lamp protective tube
- 10 Radiation chamber
- 11 Mounting elements
- 12 Water outlet
- 13 O-ring
- 14 Connector
- 15 Lamp cover
- 16 Teflon ring
- 17 Cable
- 18 Circular plug

5.1.3 Hydraulic Connections



ATTENTION!

- Make the hydraulic connection of the radiation chamber in accordance with valid general guidelines as well as the locally applicable installation regulations.
- Use UV-resistant material for the hydraulic connection!
If PVC is used, it is possible that the PVC material may discolour in the area of the connection and even turn brittle under unfavourable conditions.
- In applications with demanding disinfection requirements (e.g. drinking water disinfection) without facilities for interrupting the water flow in the case of fault/malfunction (e.g. shutting down the delivery pump):
Fit an automatic shut-off valve downstream of the radiation chamber and connect to the control!
The automatic shut-off valve must close automatically to ensure the flow of water is interrupted also in the event of power failure.

IMPORTANT!

- Fit valves upstream and downstream of the radiation chamber for the purpose of shutting off the radiation chamber when performing maintenance and servicing work!
- Fit suitable stopcocks upstream and downstream of the radiation chamber for the purpose of taking microbiological samples!

5.2 Control Cabinet and Control

5.2.1 Installation

- The control cabinet and/or the carrier panel with the control and ballast are to be mounted on the wall or a suitable frame such that the lamps and sensors can be connected with the cables provided.



ATTENTION!

The lamp connection cable and the sensor cable must not be extended!

5.2.2 Electrical Connections

Electrical installation must be performed by an authorised electrician using the supplied documentation and diagrams (circuit diagram).



ATTENTION!

- Comply with the valid general guidelines as well as the locally applicable installation regulations!
- Perform installation work only with the power supply to the system disconnected!
- Connect the PE conductor to the radiation chamber!
- The lamp connection cable and the sensor cable must not be extended!

5.2.3 Opening Control Unit

Electrical installation must be performed by an authorised electrician using the supplied documentation and diagrams (circuit diagram).



ATTENTION!

Before opening, make sure that no voltage is applied to the control unit!

- Undo the 4 screws at the top of the housing
- Open the housing:
for this purpose exert pressure with the index finger on to the front edge of the housing while simultaneously pulling forward so that the catch hook disengages
- Carefully pull the upper section forward away from the lower section (both sections are connected by a ribbon cable!)
- Fit the upper section with both guide rails in the approx. 80 mm high plug-in slot

All connection terminals are now freely accessible. Blanked off holes that must be broken out to insert the connection cables are provided on the underside of the control unit.

The openings in the rear row are intended for PG-11 screwed glands.

The 5 openings in the front row are intended for PG-7 screwed glands.

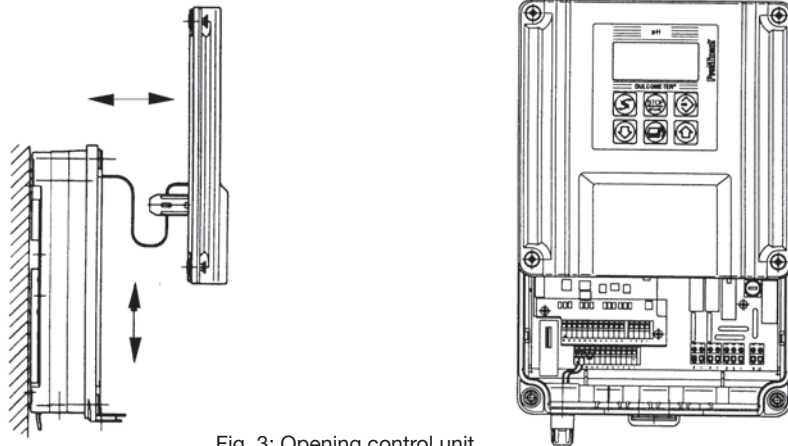


Fig. 3: Opening control unit



ATTENTION!

Use the appropriate tools to break out the blanked off cable leadthroughs on the underside of the control unit so as no to damage the pc-board and the thread.

- Break out blanked-off cable leadthroughs on the underside of the control unit
- First install the cables in the rear row:
 - Fit screwed gland, thrust collar and seal from supplied supplementary kit on the cable, screw into the threaded hole and tighten by hand
- Pull PG-7 screwed glands over the cable and lock with lock nut
- Route strands to the terminals corresponding to the terminal connection diagram
- Connect unused terminals to the corresponding plug connectors
- Close control unit

