evoqua
WATER TECHNOLOGIES



WALLACE & TIERNAN® UV DISINFECTION UNIT BARRIER M

OPERATING MANUAL



Please note

Original manual!

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1. Introduction

1.1 Documentation of the Barrier M

1.1.1 Target groups

The documentation for the UV disinfection unit is directed towards all personnel working on or with the UV disinfection unit:

- Operator
- Service technician

Documentation is divided into two separate instruction sets according to each target group:

- The operating manual for the operating personnel / operator of the UV disinfection unit.
- The commissioning manual for installation, commissioning, and repair and maintenance work by trained and authorized technical personnel, intended only for installation and service technicians.

All persons working with the UV disinfection unit must have read and understood the operating manual, especially the safety notes and instructions.

1.1.2 Documentation structure

Operating Manual

Chapter 1	Introduction Documentation structure, conventions
Chapter 2	Safety Intended purpose, general safety notes and notes about the UV disinfection unit
Chapter 3	Description Design, versions and functions of the UV disinfection unit
Chapter 4	Technical data Disinfection chamber (UV reactor), UV lamps, controller
Chapter 5	Operation Operation, faults, maintenance, information for repair work by the operating personnel / operator
Chapter 6	Spare parts, maintenance schedule, logbook
Chapter 7	Table of UV alarm levels
Chapter 8	Declaration of Conformity
Chapter 9	Index

Commissioning manual for installation, commissioning and maintenance work by technical personnel

Chapter 1	Scope of supply, transport, storage
Chapter 2	Installation and commissioning Installation and commissioning of the UV disinfection unit
Chapter 3	Maintenance and repair Maintenance and servicing of the UV unit by technical personnel
Chapter 4	RS485 Bus Interface
Chapter 5	Drawings CN drawing, explosion drawings
Chapter 6	Circuit diagram Electrical wiring diagrams
Chapter 7	Index

Please consult the table of contents and the index to find the information you require quickly.

1.2 Conventions

Notes This operating manual contains a number of notes with different priorities marked with symbols.

Pictogram	Note	Meaning
	*Danger!*	Immediate danger to life and limb! If the situation is not handled properly, death or serious injury may be the result.
	*Warning!*	Danger to life and limb! If the situation is not handled properly, death or serious injury may be the result.
	*Attention!*	If this warning is not observed, medium or slight injury or damage to the equipment may be the result.
	*Warning!*	Electrical hazard. The chamber and the control cabinet must be grounded with a sufficient cross-section. Before performing any repair or maintenance work on the UV disinfection unit, switch it off with the emergency OFF main switch.
	*Warning!*	Risk of burns! Hot surface! Remember that the lamps are hot when they have been in use. After use, leave them to cool down for at least 15 minutes.
	*Attention!*	Risk of injury! Wear safety goggles! To prevent injury to the eyes caused by exposure to ultraviolet light, always wear a protective mask. Never look directly at a UV lamp when it is on! Do not expose your skin unnecessarily to UV radiation!
	*Attention!*	Risk of damaging the lamp! When working with the lamps and quartz sleeves, always wear clean cotton gloves. Only touch the lamps at both ends if possible.

Pictogram	Note	Meaning
	*Attention!*	Environmental hazard! The UV lamps contain mercury. Faulty lamps must be disposed of at a collection point for chemical waste.
	*Please note*	These notes are intended to help you when working on the unit

2. Safety

2.1 Intended purpose

The UV disinfection unit is designed for the treatment of liquids which are permeable to UV rays, such as drinking water, process water, waste water and swimming pool water. The operational safety of the UV disinfection unit is only ensured when it is used in accordance with its intended application. The unit may only be used in accordance with its intended purpose as defined in the order and under the operational conditions stated in the technical specifications.

Compliance with the intended use also includes reading this operating manual and observing all the instructions it contains. Furthermore, all inspection and maintenance work must be performed at the prescribed intervals.

The operator bears full and sole responsibility if this device is put to any use which does not comply strictly and exclusively with this intended use.

