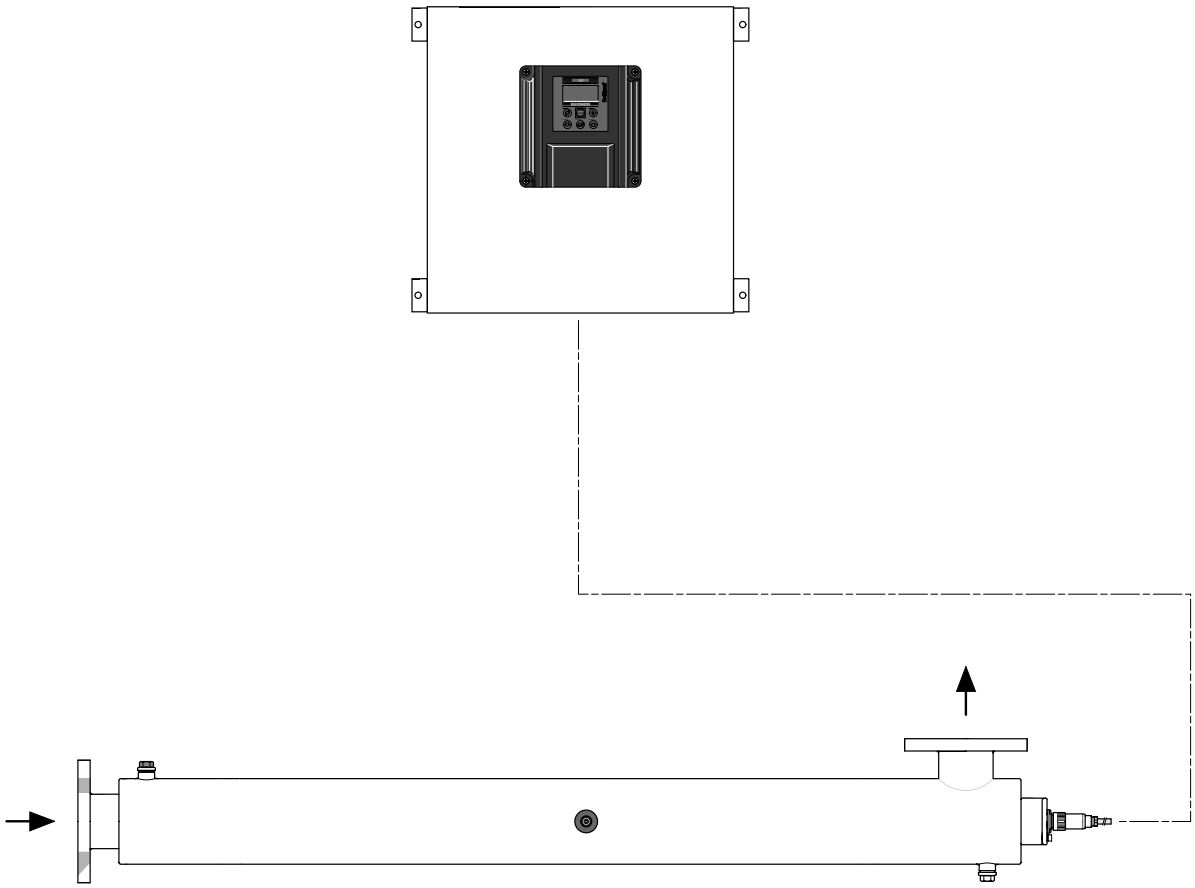
Operating instruction manual

Certified Dulcodes
UV disinfection system



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Read through operating instructions completely before commissioning equipment.
Do not discard. Damage caused by misuse will render the guarantee void.

Publishing details:
Operating instruction manual for certified Dulcodes UV disinfection system

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General instructions for use of this manual

Please read through the following instructions for use of this manual. They will help you get the best use out of this operating instruction manual.

The following are highlighted in the text:

- **Numbered points**

▶ Instructions

Working instructions:

NOTICE

Notices are intended to make your work easier.

and safety instructions:

WARNING

Describes a potentially hazardous situation. If not avoided, could result in fatal or serious injury.

CAUTION

Describes a potentially hazardous situation. If not avoided, could result in slight injury to persons or property.

IMPORTANT

Describes a potentially hazardous situation. If not avoided, could result in damage to property.

1 Application

The Dulcodes UV disinfection systems are used in the disinfection of

- potable water and
- industrial water.

In UV disinfection the water to be disinfected is irradiated with short wave UV light. Known as UV-C radiation, it is a fast, reliable biocidal treatment.

Dulcodes UV disinfection systems are supplied ready for connection.
They are available in different designs, specified by the Identcode.
The performance data can be found in the data sheets supplied with the Dulcodes UV disinfection systems.

Scope of supply

- Radiation chamber
- UV lamps with lamp protection tubes
- Control cabinet with system controller and ballasts
- UV-C sensor
- Operating instruction manual and data sheet

2 Safety instructions

WARNING

- **UV-C radiation is dangerous to the skin and eyes. Lamps must be operated only after installation.**
- **The UV disinfection system must be installed according to regulations before commissioning.**
- **The UV disinfection system must be operated only with manufacturer-approved components (lamps; lamp protection tubes, UV-C sensor etc.).**
- **The UV-C sensor must be installed before the UV disinfection system is started up. If the UV-C sensor is not installed, hazardous UV radiation is emitted by the system.**
- **Check the UV-C sensor at regular intervals and send to the manufacturer every two years for inspection and calibration to guarantee trouble-free disinfection.**
- **To avoid exceeding the maximum admissible flow, fit the max. contact of an external flow meter to the system controller's external fault switch input or install an alternative means to ensure that the maximum admissible flow cannot be exceeded.**
- **The minimum admissible UV transmission of the water to be disinfected may not be exceeded.**
- **If the UV disinfection system is operated for a relatively long period without a water flow, particularly in multiple-lamp systems, the temperature of the water in the radiation chamber should be monitored and the system shut down if the maximum admissible water temperature is reached.**
- **If the water to be disinfected contains suspended solids or turbidity a suitable filter should be fitted upstream from the UV disinfection system.**
- **The admissible operating pressure stated in the accompanying data sheet must not be exceeded.**

NOTICE

- Read the data sheet supplied with the UV disinfection system.

3 Function

The water to be disinfected flows through the stainless steel radiation chamber to the UV lamps. The ultraviolet radiation kills all the bacteria.

The low-pressure UV lamps generate a high yield UV-C radiation of 254 nm wavelength which is particularly effective in disinfection. The lamps are located in lamp protection tubes made of high-quality quartz with high UV transmission.
The compact radiation chamber, the optimised flow and the fitted turbulence generators ensure even radiation of the overall water flow.

A controller monitors the UV disinfection system in conjunction with the UV-C sensor.

Start-up

The lamps are started after switching on the Dulcodes UV disinfection system. In systems with a databus connected to the ballasts, the bus is activated before the lamps are started. Depending on the size of the system, this can take several seconds.
Once started, the lamps take several minutes to reach the operating temperature.

The UV-C sensor monitors the lamps: As soon as the UV-C output has exceeded the minimum irradiance the flushing valve opens for start-up flushing.

The flushing valve also opens if the minimum irradiance is not exceeded within the maximum admissible warm-up time. If the minimum irradiance is not exceeded within the maximum free flushing period the controller switches off the UV disinfection system and registers an error.

The stop valve opens after start-up flushing. The UV disinfection systems returns to normal operation.

Normal operating mode

In normal operating mode the UV-C sensor continues to monitor the UV-C output:

If the UV-C output falls below the warning threshold a warning is given.

If the UV-C output falls below the minimum irradiance the stop valve closes and the flushing valve opens.

If the UV-C output does not rise above the minimum irradiance within the maximum free flushing period the controller switches off the UV disinfection system and registers an error.

The lamp function is constantly monitored. If a lamp fails the stop valve closes, the controller switches off the UV disinfection system and registers an error.

Intermittent flushing

When intermittent flushing is active the flushing valve opens after the maximum idle period for the set intermittent flushing period.

Switching off

When the UV disinfection system is switched off, the stop valve closes and the lamps are turned off. If the lamp afterburn is required the lamps are turned off after the lamp afterburn period.

4 Controller

Version

Since the electronics and software are subject to constant improvement, the version number is included as an identification feature. This should be quoted in the event of complaint. You can call up the version number on the display.