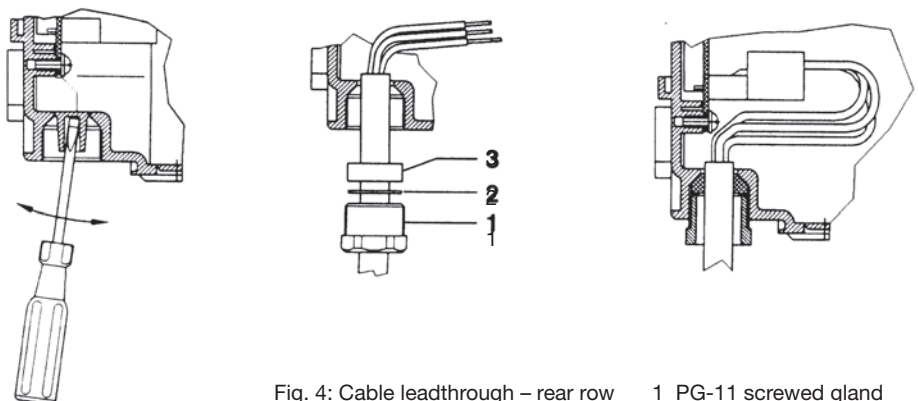


Fig. 4: Cable leadthrough – rear row

- 1 PG-11 screwed gland
- 2 Metal ring
- 3 Rubber seal

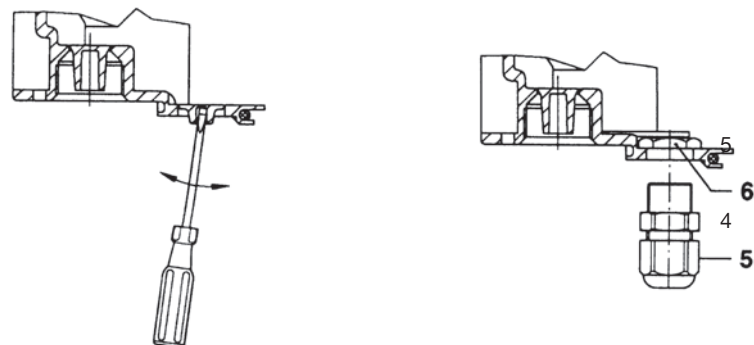


Fig. 5: Cable leadthrough – front row

- 4 PG-7 screwed gland
- 5 Lock nut

5.3 Installing Lamp Protective Tubes



ATTENTION!

**Examine for signs of damage before installing the lamp protective tubes!
Do not install damaged protective tubes!**

- Use supplied C-wrench to release the retaining fixtures for the protective tubes
- Remove retaining fixtures for protective tubes by turning out of the radiation chamber
- Fit supplied O-ring approx. 40 mm over the open end of the lamp protective tube
- Insert lamp protective tube in radiation chamber



ATTENTION!

**Make sure the protective tube is fitted correctly!
The lamp protective tube may protrude by a maximum of 40 mm and exhibit no angle offset!**

- Check whether the Teflon ring is located in the groove provided in the retaining fixture of the protective tube (see Fig. 2). Otherwise fit the Teflon ring into the retaining fixture of the protective tube such that it snaps into the groove.
- Slide the retaining fixture over the protective tube and screw into the radiation chamber; tighten by hand.
- Use supplied C-wrench to tighten the protective tube retaining fixtures; very little force is required for this purpose

5.4 Installing and Connecting UV Lamps



WARNING!

- **Switch off the master switch or disconnect the power plug before installation and connecting the UV lamps!**
- **Place the UV lamps into operation only in their installed state!**
UV-C radiation is harmful to the eyes and skin!
Install the UV disinfection system in accordance with regulations and instructions before starting up the UV lamps!
- **Do not change/modify the lamp connection cables already fitted!**
- **Do not change/modify the distance between the connector and lamp cover!**
Otherwise it will not be possible to ensure that the lamp rests against the closed end of the protective tube. This position, however, is the prerequisite for safe and reliable disinfection!



ATTENTION!

**Do not touch the glass of the UV lamps with bare hands!
Fingerprints burn into the glass and can cause premature failure. Before fitting the lamps, remove fingerprints with a cloth moistened with alcohol!**

Systems without connector on lamp cover

- Fit O-ring in the groove provided on the protective tube retaining fixture
- Insert UV lamp in the protective tube so that it protrudes by approx. 100 mm
- Plug in connector on UV lamp
- The connector can be plugged in only in certain positions, it may be necessary to turn it through 90° before attempting to plug in again
- Completely insert the UV lamp into the protective tube
- Secure UV lamp cover on retaining fixture for protective tube with knurled nut; only slight force is required

Systems with connector on UV lamp cover

- Fit O-ring in the groove provided on the protective tube retaining fixture
- Plug in connector on UV lamp
- The connector can be plugged in only in certain positions, it may be necessary to turn it through 90° before attempting to plug in again
- Insert UV lamp into protective tube until the UV lamp cover comes to rest against the retaining fixture for the protective tube
- Secure UV lamp cover on retaining fixture for protective tube with knurled nut. Use only very little force to tighten the knurled nut.
- Plug in circular connector at the socket on the UV lamp cover and secure with knurled nut. Use only very little force to tighten the knurled nut.

6 Start-Up



WARNING!

In the case of applications with stringent disinfection requirements (e.g. drinking water disinfection), disinfect/sterilise the piping system, e.g. in a high-chlorinating process, prior to initial operation!

This is particularly necessary in piping systems that have already been subject to soiling, germs or micro-organisms.

6.1 Checking the Radiation Chamber for Leaks and Venting

- Release (open) vent screw on radiation chamber
- Slowly open shut-off valve upstream of radiation chamber
- Fill radiation chamber until water emerges at the vent screw
- Close vent screw, use only slight force
- Check radiation chamber for leaks
- Open shut-off valve downstream of radiation chamber
(necessary only for manual shut-off valve)

6.2 Switching On Disinfection System



ATTENTION!

Do not switch on the system before the radiation chamber is filled with water!

- Switch on master switch or connect power plug
- Check parameters in programming mode of the control system and change if necessary
(see 4.3 Operating Status)



ATTENTION!

Make sure that the UV lamps are operated at the standard current!

- Switch on UV disinfection system with the START/STOP key;
press the START/STOP key and hold for at least 2 seconds.
- If the control assumes the PAUSE state, operate the pause contact

After being ignited, it can take several minutes for the UV lamps to reach their full UV output.

IMPORTANT!

Observe the supplementary operating instructions provided for special applications, in which the sensor signal is displayed in %.

6.3 Calibrating UV-C Sensor

The UV-C sensor is calibrated at the factory and does not need recalibration.

IMPORTANT!

All new UV lamps require a burn-in period of 100 to 200 hours. Therefore, check the warning threshold and the warning threshold approximately 200 operating hours after commissioning (start-up).