2.2 General safety instructions

Evoqua places great emphasis on safety when working on or with the UV disinfection unit. This was already taken into account in the design of the system and by the integration of safety features.

Safety instructions

The safety instructions in this documentation must always be observed. These do not affect the validity of any additional national or company safety instructions.

Safety instructions on the UV disinfection unit

All of the safety instructions on the UV disinfection unit must be observed. They must always be complete and easily legible.

State of the art

The UV disinfection unit was constructed according to state-of-the-art technology and all recognized technical regulations relevant to safety. However, if the unit is used by personnel who have not received appropriate training and instruction, use of the unit may result in risk to life or limb for the user or third parties as well as damage to the UV disinfection unit and other equipment. Installation and maintenance as well as any work not described in this operating manual may only be performed by trained and authorized personnel.

Personnel

The operator of the overall system must ensure that only authorized and qualified technical personnel are permitted to work with and on the UV disinfection unit within their defined scope of authority.

"Authorized and qualified technical personnel" are:

Operation

- Operating personnel who have received training and instruction from the operator, from Evoqua or from a service partner.

Installation, commissioning and maintenance work, level 2

- Evoqua service personnel or technical personnel trained and authorized by Evoqua. Level 2 installation, commissioning and maintenance work may only be performed by the above.

Electrical work

- Authorized and qualified electricians. Electrical work may only be performed by authorized and qualified electricians.

Spare parts / components

Correct operation of the UV disinfection unit is only guaranteed if original spare parts and components are used in the combination described in this operating manual. If this stipulation is not observed, there is the risk of malfunction or damage to the UV disinfection unit.

Modifications and extensions

Never attempt to perform any modifications, extensions or conversions to the unit without the written approval of the manufacturer! These could have an adverse affect on safety!

Electrical power

During normal operation, the controller must remain closed.
Prior to installation, inspection, maintenance and repair work, always switch the UV disinfection unit off using the emergency OFF main switch and secure against reactivation.

Connect all cables in accordance with the wiring diagram.

Disposal

Ensure safe and environmentally-friendly disposal of agents and replaced parts.

2.3 Notes on the periphery of the UV Unit

Working environment

Ensure that the unit is installed in a clean place that is well illuminated.

Installation site

Control cabinet and disinfection chamber should be installed in a location where they are protected against heat and rain.

Quality of the liquid to be treated

Liquids with a high content of dissolved minerals or salts (max. chloride concentration 800 mg/l) or suspended particles can also cause excessive wear such as corrosion on metal parts. Please contact Evoqua Water Technologies GmbH, Günzburg for advice.

Unpacking / Transport

Lift or transport the UV disinfection unit and the control cabinet with suitable lifting devices to prevent any risk of slipping.



Attention!

Risk of injury and damage to the UV disinfection unit!

The disinfection units must not be lifted by the cable duct or the end caps.

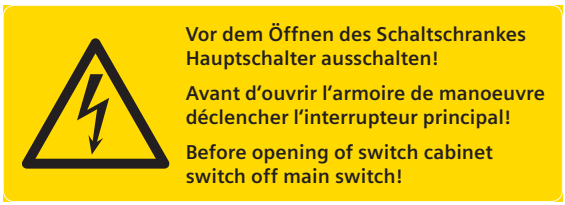
2.4 Safety instructions on the UV disinfection unit

Everyone involved must be informed about the dangers arising from the UV disinfection unit.

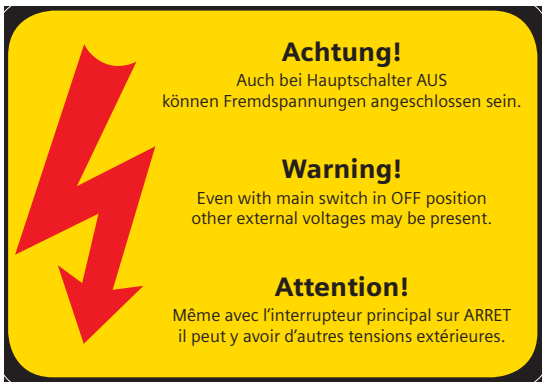
The following safety instructions are attached to the UV disinfection unit respectively to the control cabinet:

Control cabinet, outside





Control cabinet, inside



UV disinfection unit



Please note

Ensure that the safety instructions are always complete and easily legible!