Default settings

The Dulcodes UV disinfection system controller is pre-set at the factory. For many applications, therefore, you need only set the warning and safety thresholds when commissioning. It is also recommended that you set the analogue sensor signal output in accordance with the accompanying data sheet to ensure that the trend displays are correct.

NOTICE

- Changes to settings can be carried out only when the UV disinfection system is switched off. Exceptions: sensor calibration and lamp current settings.

4.1 Display

The system is provided with a graphical display.

Operating mode When operating mode display is active, warnings are shown by flashing arrows and messages and errors are indicated by flashing error signals.

Programming mode In programming mode the flashing numerical values or details are variable.

NOTICE

- The display returns to the normal display of the operating mode 5 minutes after the last keystroke.

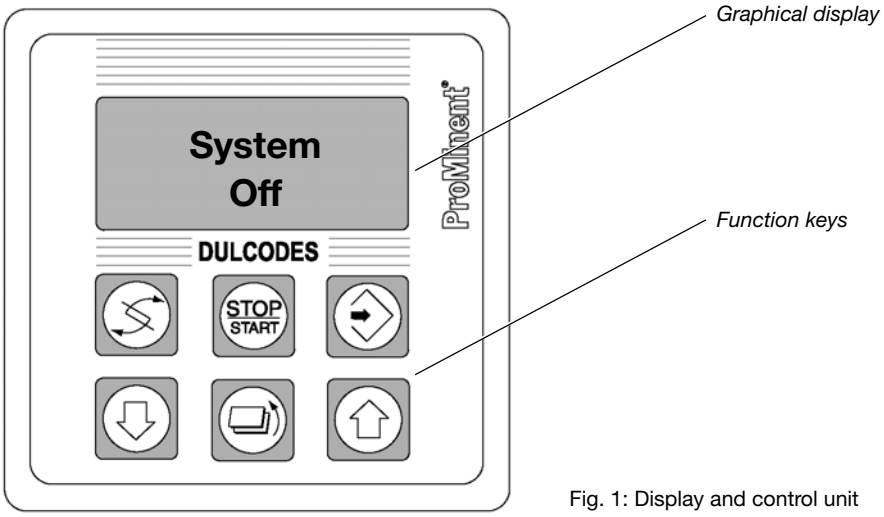


Fig. 1: Display and control unit

4.2 The operating controls

START/STOP 

Switches UV disinfection system on or off

CHANGE 
In operating mode: The display window switches
to programming mode: change variable parameters

BACK 
Back one level within a particular menu

DOWN 
In programming mode: Reduce displayed numerical value
Change an entry

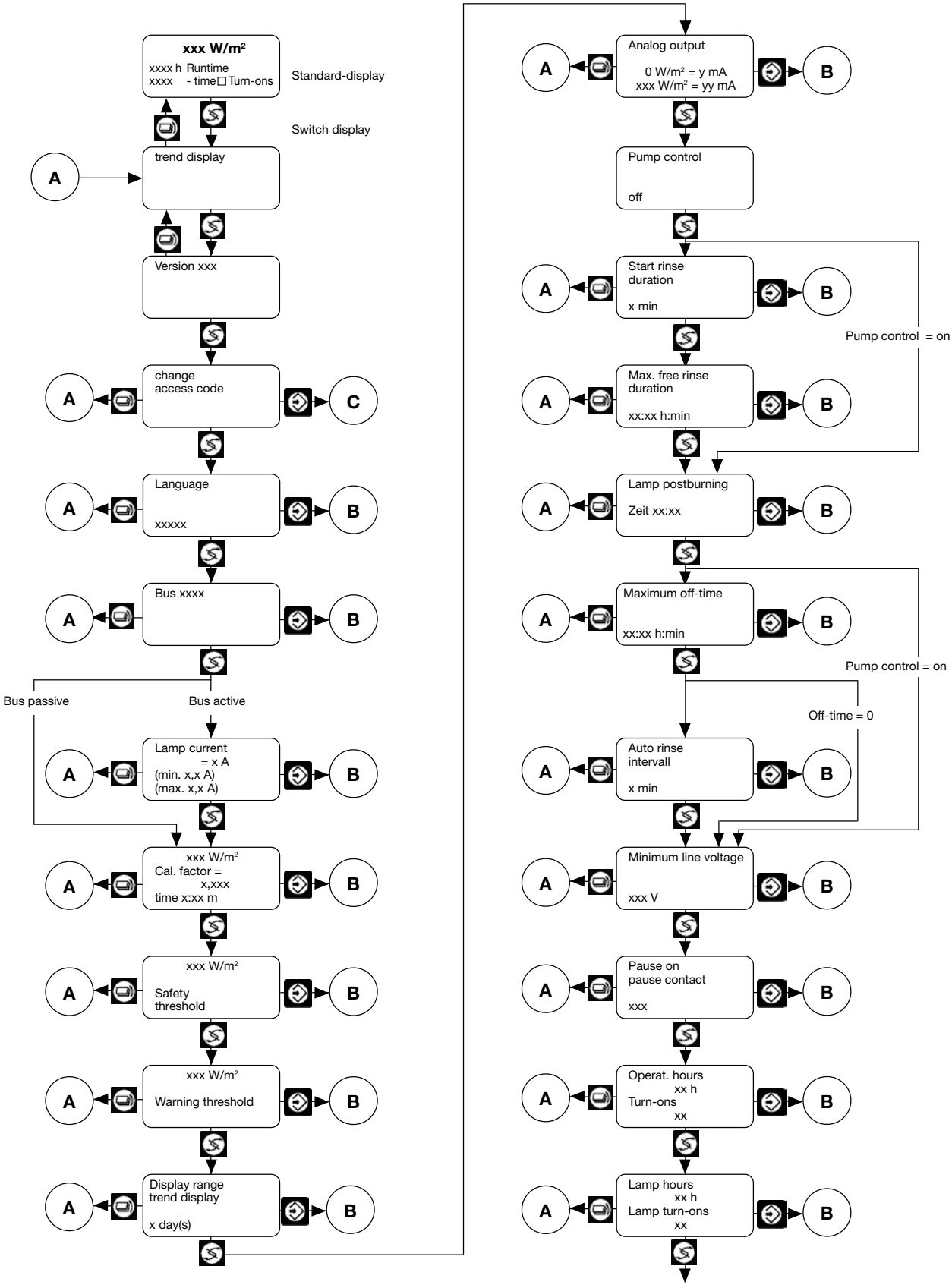
UP 
In programming mode: Increase a displayed numerical value
Change an entry

ENTER 
In operating mode: Switch to programming mode
Acknowledge a fault
in programming mode: Accept a new value or change mode.

NOTICE

- Hold down start/stop button for at least 2 sec. The display returns to the normal display of the actual operating mode 5 minutes after the last keystroke.

4.3 Operating status displays and parameter settings

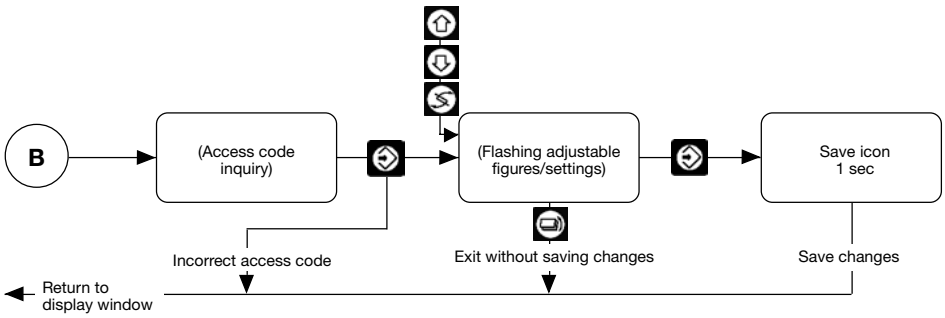


A Return to trend display

B Switch to programming mode

C Switch to “Change access code” mode

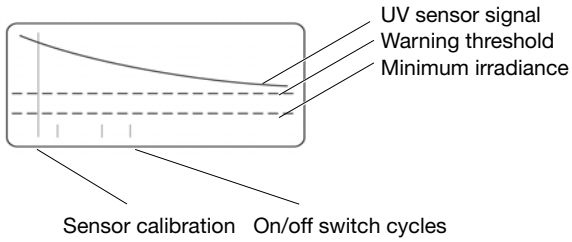
Programmieranleitung



NOTICE

- Once you have entered the correct access code it will not be necessary to re-enter the code during subsequent programming operations. The flashing numerals/settings appear as soon as you press the ENTER button.
- Access is automatically cancelled 5 min. after the last keystroke and/or after a return to the trend or standard display.