7 Maintenance

Maintenance of the UV disinfection system is restricted to cleaning the lamp protective tubes as well as to replacing the UV lamps at the end of their maximum permissible useful life.

In the case of systems that have a fan installed in the control cabinet, the filter mats of the fan and the air outlet filter in the control cabinet should be replaced at regular intervals (normally once a year).

An operation log should be kept for documentation purposes; a corresponding form can be found in the annex.



WARNING!

- Replace the UV-C lamps after the maximum permissible useful life at the latest! Otherwise, operational reliability of the UV disinfection system can no longer be guaranteed.
- The maximum permissible useful life is defined in the datasheet provided with the UV disinfection system.
- Disconnect the power plug or switch off the mains switch before performing any maintenance/servicing work.
- Depressurise radiation chamber before performing maintenance work.
- UV-C radiation is harmful to the eyes and skin!
Place the UV lamps into operation only in their installed state!
Install the UV disinfection system in accordance with regulations and instructions before starting up the UV lamps!
- Soiled filter mats of the fan and of the air outlet filter can cause overheating and irreparable damage to the control cabinet.

7.1 Cleaning Lamp Protective Tubes

Iron, manganese or lime deposits can form on the lamp protective tubes during operation. Since these deposits absorb UV radiation, they should be removed at regular intervals.

IMPORTANT!

The protective tubes should be cleaned at the latest when the sensor signal drops below the warning threshold provided this is not due to other reasons such as lamp ageing or substantial deterioration in UV transmission.

In many UV disinfection systems, it is sufficient to clean the lamp protective tubes once a year as part of the lamp replacement procedure. Cleaning every one or two months may be necessary in UV disinfection systems that are used for wastewater disinfection.

All protective tubes in multi-lamp systems must be cleaned.

The lamp protective tubes should be removed to be cleaned or they can be cleaned by filling the radiation chamber with a cleaning solution. Acids are particularly suitable for cleaning purposes such as diluted phosphoric acid, citric acid or diluted nitric acid.



CAUTION!

- Do not use acids that cause corrosion or stress corrosion cracking as hydrochloric acid!
- Observe the safety datasheet of the selected cleaning agent!
- Wear the necessary protective clothing when cleaning the system (safety goggles, protective gloves ...)!
- Make sure that no cleaning solution enters the lamp protective tubes!
- Take particular care when cleaning UV disinfection systems to ensure that no cleaning solution enters the piping system! This requirement applies particularly to drinking water disinfection and similar applications.

NOTE!

Dispose of the used cleaning solution in accordance with valid guidelines and regulations!

Systems without connector on lamp cover

- Switch off UV disinfection system with the START/STOP button
- Switch off master switch or disconnect power plug
- Close shut-off valves upstream and downstream of the radiation chamber
- Open water drain plug and vent screw, empty radiation chamber
- Release knurled nut on retaining fixture for UV lamp protective tube by hand
- Pull out UV lamp cover until the connector of the connection cable can be disconnected from the UV lamp
- Completely pull out UV lamp and place to one side
- Use C-wrench provided to slacken off retaining fixture for protective tube
- Remove retaining fixtures for protective tubes by turning out of the radiation chamber
- Pull out UV lamp protective tube
- Remove O-ring from lamp protective tube
- Wash lamp protective tube with cleaning solution or dip in cleaning solution until the deposits have been removed completely
- Rinse protective tube with clear water and dry with a soft cloth

*Variant 1: Removing
UV lamp protective tubes*

**ATTENTION!**

**Before installing, check the lamp protective tube for damage!
A damaged protective tube must not be reinstalled.**

- Check O-ring for damage. Replace damaged seal
- Fit O-ring approx. 40 mm over the open end of the lamp protective tube
- Insert lamp protective tube in radiation chamber

**ATTENTION!**

**Make sure the protective tube is fitted correctly!
The lamp protective tube may protrude by a maximum of 40 mm and exhibit no angle offset!**

- Slide the retaining fixture over the protective tube and screw into the radiation chamber; tighten by hand.
- Use supplied C-wrench to tighten the protective tube retaining fixtures; very little force is required for this purpose
- Installation and connection of UV lamps as described under 5.4.

*Variant 1: Removing**UV lamp protective tubes***Systems with connector on UV lamp cover**

- Switch off UV disinfection system with the START/STOP button
- Switch off master switch or disconnect power plug
- Close shut-off valves upstream and downstream of the radiation chamber
- Open water drain plug and vent screw, empty radiation chamber
- Release circular plug on lamp cover by turning the knurled nut and disconnect
- Release knurled nut on retaining fixture for lamp protective tube and detach
- Raise lamp cover and completely remove the UV lamp and place to one side
- Use C-wrench provided to slacken off retaining fixture for protective tube
- Remove retaining fixtures for protective tubes by turning out of the radiation chamber
- Pull out UV lamp protective tube
- Remove O-ring from lamp protective tube
- Wash lamp protective tube with cleaning solution or dip in cleaning solution until the deposits have been removed completely
- Rinse protective tube with clear water and dry with a soft cloth
- Check O-ring for damage. Replace damaged O-ring
- Fit O-ring approx. 40 mm over the open end of the lamp protective tube
- Insert lamp protective tube in radiation chamber
- Slide the retaining fixture over the protective tube and screw into the radiation chamber; tighten by hand.
- Firmly tighten the protective tube retaining fixture with the C-wrench provided, only very little force is required for this purpose
- Installation and connection of UV lamps as described under 5.4.