2.5 Quartz sleeve breakage



Warning!

Broken parts have sharp edges and must not get into the process water! The customer must provide for measures to be taken in order to prevent broken parts from getting into the process water!

2.6 Lamp breakage



Environmental hazard!

The UV lamps contain a small amount of mercury. If a lamp is broken, the mercury must be bound with either the mercury collector (option, see chapter 3.9.8) or using a powerful pipette. The bound mercury must be disposed of at a collection point for chemical waste in accordance with locally applicable regulations. Avoid contact with your skin and hair; do not breathe in any fumes and ensure adequate ventilation!

Faulty lamps can be returned to Evoqua Water Technologies GmbH, Günzburg.

3. Description

3.1 General information

UV radiation is increasingly employed as an environmentally-friendly alternative to chemical disinfection methods, especially for applications in which a depot effect is not required. The advantages are obvious:

- There are no by-products
- The taste and smell of the water remain neutral
- UV radiation is non-corrosive

The Barrier M system was primarily designed for the treatment of drinking water, swimming pool water and process water. It is equipped with special lamps type WTL in accordance with the medium-pressure principle. These emit a UV-C wavelength spectrum of 200 to 300 nm which is absorbed by micro-organisms in the water and which affects both the DNA and cell walls, protein and enzymes. The repair mechanisms of the micro-organisms are therefore also destroyed.

The properties of the water requiring treatment are decisive for the number and strength as well as the optimum arrangement of the WTL high-power lamps. The spectral extinction coefficient SEC is particularly important for the configuration of the UV disinfection unit, the transmission value T_{10} can also be used.

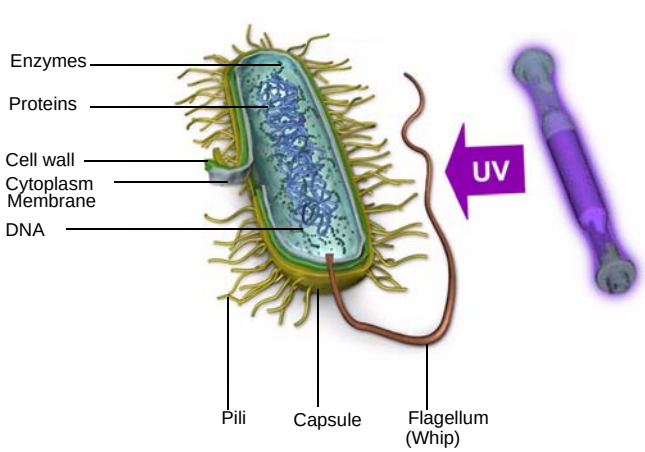


Bild 1 Bacteria

3.2 Versions

The Barrier M UV disinfection unit consists primarily of the disinfection chamber and the control cabinet.

The UV disinfection unit can also be equipped with the following options:

- Manual cleaning mechanism or
- Automatic cleaning mechanism
- Wall brackets to affix the reactor firmly to the wall

The UV disinfection unit is available in the following models:

Model	Number of lamps	Capacity m³/h		
		Disinfection		Chloramine reduction
			$T_{10\ mm}$	
Barrier M 35	1	33 m³/h	98 %	19 m³/h
Barrier M 80	1	70 m³/h	98 %	39 m³/h
Barrier M 135	1	112 m³/h	98 %	61m³/h
Barrier M 210	4	116 m³/h	90 %	n. a.
Barrier M 275	1	223 m³/h	98 %	119 m³/h
Barrier M 290	3	106 m³/h	85 %	n.a.
Barrier M 350	4	130 m³/h	85 %	n.a.
Barrier M 525	2	337 m³/h	98 %	176 m³/h
Barrier M 700	3	313 m³/h	90 %	295 m³/h
Barrier M 900	4	298 m³/h	85 %	n. a.
Barrier M 950 - nur Chloraminabbau	3	n. a.		402 m³/h
Barrier M 1200 - nur Chloraminabbau	4	n. a.		528 m³/h
Barrier M 1250	6	320 m³/h	80 %	n. a.
Barrier M 1400	2	493 m³/h	90 %	n. a.
Barrier M 1700 - nur Chloraminabbau	4	n. a.		653 m³/h
Barrier M 2000	3	709 m³/h	90 %	750 m³/h
Barrier M 2600	4	923 m³/h	90 %	974 m³/h
Barrier M 3800	6	912 m³/h	85 %	n. a.