4.3.1 Trend displays



The trend display enables the user to track lamp aging, deposition on the protective lamp tubes and changes in the water quality.

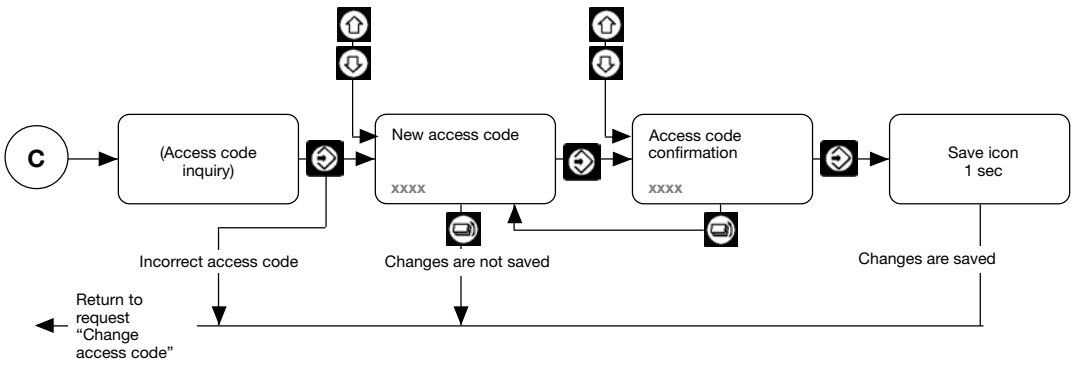
The progress of the UV sensor signal is displayed in a time window. Horizontal lines show the minimum irradiance and the warning threshold. The short vertical dashes indicate each UV disinfection system switch cycle. The UV sensor signal display range is between 0 W/m² and the value assigned to the 20 mA analogue output value (see 4.3.10). The time window is adjustable (see 4.3.7) and guarantees a current display: After the set time has expired, the earliest value is deleted and the new value is displayed.

NOTICE

- Each time you recalibrate the UV-C sensor a solid vertical line is shown in the trend display.
- The contents of the trend display are deleted when you alter the display range or reset the operating hours counter.

4.3.2 Changing access code

The system controller programming mode is protected by an access code to prevent unauthorised changes to the settings. The access code can be selected by the operator. Programming mode remains locked after the access code is changed. Access is enabled only after entry of the new access code.



NOTICE

- Make a note of the access code. Settings can be changed only after entry of the correct access code.
- The preset access code does not guarantee protection from unauthorised changes.

Default setting 5000

4.3.3 Language setting

Language

German

You can choose from a selection of language options:
German, English, French, Spanish

Default setting German

4.3.4 Ballast BUS activation / deactivation

Bus passive

Bus active
10 Lamp
EVG#001
EVG-Code

The ballasts for the Opti-Flux lamps have a BUS-interface. The BUS-interface is used to turn lamps are on and off and monitor their function. It is also possible to change the lamp current. When the BUS is active and the system is switched on, the number of ballasts are displayed. You can call up the serial numbers for individual ballasts using the UP and DOWN keys.

NOTICE

- In UV disinfection systems whose ballasts have a BUS-interface you need to switch the BUS to active. If the BUS is inactive the lamps cannot be started.

Default setting In systems with ballasts using a BUS-interface, active, otherwise inactive

4.3.5 Lamp current setting

Lamp current
= 2 A
(min. 1,2 A)
(max. 2,3 A)

In the case of ballasts with a BUS-interface the user can select the lamp current within a specific range. This makes it possible to adapt the lamps to special operating conditions. The lamp current can also be adjusted in operating and free flushing modes.

The admissible parameters for the lamp current are not monitored when the system is switched off. If lamp current is set outside the admissible parameters the “Lamp current” error message will appear after the system has been switched on and the BUS has initialised.

NOTICE

- The lamps are operated with the standard current, deviation is only feasible and reliable in a few exceptional cases.
- Please find the admissible lamp current range and the standard current in the accompanying data sheet.

IMPORTANT

- **Every time the lamp is operated outside the admissible range premature failure may result**
- **If the lamp current is too high the lamps will overheat and the UV-C output will drop.**
- **If the lamp current is too low the UV-C output will drop significantly.**

Default setting Depends on lamp type.

4.3.6 Inspection and recalibration of the UV-C sensor

WARNING

- **Check the UV-C sensor at regular intervals (calibration certificate).**
- **If the UV-C sensor is removed while the lamps are on UV-C radiation, which can damage the eyes and skin, will be emitted from the sensor window. It is therefore permissible to operate the UV disinfection system with the UV-C sensor removed only when recalibrating the UV-C sensor.**
- **Wear the prescribed safety gear during the inspection and recalibration of the UV-C sensors (safety goggles).**

100 W/m²
Cal.-factor =
0,420
Time 5:00

The UV-C sensor must be inspected with a reference radiometer at least twice a year or every month if flow exceeds 100 m³/h. A DVGW certified reference radiometer is required for the inspection of the UV-C sensor.

Recalibration, if required, must be carried out by manufacturer-authorised personnel.

The calibration factor is protected by its own access code to prevent unauthorised interference. It can be accessed only by manufacturer-authorised personnel.

4.3.7 Setting trend display range

Display range
trend display

100 day(s)

The operator can set the time for which the sensor signal is recorded for the trend display. The value (in days) is interpreted as a time window and thereby guarantees an ongoing display: After the set time has expired, the earliest value is deleted and the new value is displayed.

Default setting 100 days

4.3.8 Minimum irradiance setting

100 W/m²

Safety threshold

If the UV-C output drops so far that the sensor signal falls below the minimum irradiance, safe disinfection is no longer guaranteed. In this case the stop valve closes and/or the feed pump is switched off. The minimum irradiance breach is indicated on the display by two flashing arrows.

The minimum irradiance depends on the system type and the maximum flow through the system and is given on the data sheet that accompanies the system.

An alarm device can be connected to the controller's SAFETY THRESHOLD signal relay. The relay makes contact when the minimum irradiance is breached.

Default setting Depending on the system type.

WARNING

- **Adequate disinfection is guaranteed only when the minimum irradiance is set correctly.**

NOTICE

- The minimum irradiance must be lower than the warning threshold. It cannot be set higher than the warning threshold.

4.3.9 Warning threshold setting

105 W/m²

warning threshold

A warning signal is given if the UV-C output drops so far that the sensor signal breaches the warning threshold. In order to prevent the sensor signal from falling below the minimum irradiance, clean the lamp protection tubes or replace the lamps and/or improve the water quality by suitable means. A flashing arrow on the display indicates that the warning threshold has been breached.

A warning device can be connected to the controller's WARNING THRESHOLD signal relay.

The relay makes contact when the warning threshold is breached. The warning threshold must be higher than the safety threshold and is given in the accompanying data sheet

Default setting Depending on the system type.

4.3.10 Analogue output: sensor signal: allocating standard signal

Analog output

0 W/m² = 0 mA
120 W/m² = 20 mA

The UV-C-sensor signal can be simultaneously plotted with a recorder. The recorder is connected for this purpose to the controller's standard output.

The operator can choose between a standard signal 0 to 20 mA and 4 to 20 mA:
0 and/or 4 mA corresponds to the sensor signal 0 W/m²,
20 mA can be assigned to any value.

NOTICE

- The sensor signal value assigned to 20 mA is simultaneously the maximum value of the trend display.

Default setting 0 W/m² = 0 mA
xxx W/m² = 20 mA (depending on the system type)

4.3.11 Pump controller activation

Pump control

on

The pump controller is activated in order to actuate a feed pump by means of the pump relay.

The pump relay opens when the system is switched off and stays open while the pump controller is off even while the system is running.

If the system is switched on when the pump controller is on the system leaves warm-up mode only when the warning threshold is exceeded. The pump relay then makes contact.

The pump relay contact opens if the system switches off or into pause mode

If the minimum irradiance is breached or a lamp fails the pump relay breaks contact and the system registers an error.

Default setting Off

IMPORTANT

- **The UV disinfection system's radiation chamber must be completely filled with water before operation commences. If the radiation chamber is empty or only partially filled there is a danger that lamps and radiation chamber may be damaged. Ensure, therefore, that the radiation chamber cannot run when empty (pump switched off).**

NOTICE

- Start-up, free and intermittent flushing are not possible when the pump controller is on. The associated program windows are therefore concealed.
  Since the feed pump usually requires a certain ramping down period, the lamp afterburn time must be set to at least a minute.