Cleaning UV-C sensor

The UV-C sensor should also be cleaned every time the lamp protective tubes are cleaned:

- Disconnect sensor connection cable from UV-C sensor
- Unscrew UV-C sensor out of radiation chamber
- Clean quartz window with a rag soaked in cleaning solution until the coating is completely removed
- Rinse quartz window with clear water and dry with a soft cloth
- Check O-ring for damage. Replace damaged seal
- Reinstall UV-C sensor and firmly tighten; only slight pressure is required for this purpose
- Connect sensor cable to UV-C sensor
- Screw in water drain plug and firmly tighten; only very little force is required for this purpose
- Slowly open shut-off valve upstream of radiation chamber
- Fill radiation chamber until water emerges at the vent screw
- Close vent screw; only slight force is required for this purpose
- Open shut-off valve downstream of radiation chamber
(necessary only for manual shut-off valve)
- Check radiation chamber for leaks
- Switch on master switch or connect power plug

The UV disinfection system is now ready for operation.

*Variant 2:**Filling with cleaning solution*

Cleaning the lamp protective tubes by filling the radiation chamber with a cleaning solution:

- Switch off UV disinfection system with the START/STOP button
- Switch off master switch or disconnect power plug
- Close shut-off valves upstream and downstream of the radiation chamber

- Open water drain plug and vent screw and remove
- Discharge radiation chamber
- Reinstall water drain plug and tighten, only very little force is required for this purpose
- Fill the radiation chamber with cleaning solution via the vent opening
- Allow the cleaning solution to soak in for at least 20 minutes
- Open water drain plug and remove
- Discharge (empty) radiation chamber and dispose of cleaning solution according to requirements
- Thoroughly flush radiation chamber with clean water until all remains of the cleaning solution are removed
- Screw in water drain plug and firmly tighten; only very little force is required for this purpose
- Slowly open shut-off valve upstream of radiation chamber
- Fill radiation chamber until water emerges at the vent screw
- Close vent screw; only slight force is required for this purpose
- Open shut-off valve downstream of radiation chamber (necessary only for manual shut-off valve)
- Check radiation chamber for leaks
- Switch on master switch or connect power plug

The UV disinfection system is now ready for operation.

IMPORTANT!

For radiation chambers that are regularly cleaned by filling with a cleaning solution, it is recommended to replace the water drain screw and vent screw by suitable valves. It is advisable to use a suitable acid-resistant pump to fill larger radiation chambers via the water drain opening.

If the radiation chamber is filled using a pump, it is advisable to circulate the cleaning solution via the vent opening. This will shorten the cleaning time and improve the results.

7.2 Changing UV lamps



ATTENTION!

The UV lamps should be renewed at the latest when

- the sensor signal approaches the warning threshold provided there are no other causes such as coating formed on the lamp protective tubes or a substantial deterioration in UV transmission;
- the operating period of the UV lamps approaches or exceeds the maximum useful life of the lamps.

Do not touch the glass of the UV lamps with bare hands!

Fingerprints burn into the glass and can cause premature failure. Before fitting the lamps, remove fingerprints with a cloth moistened with alcohol!



WARNING!

- Switch off the master switch or disconnect the power plug before installing and connecting the UV lamps!
- UV-C radiation is harmful to the eyes and skin!
Place the UV lamps into operation only in their installed state!
Install the UV disinfection system in accordance with regulations and instructions before starting up the UV lamps!
- Do not change/modify the lamp connection cables already fitted!
- Do not change/modify the distance between the connector and lamp cover!
Otherwise it will not be possible to ensure that the lamp rests against the closed end of the protective tube. This position, however, is the prerequisite for safe and reliable disinfection!

IMPORTANT!

Clean the protective tubes every time the UV lamps are replaced!

For multi-lamp systems: All UV lamps should be replaced in the event of a lamp failure at the end of the maximum useful life!

Systems without connector on UV lamp cover

- Switch off UV disinfection system with the START/STOP button
- Switch off master switch or disconnect power plug
- Release knurled nut on retaining fixture for UV lamp protective tube by hand
- Pull out UV lamp cover until the connector of the connection cable can be disconnected from the UV lamp
- Completely pull out UV lamp and place to one side

- Check whether the O-ring on the retaining fixture for the protective tube is fitted in the groove and is not damaged, replace damaged seal.
- Insert the new lamp in the protective tube and leave protruding by approx. 100 mm
- Plug in connector on UV lamp

Systems with connector on UV lamp cover

- Switch off UV disinfection system with the START/STOP button
- Switch off master switch or disconnect power plug
- Close shut-off valves upstream and downstream of the radiation chamber
- Release circular plug on lamp cover by turning the knurled nut and disconnect
- Release knurled nut on retaining fixture for lamp protective tube and detach
- Lift lamp cover and completely remove UV lamp
- Unplug UV lamp from connector and place to one side
- Plug in connector at new UV lamp
- The connector can be plugged in only in certain positions, it may be necessary to turn it through 90° before attempting to plug in again
- Check whether the O-ring on the retaining fixture for the protective tube is fitted in the groove and is not damaged, replace damaged seal.
- Insert new UV lamp into protective tube until the UV lamp cover comes to rest against the retaining fixture for the protective tube
- Secure UV lamp cover on retaining fixture for protective tube with knurled nut. Use only very little force to tighten the knurled nut.
- Plug in circular connector at the socket on the UV lamp cover and secure with knurled nut. Use only very little force to tighten the knurled nut.

IMPORTANT!

The connector can be plugged in only in certain positions, it may be necessary to turn it through 90° before attempting to plug in again.

- Completely insert the UV lamp into the protective tube
- Secure lamp cover to retaining fixture for protective tube with knurled nut; hand-tighten knurled nut
- Slowly open shut-off valve upstream of radiation chamber
- Open shut-off valve downstream of radiation chamber (necessary only for manual shut-off valve)
- Switch on master switch or connect power plug

Reset lamp operating hours and switching operations

- With the system switched off press the CHANGE key to display the lamp operating hours and switching operations
- Confirm by pressing the ENTER key – “Enable Code Query” appears in the display
- Enter the enable code and confirm by pressing the ENTER key – “Reset” appears in the display
- Confirm by pressing the ENTER key – the display is now reset



ATTENTION!