3.3 Design and functions

Overall design

The following illustration shows the typical configuration of the Barrier M system with the control cabinet. This may vary, however, depending on the selection of the options, the application and the size of the system.

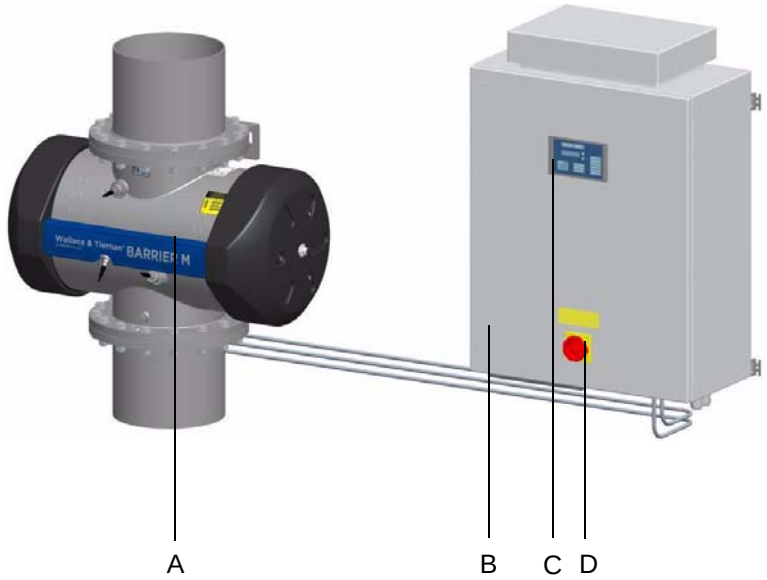


Bild 2 Barrier M - disinfection chamber (UV reactor) with control cabinet

A Disinfection chamber (UV reactor)
B Control cabinet
C Display
D Emergency OFF main switch

Disinfection chamber (UV reactor)

The core of the Barrier M system is the disinfection chamber with the WTL high-power lamps, which are installed horizontally. The UV reactor is designed to ensure optimum disinfection of the water with the optimum arrangement, number and strength of the lamps and very low pressure loss due to the hydrodynamic design. The disinfection chamber can be installed in either a horizontal or a vertical pipe.

UV lamps

The operating status of each individual lamp is automatically monitored and displayed on the operating panel by LED indicators. The lamps can be replaced by trained and instructed operating personnel simply and without requiring special tools.

Controller

The Barrier M controller can be installed in a sheet steel or stainless steel control cabinet. The settings and important system data are displayed on the operating panel. Status and error messages are also indicated by LEDs on the operating panel.

UV sensor

The UV sensor constantly monitors the intensity of the UV light in the chamber and displays its status on the control cabinet operating panel.

Disinfection control

Depending on the SAtC (Spectral Attenuation Coefficient) or water transmittance, the flow rate, deposits on the quartz sleeves or UV measuring window and the age of the UV lamps the UV power of the lamps can be automatically stepless adjusted.

Dose control

The dose control determines the UV dose currently present in the chamber, which means the lamp power is adapted to the prevailing conditions accordingly.

Flow rate monitoring

The flow rate monitoring enables processing of the signals of a flow rate measurement system integrated at the customer site and the triggering of an alarm via minimum and maximum limit values.

Automatic cleaning mechanism

The automatic cleaning mechanism, available as an option (for the Barrier M 80 or higher) is controlled by programmed time intervals. It is also activated automatically if the intensity of the UV light in the chamber drops, just before the minimum UV intensity is reached.