4.3.12 Start-up rinsing duration setting

Start rinse duration

1 min

The start-up flushing should ensure that only clean water reaches the user. The automatic flushing valve (if present) opens automatically for the start-up flushing once the UV-lamps have reached the operating temperature and the sensor signal is above the minimum irradiance. The stop valve opens at this point.

NOTICE

- In most cases, a 1 min. start-up flushing period is sufficient. If there is no flushing valve the start-up flushing period can be set to 0 min.

Default setting 1 min

4.3.13 Maximum free rinsing duration setting

Max. free rinse duration

00:01 h:min

Free flushing is usually carried out in potable water disinfection. Maximum free flushing periods of more than 10 hours are common in these cases. After e.g. heavy rainfall in water with minimal natural filtration properties, UV transmission is considerably reduced. If the UV-C-sensor signal falls below the minimum irradiance, the stop valve closes and the flushing valve opens. Once the water quality improves, the UV disinfection systems reverts to normal operating mode. If the UV-C-sensor signal does not rise above the minimum irradiance within the maximum free flushing period, the UV disinfection system registers an error.

Default setting 1 min

4.3.14 Lamp postburning setting

Lamp postburning

Off

In large UV disinfection systems for potable water disinfection it can sometimes take some time for the stop valve to close or for the water flow to be limited in another way. In this case the lamp afterburn prevents impure water from reaching the user while the UV disinfection system is shutting down. A 1 min. afterburn time is usually sufficient.

Default setting off

4.3.15 Idle and intermittent rinsing time setting

Maximum off-time

00:00 h:min

Auto rinse interval

0 min

Idle flushing is generally used with private potable water supplies. UV disinfection systems for private water supplies can go for long periods without water being drawn. Idle flushing is recommended in order to avoid inadmissible heating and irradiation of the water

If a flow meter is attached to the controller's FLOW switch input, whose contact closes when the flow drops below a minimum value, the flushing valve opens for the intermittent flushing time if no water has been drawn within the maximum idle time.

If there is no flow meter attached to the controller's FLOW switch input, i.e. the switch input is open, the flushing valve opens after the maximum idle time for the interval time (periodic flushing).

In most cases the maximum idle time is set to 5 hours. A 1 minute interval time is normally sufficient.

If the maximum idle time is set to 00:00 there is no intermittent flushing.

Default setting 00:00 h:min
1 min

4.3.16 Minimum line voltage setting

Minimum line voltage

180 V

The supply voltage monitor prevents an uncontrolled failure of the UV disinfection system and the lamps due to low supply voltage. If the supply drops to the minimum value the controller switches to low voltage mode and the system is switched off. If the supply rises above the admissible minimum value again, the system automatically recommences operation.

IMPORTANT

- **You must consult the manufacturer before attempting to change the minimum supply voltage.**

Default setting 180 V

4.3.17 Pause function

Pause on pause contact

closed

The UV disinfection system can be started and stopped by opening and closing an external contact which is connected to the controller
The operator chooses whether the UV disinfection system commences operation when the pause contact is open or closed.

Default setting Default setting Pause when pause contact is closed,
UV disinfection system commences operation when pause contact is open

4.3.18 Counters: display/reset

Operat. hours
400 h
Turn-ons
25

The OPERATING HOURS and SWITCH Turn-ons counters cannot be reset.
The LAMP HOURS and LAMP SWITCH Turn-ons can be reset.

Lamp hours
400 h
Lamp turn-ons
25

4.3.19 Alarm warning relay

A warning device can be attached to the ALARM warning relay.
The relay opens contact in the event of a fault or power failure.

4.3.20 Switch input: external fault

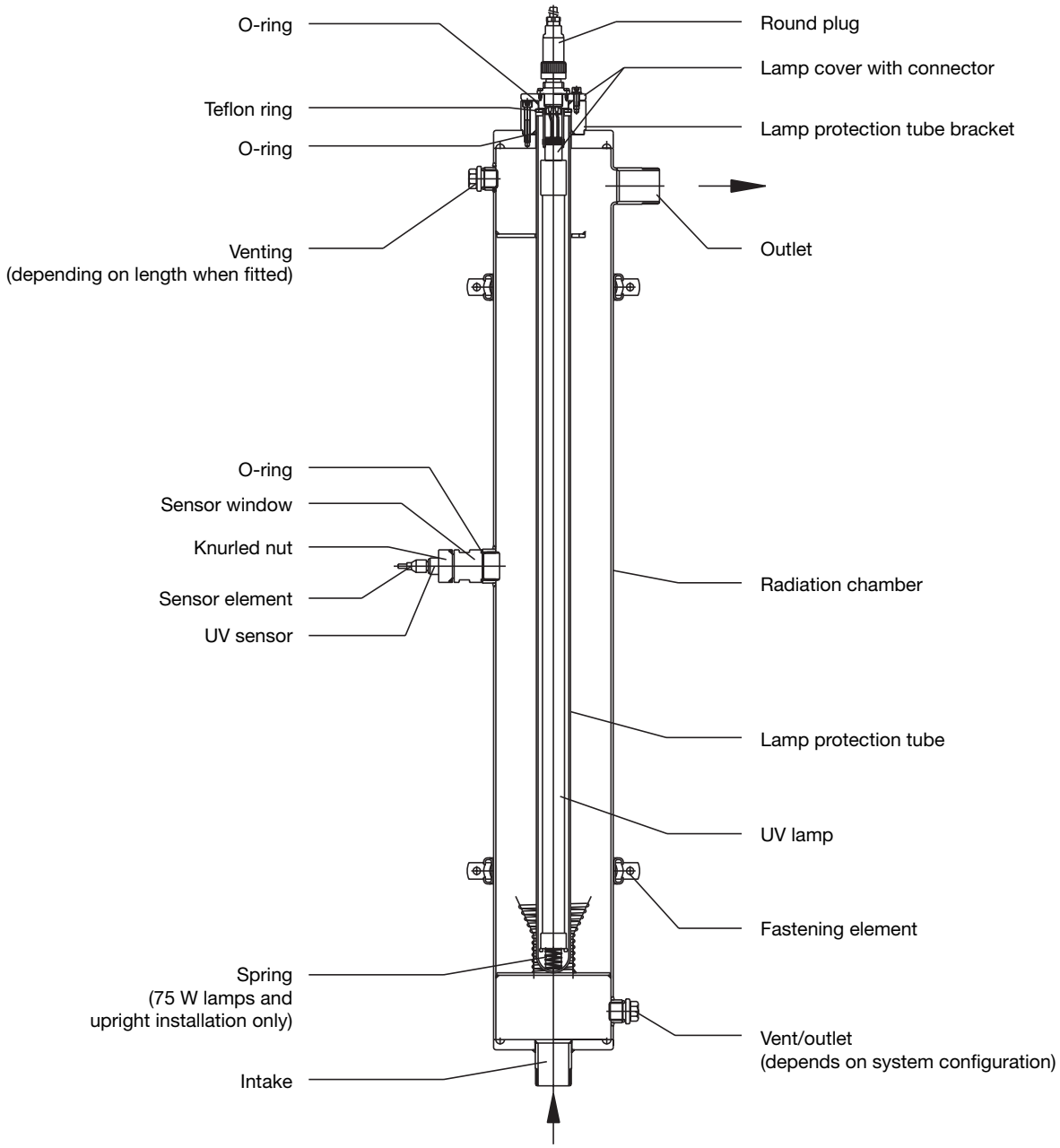
A fault indicating device with a voltage free contact output can be connected to the External Fault switch input. As soon as the fault indicating device contact output opens, the UV disinfection system switches off and registers an error.

A flow meter with a voltage free contact output (relay) is required to monitor the maximum admissible flow. The contact must open when the maximum admissible flow is exceeded.

Particularly multiple lamp systems may require a temperature monitor in order to prevent the system from overheating if the water flow is interrupted for a long period. In most cases this means a contact thermostat with a voltage free contact output which opens if the maximum admissible temperature is exceeded.