Recalibrate the UV-C sensor after installing new UV lamps!

Safe and reliable operation of the UV disinfection system is guaranteed only after recalibration.

7.3 Calibrating UV-C Sensor

The UV-C sensor is calibrated at the factory and does not need recalibration.

IMPORTANT!

- Observe the supplementary instructions for special applications, in which the sensor signal is displayed in %.
- All new UV lamps require a burn-in period of 100 to 200 hours. Therefore, check the warning threshold and the warning threshold approximately 200 operating hours after replacing the UV lamps.

7.4 Replacing Filter Mats

Replacing the filter mats of the fan and air outlet filter



WARNING!
Soiled filter mats of the fan and of the air outlet filter can cause overheating and irreparable damage to the control cabinet.
The filter mats of the fan and of the air outlet filter should be replaced at least once per year. The filter mats should be replaced at shorter intervals under unfavourable ambient conditions.

- Switch off UV system with the START/STOP key
- Switch off master switch
- Remove fan cover. For this purpose, grab the cover with the fingers in the bottom grip recesses and pull off the cover.
- Remove soiled filter mat and fit new filter mat with the white side facing inward (control cabinet side).
- Replace filter mat of the air outlet filter as described above.
- Switch on master switch

7.5 Troubleshooting



CAUTION!
• Only authorised electricians are permitted to perform troubleshooting operations on the opened control cabinet and replace components!

↓

55.0 W/m²

10 h Operation

20 ON/OFF

Warning threshold undershot
Indication: Arrow pointing down

↓↓

40.0 W/m²

Clear flushing

Time 00:11 ■■

Warning threshold undershot
Indication: Two flashing arrows pointing down
The remaining clear flushing time is shown
(2 squares flash instead of the seconds)

Fault

UV sensor

Fault: Warning threshold undershot (after maximum clear flushing time has elapsed)
Error message: UV sensor

- Confirm error message with ENTER key
- Press CHANGE key to assume emergency mode (see 4.3.20)

Emergency mode

UV sensor

Emergency mode: Warning threshold undershot
➤ System continues operating in emergency mode

- | | |
|----------------|---|
| Possible cause | Coating on lamp protective tube |
| Remedy | ➤ Clean lamp protective tube |
| Possible cause | Deterioration of UV transmission of water to be treated |
| Remedy | ➤ Improve water quality |
| Possible cause | UV lamp at end of useful life |
| Remedy | ➤ Install new UV lamps |
| Possible cause | Incorrect lamp current |
| Remedy | ➤ Operate with standard current |
| Possible cause | Sensor not calibrated correctly |
| Remedy | ➤ Recalibrate sensor |

Fault

**xx lamps defective
Lamp #xx**

Fault: Lamp failed
Error message: xx lamp defective

- Confirm error message with ENTER key
- Press CHANGE key to assume emergency mode (see 4.3.20)

Emergency mode

**xx lamps defective
Lamp #xx**

Emergency mode: Lamp failed

- System continues operating in emergency mode

Possible cause

Lamp xx defective

Remedy

- Install new UV lamps

Possible cause

Incorrect lamp current

Remedy

- Operate with standard current

Possible cause

Ballast defective

Remedy

- Replace ballast

IMPORTANT!

- **The number of failed UV lamps is indicated.**
- **If more than one UV lamp has failed, the individual lamps can be queried by pressing the UP and DOWN key.**

Fault

Other fault

Error message: Other fault

- Confirm error message with ENTER key

Possible cause

External fault signalling device triggered

Remedy

- Rectify external cause of fault

Possible cause

No external fault signalling device connected and no jumper is connected across the contacts at the fault input

Remedy

- Connect jumper across contact at fault input

Fault

**Mains voltage
too low**

Error message: Mains voltage too low

Cause

The supplied voltage is or was lower than the minimum permissible supply voltage

Remedy

- Check supply voltage

Fault

Bus fault

Error message: Bus fault

Possible cause

Bus connection interrupted

Remedy

- Re-establish bus connection (see "Function and Fault Indicators on Ballast Units")

Possible cause

Power supply not sufficient on one or several ballasts

Remedy

- Check power supply or fine fuse in ballast (only by authorised electrician!)

Possible cause

Ballast defective

Remedy

- Replace ballast (only by authorised electrician!)

Fault

Memory error

Error message: Memory error

Cause
Remedy

The control determined an error in the memory as part of the self-test
➤ Replace control unit (only by authorised electrician!)

Fault

Basic setting

Error message: Basic setting

Cause
Remedy

The control determined an error as part of the self-test
➤ Replace control unit (only by authorised electrician!)

Fault

Lamp current

Error message: Lamp current

Cause
Remedy

Lamp current set outside the permissible limits
➤ Set lamp current within permissible limits (see datasheet)

Function and Fault Indicators on Ballast Units

The three red LEDs on the ballasts serve the purpose of checking function and troubleshooting. All three LEDs light up for approx. 1 second when the supply voltage is applied.