Manual cleaning mechanism

The mechanical cleaning mechanism, also available as an option, can be actuated as required without having to switch off the UV disinfection unit.

3.4 Disinfection chamber (UV reactor)

3.4.1 General information

The treatment disinfection chamber (UV reactor) comprises the following main elements:

- Housing
- UV lamps
- UV sensor
- Temperature sensor

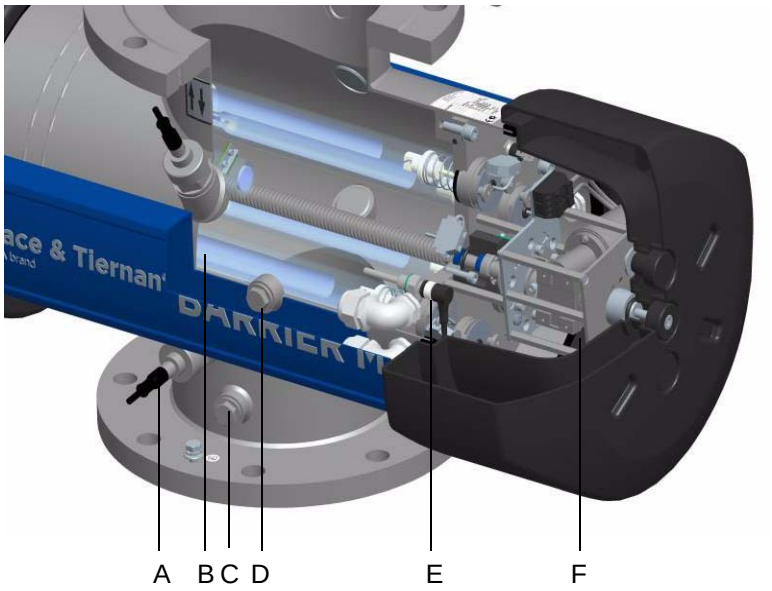


Bild 3 Barrier M housing with options

A UV sensor
B UV lamps
C Sacrifical anode (optional)
D Drain or vent screw
E Pt100 temperature sensor
F Automatic cleaning mechanism with motor (optional)

3.4.2 Housing

The housing is the main component of the Barrier M and it is available in five different sizes. The water connections for the inlet and outlet are along one axis in every version. Connections for draining and venting the UV disinfection unit are standard features. Cable ducts are provided on the long sides of the housing through which all cables are routed to the measuring points and the consumer units.

The UV lamps are positioned in the chamber at right angles to the flow direction. The lamps are mounted with two flanges on both sides. The temperature sensor and, if fitted, the cleaning mechanism, are also mounted on one of the flanges. Protective caps are fitted on both sides.

The housing size and version mainly depend on the maximum flow rate and also the properties of the water requiring treatment.

Please note

For applications with brine and salt water the standard version of the housing material, stainless steel 1.4404 (AISI 316 L), is adequate for a chloride content of < 800 mg/l chloride. For a chloride content of > 800 mg/l up to max. 20 g/l chloride the housing material has to be stainless steel 1.4462 (AISI 318 LN). Please note that only the versions Barrier M 275, 525, 700, 900 and 1250 are available in this steel quality.

3.4.3 UV lamps

The Barrier M uses medium-pressure lamps with a power output of 1000, 2000 or 3000 watts. The number and type of the installed lamps depend on the flow rate and the properties of the water requiring treatment.

The lamps are fitted in quartz sleeves for protection and to facilitate their replacement. Installation and replacement of the lamps is performed with both lateral flanges.

After the disinfection unit has been switched on, it takes approx. 4 minutes until full UV intensity is reached. The disinfectant effect is only guaranteed after this time and if the minimum UV intensity from the UV sensor is measured. After a 10 additional minutes, the UV intensity of the lamps is continuously adjusted by means of the automatic disinfection control. The lamps are therefore run at the best intensity level for the prevailing conditions.