WARNING

- **To avoid exceeding the maximum admissible flow, fit the max. contact of an external flow meter to the system controller's external fault switch input or install an alternative means to ensure that the maximum admissible flow cannot be exceeded.**
- **When connecting a flow monitor or other safety device, remove the jumper to the External Fault switch input, otherwise the error will not be indicated.**
- **When connecting several safety devices, connect signal contacts in series.**


O-ring
Teflon ring
O-ring
Venting
(depending on length when fitted)
O-ring
Sensor window
Knurled nut
Sensor element
UV sensor
Spring
(75 W lamps and
upright installation only)
Intake
Round plug
Lamp cover with connector
Lamp protection tube bracket
Outlet
Radiation chamber
Lamp protection tube
UV lamp
Fastening element
Vent/outlet
(depends on system configuration)

5 Assembly and installation

Please note the following safety instructions before installing this equipment:

WARNING

- **To avoid exceeding the maximum admissible flow, fit the max. contact of an external flow meter to the system controller's external fault switch input or install an alternative means to ensure that the maximum admissible flow cannot be exceeded.**
- **Do not exceed the minimum admissible UV transmission of the water to be disinfected.**
- **Do not exceed the maximum admissible operating pressure of the radiation chamber.**
- **If the UV disinfection system is operated for a relatively long period without a water flow, particularly in multiple-lamp systems, the temperature of the water in the radiation chamber must be monitored and the system shut down if the maximum admissible water temperature is reached.**

The maximum admissible flow depends on the system type and the UV transmission of the water to be disinfected and is given in the accompanying data sheet.

IMPORTANT

- **The installation location must be dry and frost proof. The UV disinfection systems must be protected from chemicals, dyes and fumes.**
- **The ambient temperature and the radiated temperature in the immediate vicinity may not exceed 40 °C.**

NOTICE

- Despite the use of modern lamp ballasts which start lamps gently, the UV disinfection system must be operated in such a way as to avoid starting the lamps frequently.

5.1 Radiation chamber

The radiation chamber design can be found in the accompanying data sheet: Vertical wall mounted version, horizontal version or upright version.

5.1.1 Assembly

IMPORTANT

- **The equipment must be assembled only as specified in the accompanying data sheet.**
- **Allow sufficient space for maintenance access. The space required is given in the accompanying data sheet.**

Vertical wall mounting: ▶ Attach the radiation chamber to the wall or a suitable structure using the fixing materials supplied.

Horizontal: ▶ Attach the radiation chamber horizontally to the wall or a suitable structure using the fixing materials supplied.

Upright: ▶ Place the radiation chamber on the floor.

5.1.2 Applying the warning sign

NOTICE

- Affix the self-adhesive warning sign provided to the radiation chamber where it can be clearly seen.

5.1.3 Connections, hydraulic

WARNING

- **The feed pump switches off automatically when a system fault occurs. If this does not stop the water flow you should fit an automatic stop valve downstream from the radiation chamber and connect it to the stop valve output on the UV controller. The stop valve must close automatically in order to stop the water flow even after a power failure.**

IMPORTANT

- **The hydraulic connection of the radiation chamber must comply with the applicable general regulations and the local installation directives.**
- **Use UV-resistant material for hydraulic connections. If using PVC, expect the PVC colour to fade in the vicinity of the connection. In some cases it may also become brittle.**

NOTICE

- Fit valves up and downstream from the radiation chamber to isolate the radiation chamber during maintenance work.
- Fit suitable sample taps up and downstream from the radiation chamber for microbiological sampling.

5.2 Control cabinet and controller

5.2.1 Assembly

▶ Fix the control cabinet to the wall or a suitable structure, ensuring that the lamps and the sensor can be connected to the cables provided.

IMPORTANT

- **You may not extend the lamp connection cable or the sensor cable**

5.2.2 Connections, electrical

WARNING

- **The electrical installation must be carried out by an authorised electrical technician.**
- **The applicable general regulations and local installation directives must be complied with.**
- **Carry out all assembly tasks while the equipment is disconnected from the power supply.**
- **Connect the ground lead to the radiation chamber.**

5.3 Assembly of lamp protection tubes

IMPORTANT

- **Investigate the lamp protection tubes for damage prior to installation. Do not fit damaged lamp protection tubes.**

▶ Unfasten fixing screws for the lamp protection tube brackets using the socket wrench provided and remove the lamp protection tube brackets

▶ Push the O-ring provided approx. 40 mm over the open end of the lamp protection tube

▶ Insert the lamp protection tube into the radiation chamber

IMPORTANT

- **Make sure that the lamp protection tube is seated correctly.**
- **The lamp protection tube may project no more than 30 mm and must not be slanted.**
- **Canting the lamp protection tube at assembling can cause it's damage.**

▶ Check that the Teflon ring is located in the groove provided in the lamp protection tube bracket. If not, push the Teflon ring into the lamp protection tube bracket until it locates in the groove provided

▶ Push the lamp protection tube bracket over the lamp protection tube and twist until the guide pin engages. Screw in the fastening screws with the socket wrench provided and even tighten.

5.4 Assembly and connection of the lamps

WARNING

- **Switch off at the main switch or pull out the mains plug prior to assembly and connection of the lamps.**
- **Lamps must be operated only after installation. UV-C radiation is dangerous to the skin and eyes.**
- **The UV disinfection system must be installed according to regulations before commissioning the lamps.**

IMPORTANT

- **Do not touch the lamp glass with bare hands. Fingerprints burn into the glass and can lead to premature failure. Remove fingerprints prior to assembly with a cloth soaked in alcohol.**

NOTICE

- In upright systems, attach the connector plug with the lamp shield to the lamp before inserting the lamp into the lamp protection tube.

▶ Place the O-ring in the groove on the lamp protection tube

▶ Insert lamp into the lamp protection tube and allow to project approx. 100 mm

▶ Plug connector plug with lamp shield into the lamp

▶ Insert lamp fully into the lamp protection tube.

▶ Place lamp shield onto the lamp protection tube bracket and twist until the lamp shield engages with the guide pin. Screw in the fastening screws with accompanying socket wrench and secure.

▶ Plug the round plug with lamp connection cable into the socket on the lamp shield and fasten with the knurled nut.

5.5 Assembly and connection of the sensor window and of the UV-C sensor

WARNING

- **The UV-C sensor must be installed before commissioning UV disinfection system. If the UV-C sensor is not installed, hazardous UV radiation is emitted by the system from the sensor window.**
- **The UV-C sensor may be removed while the system is running only for the purpose of recalibration and inspection of the sensor with a reference sensor and only by a manufacturer-authorised technician.**

▶ Place the O-ring in the corresponding groove in the sensor window

▶ Screw the sensor window by hand into the 1" threaded socket

▶ Secure the sensor window with an open-ended wrench; use minimum force.

▶ Insert the UV-C sensor fully into the sensor window and secure with the knurled nut; use minimum force

▶ Attach the sensor connection cable to the sensor connector and secure with the knurled nut

6 Start-up

WARNING

- **The UV disinfection system must be mounted and installed according to regulations prior to start-up.**
- **If the pipework downstream is fouled, disinfection will be required after start-up (e.g. super-chlorination).**

6.1 Leak check and radiation chamber venting

▶ Open the vent valve on the radiation chamber
▶ Slowly open the stop valve upstream from the radiation chamber
▶ Fill the radiation chamber until water emerges from the vent valve
▶ Close the vent valve.
▶ Check radiation chamber seals
▶ Open the stop valve downstream from the radiation chamber (only necessary with manual stop valve)

6.2 Checking the controller programming

WARNING

- **The minimum irradiance depends on the system type and the maximum flow through the system and can be found on the data sheet supplied with the system. Safe disinfection is guaranteed only when the minimum irradiance is set correctly.**

IMPORTANT

- **Turn on the power switch and/or plug in at the supply only once the radiation chamber is filled with water.**
- **Check whether the lamps are being operated at the standard lamp current.**

▶ Turn on power switch and/or plug in supply plug
▶ The controller must now indicate system off. If not, switch off the system by pressing the START/STOP button for 2 sec.
▶ Press the Change display key several times (see 4.3) to check the programming.
▶ Check in particular whether the minimum irradiance is set in accordance with the details in the accompanying data sheet.

NOTICE

- A warning threshold which has not been set in accordance with the data sheet will result in a premature or a delayed warning signal.
- An analogue output sensor signal that has not been set in accordance with the data sheet will result in an inaccurate trend display.

6.3 Switching on disinfection system

▶ Switch on the UV disinfection system with the START/STOP button; Hold down the START/STOP button for at least 2 seconds
▶ If the controller switches to PAUSE mode, actuate the pause switch

It may take a few minutes from the lamps being started to reach the full UV output.