LED "Power Supply" (identification on pc-board "Power")

ON
OFF

Ballast power supply is OK
Although the master switch is on and the power plug is connected
➤ Check power supply (only by authorised electrician!)
➤ Check fine fuse

LED "Lamp" (identification on pc-board "Error")

Flashes for
approx. 1 to 15 sec
ON

Lamp electrodes are preheated before ignition
UV lamp inoperative
The LED goes out by switching the power supply off and on again and comes on again after a renewed ignition attempt
➤ Check lamps

LED "Bus" (identification on pc-board "Tx")

Lights up every 0.1 to 3 sec
Does not light up

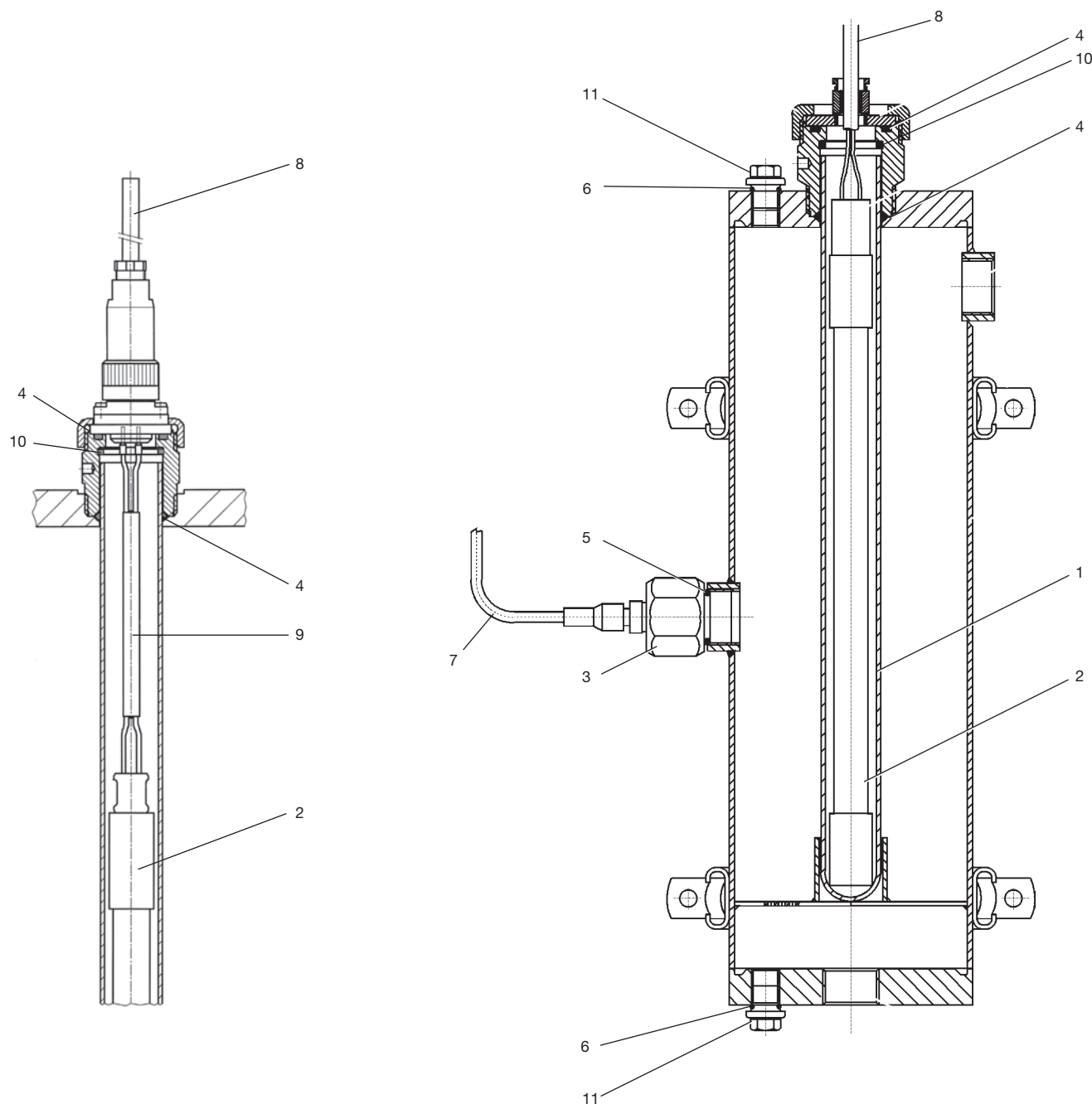
The ballast is addressed by the control.
Although the system is switched on:
The bus connection to the ballast is interrupted or the ballast is defective

IMPORTANT!

Since the data bus is designed as a bus with ring structure, the ballasts following a defective ballast or interrupted data line can no longer be addressed.