The service life of the UV lamps depends on the frequency of the switching cycles (maximum 4 switching cycles per day) and is normally up to about 9,000 hours provided that the UV disinfection unit is operated in the disinfection control mode (standard) and subject to the defined operating conditions (refer to setting data configuration sheet). For details on the service life of the UV lamps refer to chapter 5.3 Service life of UV lamps.



The lamps have a very low degree of radiation deterioration. The radiation intensity of the lamps only drops slightly as they approach the end of their service life. An additional reduction in the UV intensity occurs as the result of soiling of the quartz sleeve. Proper cleaning should therefore be ensured.

Bild 4 Barrier M UV lamps

3.4.4 UV sensor



Another key component of the Barrier M system is the UV sensor, installed as a standard feature to enable continuous online monitoring of the disinfection efficiency. It is mounted in the middle of the side of the UV reactor and measures the UV intensity in the UV reactor. It then sends these measurements to the control system for optimized adjustment of the UV intensity, displayed as a status message on the operating panel. The UV sensor has an effective range from 220 - 285 nm.

Bild 5 Standard UV sensor

3.4.5 Pt100 temperature sensor



The UV lamps produce a considerable amount of heat, which is carried away by an adequate flow of water. If this flow of water is not ensured, overheating can occur, possibly resulting in damage to the UV disinfection unit. A Pt100 temperature sensor is installed in the UV disinfection unit on one of the lateral flanges for monitoring the water temperature. As soon as the set maximum water temperature is exceeded, an alarm signal is given and the unit is switched off.

Bild 6 Pt100 temperature sensor

3.4.6 Bimetallic switch



A bimetallic switch is fitted on the side flange to provide additional temperature monitoring. This switches the lamps off if the Pt100 temperature sensor fails and the surface temperature in the disinfection chamber, as measured on the lamp flange, rises above the maximum threshold, which is set at 65°C.

Bild 7 Bimetallic switch

3.5 Controller

3.5.1 Design

Housing

The Barrier M controller can be installed in a sheet steel or stainless steel control cabinet. The emergency OFF main switch and the operating panel are fitted into the front panel. To provide cooling a fan is fitted in the control cabinet and ventilation grills on the front panel respectively on top of the control cabinet or on the side panels.

Emergency OFF main switch

The emergency OFF main switch is used to switch the entire UV disinfection unit on and off. If the contact for the external release is closed, the UV disinfection unit is controlled from an external control room.

Operating panel

The settings and important system data are displayed on the operating panel. Status and error messages are also indicated by LEDs on the operating panel.

3.5.2 Functions

The controller is used to record and process the measured data as well as for process control.

Measurements

Measurements that can be recorded and processed:

- UV intensity
- Temperature
- Flow rate
- Transmission

Functions

The following functions are integrated into the controller:

- Display of the total number of operating hours at all power levels as well as the operating hours at each power level. Can be reset
- Display of operating hours per lamp. Can be reset
- Disinfection control
  Recording, displaying and further processing of the currently measured UV intensity. Adaptation of lamp power output to present conditions
- Display of the currently measured water temperature
- Display of the current lamp power level (in percent)
- Display of the switching cycles. Can be reset
- Performance of an LED test
- Display of current signal state of alarms, and release contact, digital inputs and outputs and current values of analog inputs in mA
- Display of pulses counted during running cleaning process

- Display of remaining running time of heating up („start-up”) and warm-up („no dim.”) period.
- Display of active alarms or messages
- Running an alarm reset
- Activating test mode
- Selecting language
- Version display

The following additional functions are possible:

- Dose control

  Recording, display and further processing of the current UV dose
- Transmission display

  Display and further processing of the current transmission value T_{10}
- Flow rate monitoring

  Display and further processing of the current flow rate value
- Display of the cleaning cycles. Can be reset
- Display of the set cleaning intervals in operation and in standby. Can be changed
- Manual triggering of cleaning

Safety functions

- Display of operating or alarm states via LED:
  - Alarms

    UV pre-alarm

    UV alarm

    Water temperature pre-alarm

    Controller temperature alarm

    Water temperature alarm

    Flow rate alarm

    Cleaning alarm (only with the automatic cleaning option)
  - Operating states

    Power

    UV active

    Lamps … active

    Cleaning active
- Safety deactivation in case of a temperature alarm (controller and water temperature), cleaning alarm, flow rate alarm and as an option in case of UV alarm and failure of lamps. As an option, the shutdown can be delayed in the case of UV alarm, failure of lamps and flow rate alarm.