7 Maintenance

Maintenance of the UV disinfection system involves the following tasks:

- Inspection of the UV-C sensor at regular intervals with a reference radiometer (every six months, every month if flow exceeds 100 m^3/h).
- Cleaning the lamp protection tubes and the UV-C sensor window (as required).
- Replacing the lamps (at least after the maximum lamp service life).
- Inspection and calibration of the UV-C sensor at regular intervals.
- Replacing the filter gauzes in the fan and fan exhaust filter in the control cabinet (at least after one year).

A daily operating log should be kept as documentation. You will find a template in the appendix.

WARNING

- **The UV disinfection system must be operated only with manufacturer-approved components (lamps; lamp protection tubes, UV-C sensor etc.) to guarantee problem-free disinfection.**
- **The UV lamps must be changed at least after the maximum admissible service life.**
- **Check the UV-C sensor at regular intervals to guarantee trouble free disinfection.**
- **Unplug at the supply or switch off with the power switch prior to all maintenance work.**
- **Depressurise the radiation chamber prior to all maintenance work.**
- **UV-C radiation is dangerous to the skin and eyes. Lamps must be operated only after installation.**
- **The UV disinfection system is to be installed according to regulations before commissioning the lamps.**
- **Soiled filter gauzes in the fan and the exhaust air filter can cause overheating and lead to irreparable damage to the control cabinet.**

7.1 Checking the UV-C sensor

WARNING

- **If the UV-C sensor is removed when the lamps are started, UV-C radiation, which can damage the eyes and skin, will be emitted through the sensor window. It is therefore permissible to operate the UV disinfection system with the UV-C sensor removed only when inspecting and recalibrating the UV-C sensor.**
- **Wear the prescribed safety gear during the inspection and recalibration of the UV-C sensor (safety goggles).**

The UV-C sensor must be inspected with a reference radiometer at least twice a year or every month if flow exceeds 100 m^3/h.

NOTICE

- A DVGW certified reference radiometer is required for the inspection of the UV-C sensor.
- If the sensor window is likely to become fogged you will need a lint-free paper towel and tweezers to remove condensation from the sensor window.
- The UV-C sensor is inspected while the system is running.
- A stable sensor signal is required before the UV-C sensor can be inspected. The UV lamps should therefore be operating at least half an hour before the start of the inspection.

▶ Press the CHANGE key several times until the sensor calibration display appears (see 4.3.6).

▶ Warning and safety threshold monitoring ceases for the duration of the checking after entering the access code and pressing the ENTER key. After the displayed time has passed, warning and safety threshold monitoring is automatically reactivated.

NOTICE

- Reset the UV-C sensor before the end of the checking period, otherwise the system registers an error.
- Before inserting the UV-C sensor or the tip of the reference radiometer sensor, always check whether the sensor window is fogged. If so, wipe dry with a lint-free cloth.

▶ Make a note of the lamp strengths displayed by the controller
▶ Unfasten the union nuts and remove the UV-C sensor
▶ Insert the tip of the reference radiometer sensor into the sensor window
▶ Record the radiation intensity measured by the reference radiometer
▶ Remove the tip of the reference radiometer sensor
▶ Insert the UV-C sensor into the sensor window
▶ Tighten the union nuts
▶ Record the radiation intensity displayed by the controller

If the radiation intensity displayed on the controller varies by more than ± 5 % from the intensity indicated by the reference radiometer have the sensor recalibrated by an authorised person.

7.2 Cleaning the lamp protection tubes

The lamp protection tubes may pick up deposits e.g. of iron, manganese or calcium during operation. As these deposits absorb ultraviolet radiation they must be removed at regular intervals.

NOTICE

- Cleaning should be carried out at the latest when the sensor signal falls below the warning threshold as long as this is not traceable to other causes such as lamp aging or severe deterioration of the UV-transmission.

Annual cleaning of the lamp protection tubes when the lamps are being replaced is sufficient for the majority of UV disinfection systems. Be sure to clean all lamp protection tubes in multiple lamp systems. Clean the lamp protection tubes either by dismantling them or by filling the radiation chamber with a detergent solution. Cleaning is ideally carried out using acids such as dilute phosphoric acid or citric acid or dilute nitric acid.

WARNING

- **Read the safety data sheet for the selected detergent.**
- **Wear the prescribed safety gear when cleaning (safety goggles, safety gloves).**

CAUTION

- **Do not use corrosive or stress fracture-causing acids e.g. hydrochloric acid.**
- **Take care not to allow detergent solution to enter the lamp protection tubes.**
- **Take care when cleaning UV disinfection systems that detergent solution does not enter the pipework.**

NOTICE

- Dispose of spent detergent solution in accordance with the applicable guidelines and statutory regulations.

Variant 1: Dismantling the lamp protection tubes

- ▶ Switch off the UV disinfection system with the START/STOP button
- ▶ Turn off power switch and/or unplug from the supply.
- ▶ Close the stop valves up and downstream from the radiation chamber
- ▶ Open the water drainage valve and the vent valve and empty the radiation chamber
- ▶ Release the round plug on the lamp shield by unscrewing the knurled nut and unplug.
- ▶ Slacken the fastening screws on the the lamp shield using the socket wrench provided. Lift off the lamp shield and withdraw the lamp approx. 100 mm.
- ▶ Unplug connection plug with lamp shield from the lamp.
- ▶ Withdraw lamp completely and place on one side.
- ▶ Unfasten fixing screws for the lamp protection tube brackets using the socket wrench provided and remove the lamp protection tube brackets
- ▶ Withdraw the lamp protection tube
- ▶ Remove the O-ring from the lamp protection tube
- ▶ Wash the lamp protection tube with detergent solution or immerse in detergent solution, until all deposits have been removed
- ▶ Rinse the lamp protection tube with clean water and dry with a soft cloth

IMPORTANT

- **Investigate the lamp protection tube for damage prior to installation. Do not re-install a lamp protection tube if damaged.**

- ▶ Check O-ring for damage and replace if necessary
- ▶ Push the O-ring provided approx. 40 mm over the open end of the lamp protection tube
- ▶ Insert the lamp protection tube into the radiation chamber

IMPORTANT

- **Make sure that the lamp protection tube is seated correctly. The lamp protection tube may project no more than 30 mm and must not be slanted.**

- ▶ Push the lamp protection tube bracket over the lamp protection tube and twist until the guide pin engages. Screw in the fastening screws with accompanying socket wrench and secure.
- ▶ Assemble and connect the lamps as described in 5.4.

Cleaning UV-C sensor

You need to clean the UV-C-sensor whenever you clean the lamp protection tubes:

WARNING

- **The UV-C sensor must be installed before commissioning UV disinfection system. If the UV-C sensor is not installed, hazardous UV radiation is emitted from the sensor window.**

- ▶ Loosen the sensor connection cable by unscrewing the knurled nut and remove
- ▶ Unscrew sensor and sensor window from the threaded bush using an open-ended wrench
- ▶ Clean the quartz window with a cloth soaked in detergent solution until the deposits have been completely removed
- ▶ Rinse the quartz window with clean water and dry with a soft cloth
- ▶ Check O-ring for damage and replace if necessary
- ▶ Screw sensor window and sensor by hand into the 1" threaded bushing
- ▶ Tighten sensor window with an open-ended wrench; use minimum force
- ▶ Attach the sensor connection cable to the sensor connector and secure with the knurled nut
- ▶ Close the water drainage valve
- ▶ Slowly open the stop valve upstream from the radiation chamber
- ▶ Fill the radiation chamber until water emerges from the vent valve
- ▶ Close the vent valve
- ▶ Open the stop valve downstream from the radiation chamber (only necessary with manual stop valve)
- ▶ Check radiation chamber seals
- ▶ Turn on power switch and/or plug in at the supply

The UV disinfection system is once more ready to operate.

Variant 2: Detergent solution:

Clean the lamp protection tubes by filling the radiation chamber with a detergent solution

- ▶ Turn off the UV disinfection system with the START/STOP button
- ▶ Turn off power switch and/or unplug from the supply
- ▶ Close the stop valves up and downstream from the radiation chamber
- ▶ Open the water drainage valve and the vent valve
- ▶ Empty radiation chamber
- ▶ Close the water drainage valve
- ▶ Fill radiation chamber with detergent solution via the vent valve
- ▶ Allow detergent solution to work for at least 20 minutes
- ▶ Open water outlet valve
- ▶ Empty radiation chamber and dispose of detergent solution according to regulations
- ▶ Rinse radiation chamber thoroughly with clean water, until all traces of the detergent solution have gone
- ▶ Close the water drainage valve
- ▶ Slowly open the stop valve upstream from the radiation chamber
- ▶ Fill the radiation chamber until water emerges from the vent valve
- ▶ Close the vent valve
- ▶ Open the stop valve downstream from the radiation chamber (only necessary with manual stop valve)
- ▶ Check radiation chamber seals
- ▶ Turn on power switch and/or plug in at the supply

The UV disinfection system is once more ready to operate.