8 Annex

Spare parts drawings



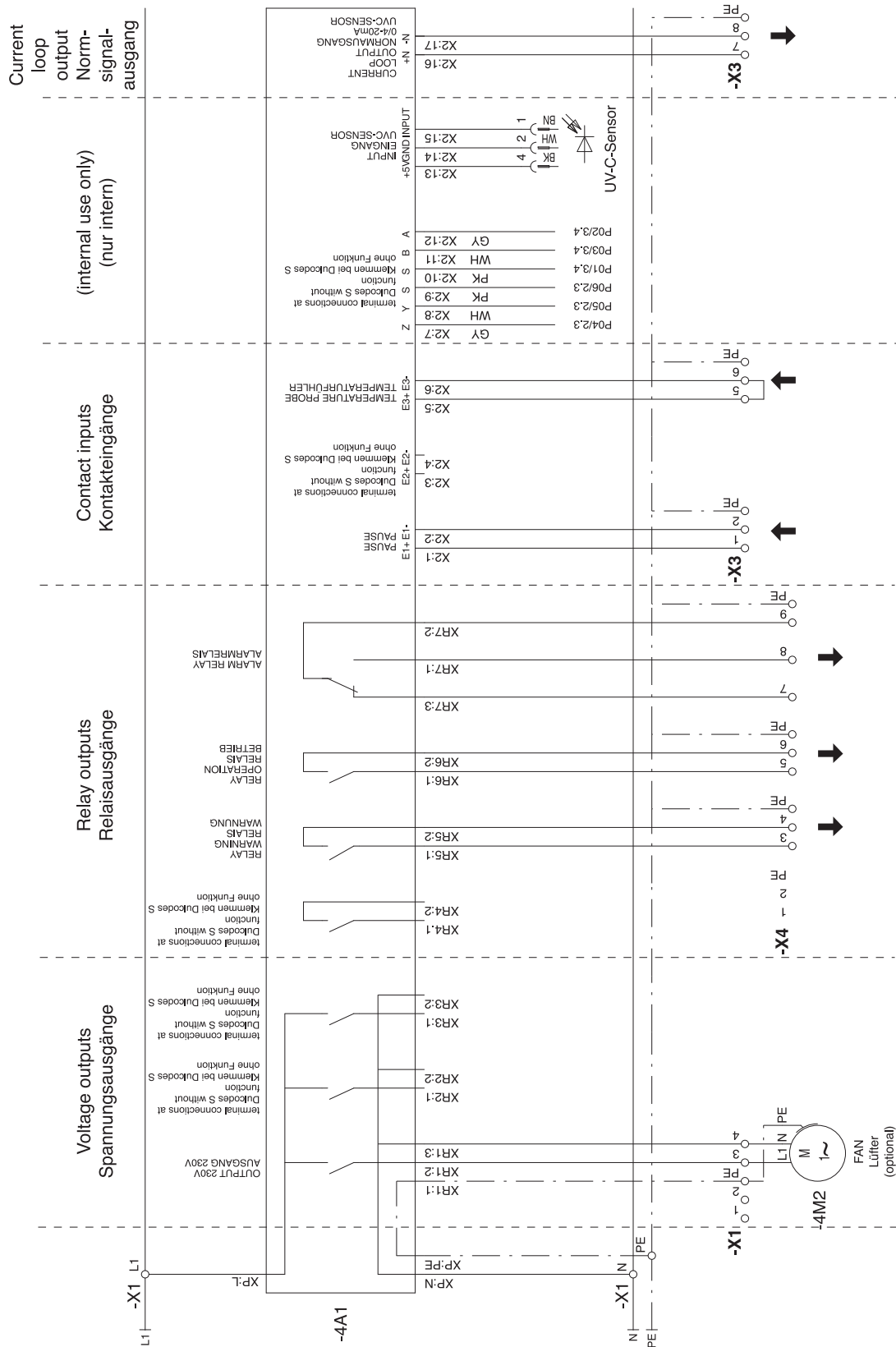
Spare Parts List

No.	Description	Part number	Change interval	Qty.
1	Lamp protective tube d40 x 2 x 100 mm Q for 75 W systems	1020845	As required	1
1	Lamp protective tube d32 x 2 x 600 mm Q for 80 W systems	1002467	As required	1
1	Lamp protective tube d32 x 2 x 900 mm Q for 130 W systems	1002468	As required	1
1	Lamp protective tube d32 x 2 x 1,400 mm Q for 1 x 230 W systems and 1-4 x 230 D	1002469	As required	1
1	Lamp protective tube d32 x 2 x 1,500 mm Q for 2-5 x 230 W systems	1002470	As required	1
1	Lamp protective tube d32 x 2 x 1,600 mm Q for 6-12 x 230 W systems	1002471	As required	1
1	Lamp protective tube 130 K	1006385	As required	1

Spare Parts List

Spare Parts List				
No.	Description	Part number	Change interval	Qty.
2	UV lamp 75 W Long Life	1020911	10,-14,000 h	1
2	UV lamp 80 W High Flux	1002485	8,-10,000 h	1
2	UV lamp 130 W High Flux	1002486	8,-10,000 h	1
2	UV lamp 230 W High Flux	1002487	8,-10,000 h	1-12
3	UVC sensor K gunmetal	1006329	As required	1
3	UVC-U sensor P/D/W/RG 3/4/4571	1028115	As required	1
3	UVC conversation kit abn 80 W from I to U sensor, including sensor, sensor cable and compact control	1029846	As required	1
4	O-ring for lamp protective tube D, W and lamp cover 31.75-3.53 EPDM/P	1004920	Every time the radiation chamber is opened	2
4	O-ring, lamp protective tube K and lamp cover	1006332	Every time the radiation chamber is opened	2
5	O-ring for UV sensor P/D/K/W 22.00-3.00 EPDM/P	1002175	As required	1
6	O-ring for screw plug G 1/4 " 10.82-1.78 EPDM/P	1002754	As required	1
7	2 m sensor cable for U sensor	1029262	As required	1
7	5 m sensor cable for U sensor	1021041	As required	1
7	10 m sensor cable for U sensor	1028063	As required	1
8	3.5 m lamp cable for P, D, K for single lamp system and multiple lamp systems built before 2002	1002770	As required	1
8	3.5 m lamp cable for W, Z, D for multiple lamp systems built after 2002	1017867	As required	1
8	7.5 m lamp cable for multiple lamp systems built after 2002	1024826	As required	1
9	0.2 m lamp cable with flange connection for 2-5 lamp systems	1017837	As required	1
9	0.3 m lamp cable with flange connection for 6-12 lamp systems	1017838	As required	1
10	Teflon ring d 36.9/30.7 x 3 PTFE white	1002751	As required	1
11	Screw plug DIN 910 G 1/4 /71.4571	1002752	As required	1
12	Controller UV-AS 230 V for U sensor	1028113	As required	1
13	Electronic Ballast EVG 60-240 W/CPU/RS 422	731210	As required	1
14	Pin-type face spanner for d45-50	1002764	As required	1
15	Filter mat SK 3322/700, control cabinet ventilation for systems with more than 2 lamps	1004212	1/2-1 year	2

Terminal Connection Diagram – Dulcodes D, K and W



EC Declaration of Conformity

We,

ProMinent ProMaqua GmbH
Maaßstraße 32/1
D - 69123 Heidelberg

hereby declare that, on the basis of its functional concept and design and in the version brought into circulation by us, the product specified in the following complies with the relevant, fundamental safety and health stipulations laid down by EC regulations.