  The criteria for shutting down the device and triggering substitute measures to ensure disinfection in the case of UV alarm and failure of lamps are as follows:

  - The UV intensity is between 90% and 100% of the minimum UV intensity for more than 2 minutes
  - The UV intensity is below 90% of the minimum UV intensity for more than 10 seconds
  - Malfunction or failure of a lamp for longer than 2 minutes

- Digital input signals:
  - Release contact for switching the UV disinfection on and off
  - "Disinfection MIN"

    If a measuring system is fitted, it is possible to switch to maximum power automatically via this input if the combined chlorine or chloramine limit value is not reached

- Analogue output signal 4 - 20 mA for UV intensity
- Floating relay outputs (e.g. for external control room) for:
  - Pre-alarm UV

    If the UV intensity is ≤ 103% of the minimum UV intensity (at 100% lamp power) an advance UV alarm is triggered
  - Water temperature pre-alarm
  - Flow rate alarm
  - UV lamp failure alarm
  - Controller temperature alarm
  - Water temperature alarm
  - UV alarm (minimum UV intensity)
  - Cleaning alarm
  - Pump on
  - System ready

    If the release contact for switching the UV disinfection on and off is connected, the signal contact for „System ready“ can be connected in addition. The signal contact for „System ready“ informs that none of the following alarms is present:
    - water temperature alarm
    - cabinet temperature alarm
    - cleaning alarm
    - flow alarm, if flow monitoring function is activated
    - UV alarm or lamp failure alarm, if automatic safety shutdown function is activated

  The status of the individual output relays is displayed on the operator menu.

- Triggering automatic cleaning at 102% of the set UV alarm value



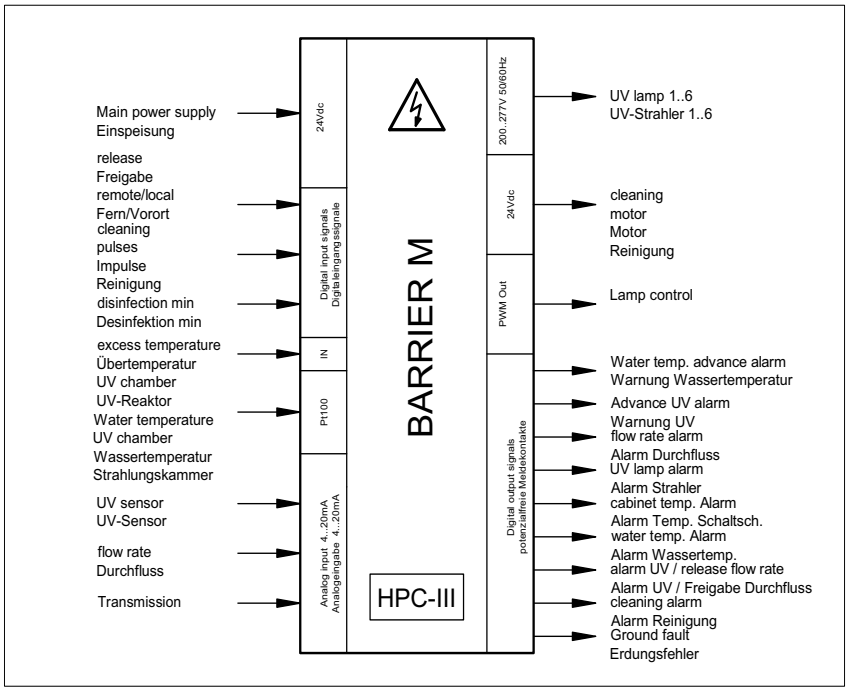
Please note

In chapter 5. Operation all functions concerning the operator are described in detail!