NOTICE

- For larger radiation chambers we recommend filling via the water drainage opening using a suitable acid-resistant pump.
- If you fill the radiation chamber with a pump it makes sense to re-circulate the detergent solution via the vent opening. This reduces the cleaning time and give better results.

7.3 Changing the lamps

Replace UV lamps at the latest

- when the sensor signal approaches the minimum irradiance, if this is not traceable to other causes such as deposits building up on the lamp protection tubes or a severe deterioration of the UV transmission;
- when the lamp operating duration approaches and/or exceeds the maximum lamp service life.

WARNING

- **Turn off at the power switch or unplug from the supply prior to assembly and connection of the lamps.**
- **UV-C radiation is dangerous to the skin and eyes. Lamps must be operated only after installation.**

IMPORTANT

- **Do not touch the lamp glass with bare hands.**
  Fingerprints burn into the glass and can lead to premature failure. Remove fingerprints prior to assembly with a cloth soaked in alcohol.

NOTICE

- Clean the lamp protection tubes every time you change the lamp.
- Dispose of the lamps in accordance with the applicable guidelines and statutory regulations. Disposal usually corresponds with the regulations for used fluorescent tubes.

NOTICE FOR MULTIPLE LAMP SYSTEMS:

- Replace all lamps when one lamp is replaced at the end of the maximum lamp service life.
- Replace all lamps when one lamp is replaced due to aging.
- Always replace defective lamps with new lamps.
- If you replace only a defective lamp, fit the new lamp in the farthest lamp protection tube from the UV-C sensor.
- Replace all lamps when one lamp is replaced towards the end of the maximum lamp service life.

▶ Turn off the UV disinfection system with the START/STOP button
▶ Turn off power switch and/or unplug from the supply.
▶ Close the stop valves up and downstream from the radiation chamber
▶ Release the round plug on the lamp shield by unscrewing the knurled nut and remove.
▶ Slacken the fastening screws on the the lamp shield using the socket wrench provided. Lift off the lamp shield and withdraw the lamps approx. 100 mm.
▶ Unplug connector with lamp shield from the lamp.
▶ Withdraw lamp completely and place on one side.
▶ Check that the O-ring on the lamp protection tube bracket is located in the corresponding groove and is not damaged. Always replace damaged seals.

NOTICE

- In upright systems, attach the connector plug with the lamp shield to the lamp before inserting the lamp into the lamp protection tube.

▶ Insert lamp into the lamp protection tube and leave approx. 100 mm projecting
▶ Attach the connector with lamp shield to the lamp
▶ Insert lamp fully in the lamp protection tube.
▶ Place lamp shield onto the lamp protection tube bracket and twist until the lamp shield engages with the guide pin. Screw in the fastening screws with accompanying socket wrench and secure.
▶ Plug the round plug with lamp connection cable into the socket on the lamp shield plug and fasten with the knurled nut.
▶ Slowly open the stop valve upstream from the radiation chamber
▶ Open the stop valve downstream from the radiation chamber (only necessary with manual stop valve)
▶ Turn on power switch and/or plug in at the supply

Reset lamp hours and lamp-ignitions

▶ When the system is switched off use the CHANGE key to display the lamp hours and reset switch cycles lamp switch cycles
▶ Confirm with the ENTER key, “Request access code” will appear
▶ Enter access code and confirm with the enter key, the “Reset” display appears
▶ Confirm with the ENTER key, the display is then reset

7.4 Recalibrating the UV-C sensor

WARNING

- **Check the UV-C sensor at regular intervals to guarantee trouble free disinfection.**
- **If the UV-C sensor is removed when the lamps are started, UV-C radiation will be emitted through the sensor window which can damage the eyes and skin. It is therefore permissible to operate the UV disinfection system with the UV-C sensor removed only when inspecting and recalibrating the UV-C sensor.**
- **Wear the prescribed safety gear during the inspection and recalibration of the UV-C sensor (safety goggles).**
- **UV-C sensors must be calibrated by manufacturer-authorised personnel or sent to the manufacturer.**

NOTICE

- Document each recalibration.
- A DVGW certified reference radiometer is required for the inspection of the UV-C sensor.
- If the sensor window is likely to become fogged, you will need a lint-free paper towel and tweezers to remove condensation from the sensor window.
- The UV-C sensor is recalibrated while the system is running.
- A stable sensor signal is required before the UV-C sensor can be recalibrated. The UV lamps should therefore be operating at least half an hour before the start of the inspection.
- The calibration factor is protected by its own access code to protect against unauthorised interference. It can be accessed only by manufacturer-authorised personnel.
- The calibration factor is adjustable within the range: 0.8 to 1.2.
- If the UV-C sensor will not calibrate, send it to the manufacturer for inspection and calibration.

▶ Press the CHANGE key several times until the sensor calibration display appears (see 4.3.6).

▶ Warning and safety threshold monitoring ceases for the duration of the checking after entering the access code and pressing the ENTER key. Warning and safety threshold monitoring recommences automatically after the period has expired.

NOTICE

- The UV-C sensor must be reset before the end of the calibration period. The system will otherwise register a fault.
- Before inserting the UV-C sensor or the tip of the reference radiometer sensor, always check whether the sensor window is fogged. If so, wipe dry with a lint-free cloth.

▶ Unfasten the union nuts and remove the UV-C sensor

▶ Insert the tip of the reference radiometer sensor into the sensor window

▶ Make a note of the radiation intensity measured by the reference radiometer

▶ Remove the tip of the reference radiometer sensor

▶ Insert the UV-C sensor into the sensor window

▶ Use the UP and DOWN keys to change the calibration factor displayed by the controller until the controller displays the same radiation intensity as measured by the reference radiometer previously

▶ Confirm the new calibration factor by pressing the ENTER key

▶ To check the calibration remove the UV-C sensor and insert the tip of the reference radiometer sensor into the sensor window again.

▶ Repeat the calibration process if the radiation intensity now measured by reference radiometer deviates more than ± 1 % from the radiation intensity displayed previously by the system.

▶ Remove the tip of the reference radiometer sensor

▶ Insert the UV-C sensor into the sensor window

▶ Tighten the union nuts

7.5 Installing a UV-C sensor that has been checked and calibrated by the manufacturer and/or a new UV-C sensor

WARNING

- **After installing a UV-C sensor that has been checked and calibrated by the manufacturer and/or a new UV-C sensors you should set the calibration factor on the system controller to 1.000 to ensure problem-free disinfection.**
- **If the UV-C sensor is removed when the lamps are started, UV-C radiation will be emitted through the sensor window which can damage the eyes and skin. UV-C sensors must therefore be installed and dismantled when the system is switched off.**

NOTICE

- The calibration factor will not be 1.000 if the UV-C sensor has been recalibrated with the system.
- If the sensor window is likely to become fogged, you will need a lint-free paper towel and tweezers to remove condensation from the sensor window.
- Check whether the sensor window is fogged before installing the new UV-C sensor. If so, wipe dry with a lint-free cloth.

▶ Switch off the system with the START/STOP button
▶ Release the sensor connection cable by unscrewing the knurled nut and remove
▶ Unfasten and take off the union nuts
▶ Remove the UV-C sensor
▶ Insert the new UV-C sensor
▶ Replace the union nuts and tighten
▶ Attach the sensor connection cable to the sensor connector and secure with the knurled nut
▶ Press the CHANGE key on the controller several times to display the sensor calibration (see 4.3.6)
▶ Check whether the calibration factor is 1.000
▶ If the calibration factor is 1.000, you can restart the system with the START/STOP button

If the calibration factor is not 1.000, set the calibration factor to 1.000 prior to starting up the system

▶ Enter the calibration code and confirm with the ENTER key
▶ Use the UP and DOWN keys to set the calibration factor to 1.000
▶ Confirm the calibration factor with the ENTER key
▶ Press the START/STOP button to restart the system

7.6 Exchanging the filter gauzes in the fan and fan exhaust

WARNING

- **Soiled filter gauzes in the fan and the exhaust air filter can cause overheating and lead to irreparable damage to the control cabinet.**

Change the filter gauzes in the fan and the exhaust air filter at least once a year. If ambient conditions demand, you may need to reduce this interval.