Any modification to the product not approved by us will invalidate this declaration.

Product description : ***disinfection plant Dulcodes and Dulcodes compact***

Product type : ***UVCa...***

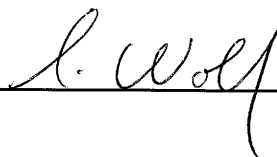
Serial number : ***see type identification plate on device***

Relevant EC regulations :
EC - machine regulation (98/37/EEC)
EC - low voltage regulation (2006/95/EC)
EC - EMC - regulation (2004/108/EC)

Harmonised standards used,
in particular :
EN ISO 12100-1, EN ISO 12100-2
EN 60204-1, EN 60335-1, EN 50106
EN 61000-3-2, EN 61000-4-2/4/5, EN 61000-6-1/2/3/4

National standards and other
technical specifications used,
in particular :

Date/manufacturer's signature : ***26.02.2008***



The undersigned : ***Dr. Andreas Wolf, Executive Vice President***

[illegible]

9 Technical Data



ATTENTION!

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

9.1 Performance Data

Type	Max. flow	Lamp output	Power input	Length of radiation chamber	Minimum clearance for lamp replacement	Ø	Empty weight/ Operating weight	Connector width
	m ³ /h	W	W	mm	mm	mm	approx.. kg	
1x75W**	5.7	75	90	1,115	910	140	12/27	G 1 1/4"
1x80W	5.4*	80	100	630	600	114	8/14	G 1 1/4"
1x130W	8.7*	130	150	940	900	114	10/20	G 2"
1x230W	20.0*	230	250	1,468	1,400	140	24/46	DN 65
2x230W	64.0*	2x230	500	1,640	1,500	220	41/96	DN 125
3x230W	117.0*	3x230	750	1,665	1,500	273	53/138	DN 150
4x230W	184.0*	4x230	1,000	1,690	1,600	324	65/150	DN 200
5x230W	228.0*	5x230	1,200	1,690	1,600	324	70/190	DN 200
6x230W	273.0*	6x230	1,400	1,790	1,600	406	75/200	DN 200
7x230W	369.0*	7x230	1,700	1,920	1,600	406	115/310	DN 250
8x230W	418.0*	8x230	1,900	1,920	1,600	406	115/310	DN 250
9x230W	467.0*	9x230	2,100	1,920	1,600	406	130/320	DN 250
10x230W	514.0*	10x230	2,400	1,920	1,600	406	130/320	DN 250
11x230W	561.0*	11x230	2,600	1,920	1,600	406	130/320	DN 250
12x230W	600.0*	12x230	2,800	1,920	1,600	406	130/320	DN 250

Permissible operating temperatures:

- Water temperature: 5 ... 70 °C; 5 ... 30 °C with Dulcodes 75 W
- Ambient temperature: 5 ... 40 °C

Requirements of the water to be treated:

- Maximum operating pressure: 10 bar*)
- No corrosive or abrasive properties, chloride content < 250 ppm
- No tendency for sedimentation
- Iron: ≤ 50 µg/l; Manganese ≤ 20 µg/l
- Turbidity: ≤ 0,3 FNN



ATTENTION! *)

The maximum permissible operating pressure is possibly lower with systems that have a non-standard design!

10 Electrical Data

Radiation chamber

Lamp type:	High flux 130/230 W	75 W
Lamp current:	normal: 2.0 A maximum: 2.3 A minimum: 1.2 A	non-adjustable

Controller

Nominal voltage:	230 V AC, 50/60 Hz
Fuses:	Micro fuse 5 x 20 mm (250 V AC): Upper fuse (proprietary provision by controller) 0.16 A slow, part no. 712048 Lower fuse (switched mains outputs XR1-XR3): 2.5 A slow, part no. 712033

NOTE

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

Switch cabinet

Inputs

- Contact inputs (-X3:1 ... -X3.6):
for contacts or switching transistors:
Open circuit voltage 5V \pm 0.5 V
Input resistance: 10 kOhm

Outputs

- Voltage outputs (-X1:1 ... -X1.10):
Type of contact: NOC
Load capacity: 250 V AC / 3 A / 100 VA
With inductive loads provide RC protection circuits!
- Relaisausgänge (-X4:1 ... -X4.6):
Kontaktart: Schließer
Belastbarkeit: 250 V AC / 3 A / 100 VA
Bei induktiven Lasten RC-Schutzbeschaltungen vornehmen!
- Alarm relay (-X4:7 ... -X4.9):
Type of contact: Change-over contact
Load capacity: 250 V AC / 3 A / 100 VA
With inductive loads provide RC protection circuits!
- Standard signal output mA (-X3:7 ... -X3.8):
0/4...20 mA, potential-free
Maximum apparent ohmic resistance: 600 Ohm

Anschriften- und Liefernachweis durch den Hersteller /
Addresses and delivery through manufacturer /
Adresses et liste des fournisseurs fournies par le constructeur /
Para informarse de las direcciones de los distribuidores, dirigirse al fabricante:

ProMaqua GmbH
Maaßstraße 32/1
69123 Heidelberg
Germany

Tel.: +49 6221 6489-0
Fax: +49 6221 6489-400

info@promaqua.com
www.promaqua.com