- ▶ Switch off the system with the START/STOP button
- ▶ Turn off power switch
- ▶ Remove the fan cover. Insert fingers into the notch on the bottom of the cover and prise off.
- ▶ Remove the soiled filter gauze and insert new gauze with the white side down (control cabinet side).
- ▶ Replace the filter gauze of the exhaust air filter as described above.
- ▶ Turn on power switch

7.7 Removing broken glass or lamps from the radiation chamber

CAUTION

- **UV lamps contain small quantities of mercury. Mercury is harmful to people and the environment. In the event of a lamp breaking you should therefore wear the necessary safety gear (gloves). Dispose of broken lamps in accordance with local directives.**
- **Wear the necessary safety gear (gloves) to protect against cuts when removing broken glass and lamps.**

In the unusual event of a lamp protection tube and / or a lamp breaking while still installed, proceed as follows:

- ▶ Turn the system off at the power switch and/or unplug from the supply
- ▶ Close the stop valves
- ▶ Empty the radiation chamber and dismantle undamaged lamps and lamp protection tubes in accordance with 7.3
- ▶ Remove broken parts of lamps and lamp protection tube through the lamp protection tube opening as far as possible. Place the broken bits into a sealed container or bag
- ▶ Dismantle radiation chamber
- ▶ In systems in which it is possible to remove broken bits via the outlet flange: Turn the system over so that the broken bits drop to the top. Remove bits by hand or using a suitable tool (tweezers, pliers) from the outlet flange or a lamp protection tube opening. (break up larger bits if necessary with a hammer shaft beforehand)
- ▶ In systems in which it is not possible to remove broken bits via the outlet flange: Turn the system upside down and shake to remove broken bits through the lamp protection tube opening. Use a suitable tool if necessary (tweezers, small pliers, screwdriver). Break up larger bits if necessary using a hammer shaft inserted through the outlet flange.
- ▶ Place broken bits into a container or bag, seal and dispose of in accordance with local directives
- ▶ Spray water into the radiation chamber to wash it out thoroughly
- ▶ Inspect the inside of the radiation chamber carefully with an endoscope or mirror for traces of glass. Remove any remaining glass and flush out radiation chamber thoroughly once more.
- ▶ Clean the lamp protection tubes and inspect for damage. Replace damaged lamp protection tubes.
- ▶ Reinstall lamps and lamp protection tubes in accordance with 7.3 and start up system.

7.8 Troubleshooting

WARNING

- **Troubleshooting while control cabinet is open and replacement of components must be carried out by an authorised electrical technician.**

↓ 105 W/m²
10 h Runtime
20 on/off

Signal below warning threshold
Signal: Down arrow

↓ ↓ 100 W/m²
F-rinse
Time 00:11 ■ ■

Signal below safety threshold
Signal: Flashing double down arrow
The remaining free rinsing period is displayed
(2 squares flash in place of seconds)

Fault
UV Sensor

Error: Signal below minimum irradiance (after maximum free rinsing period)
Error signal: UV sensor

▶ Acknowledge error signal with ENTER key

Possible cause Deposit on the sensor window
Remedy ▶ Clean sensor window
Possible cause Deposit on the lamp protection tube
Remedy ▶ Clean lamp protection tube
Possible cause Inadequate UV-transmission of the water to be disinfected
Remedy ▶ Improve water quality
Possible cause Lamp at end of the lamp service life
Remedy ▶ Fit new UV-lamp
Possible cause Inaccurate lamp current
Remedy ▶ Use standard current

NOTICE

- In single lamp systems without electronic ballast-controlled lamp operation, lamp functions are not monitored by the ballast. A defective lamp can be detected by a sensor signal of 0 W/m².

Possible cause Lamp defective (display 0 W/m²)
Remedy ▶ Fit new UV-lamp
Possible cause Starter defective (display 0 W/m²)
Remedy ▶ Fit new starter

Fault
xx Lamp fail.
Lamp #xx

Error signal: xx Lamp failure

▶ Acknowledge error signal with ENTER key

Possible cause Lamp xx defective
Remedy ▶ Fit new UV-lamp
Possible cause Incorrect lamp current
Remedy ▶ Apply standard current
Possible cause Ballast defective
Remedy ▶ Replace ballast

NOTICE

- The number of failed lamps is indicated.
- If more than one lamp has failed, use the “UP” and “DOWN” keys to identify the failed lamps.

Fault

Other fault

Error signal: Other fault

▶ Acknowledge error signal with ENTER key

Possible cause External fault indicating device triggered (e.g. flow monitor or temperature monitor)
Remedy ▶ Remedy external cause of error
Possible cause No external fault indicating device connected and contacts at error input are not jumped
Remedy ▶ Jump contacts at error input

Fault

Line voltage below xxx V

Error signal: Line voltage below XXX V

Cause The power supply is less than the minimal admissible power supply
Remedy ▶ Check power supply

Fault

Bus fault

Error signal: Bus fault

Possible cause Bus connection lost
Remedy ▶ Restore bus connection (to be carried out by an electrical technician)
Possible cause Insufficient power to one or more
Remedy ▶ Check power supply and/or fine fuse in the ballasts (to be carried out by an electrical technician)
Possible cause Ballast
Remedy ▶ Replace ballast (to be carried out by an electrical technician)

Fault

Memory fault

Error signal: Memory fault

Cause The controller has detected an error in the buffer during the self-check
Remedy ▶ Replace the controller (to be carried out by an electrical technician.)

Fault

Basic setting

Error signal: Basic setting

Cause The controller has detected an error during the self-check
Remedy ▶ Replace the controller (to be carried out by an electrical technician.)

Fault

Lamp current

Error signal: Lamp current

Cause Lamp current set outside admissible parameters
Remedy ▶ Adjust lamp current to within the admissible parameters

Function and error displays on the ballasts

The three red LEDs on the ballasts are used for function monitoring and troubleshooting.
When the power supply is connected all three LEDs are lit for approx. 1 second.

“Power supply” LED (description on “POWER” circuit board)

on Power supply to the ballasts is sufficient

off although the main switch is switched on and the system is plugged in at the mains
▶ Check power supply (must be carried out by an electrical technician)
▶ Check fine fuse

“Lamp” LED (description on “Error” circuit board)

flashes for approx. 1 to 15 sec Lamp electrodes are pre-heated prior to ignition

on Lamps not lit
If the power supply is switched off and on again the LED goes out and does not light up again until the next start attempt
▶ Check lamp

“BUS” LED (description on “Tx” circuit board)

lit every 0.1 to 3 sec. The ballast is being addressed by the controller.

does not light up although the system is switched on:
The bus connection to the ballast has been lost and/or the ballast is defective

NOTICE

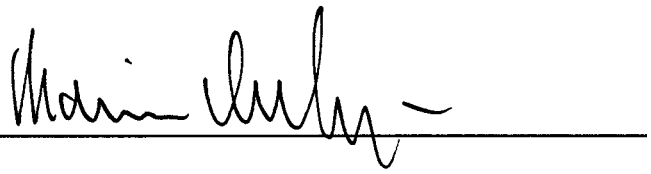
As the data bus is in a series circuit, the data connection to subsequent ballasts is lost when one ballast is defective.

EC Declaration of Conformity

We,

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5 - 11
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 :	***certified disinfection plant Dulcodes***
Product type :	***UVCa _ _ Z _ _ _ _ _ _ _ 5***
Serial number :	***see type identification plate on device***
Relevant EC regulations :	***EC - machine regulation (98/37/EC)*** ***EC - low voltage regulation (73/23/EEC)*** ***EC - EMC - regulation (89/336/EEC subsequently 92/31/EEC)***
Harmonised standards used, in particular	***DIN EN 12100-1, DIN EN 12100-2,*** ***DIN EN 50106, DIN EN 60204-1,*** ***DIN EN 61000-3-2, DIN EN 61000-4-2/4/5, DIN 61000-6-1/2/3/4***
Date/manufacturer´s signature :	*07.04.2004* 
The undersigned :	*Dr. Rainer V. Dulger, Executive Vice President R&D and Production*

The Dulcodes UV disinfection system daily log book

Date	UV-transmission [%/m²]	Flow [m³/h]	Lamp-hours	Lamp switch cycles	Radiation intensity [W/m²]	Reference radiometer [W/m²]	Calibration factor	Maintenance tasks completed	Signature