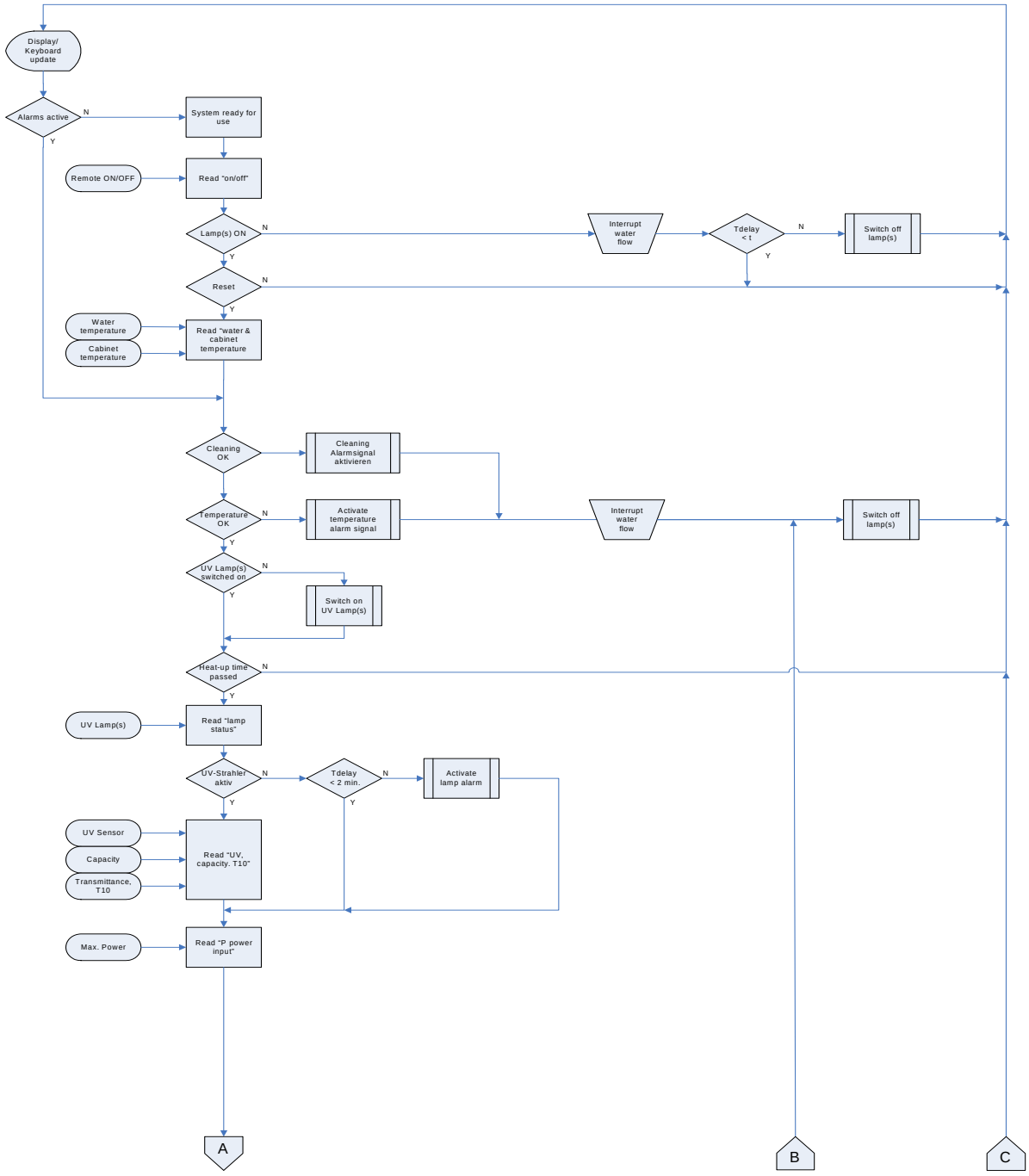
Interfaces

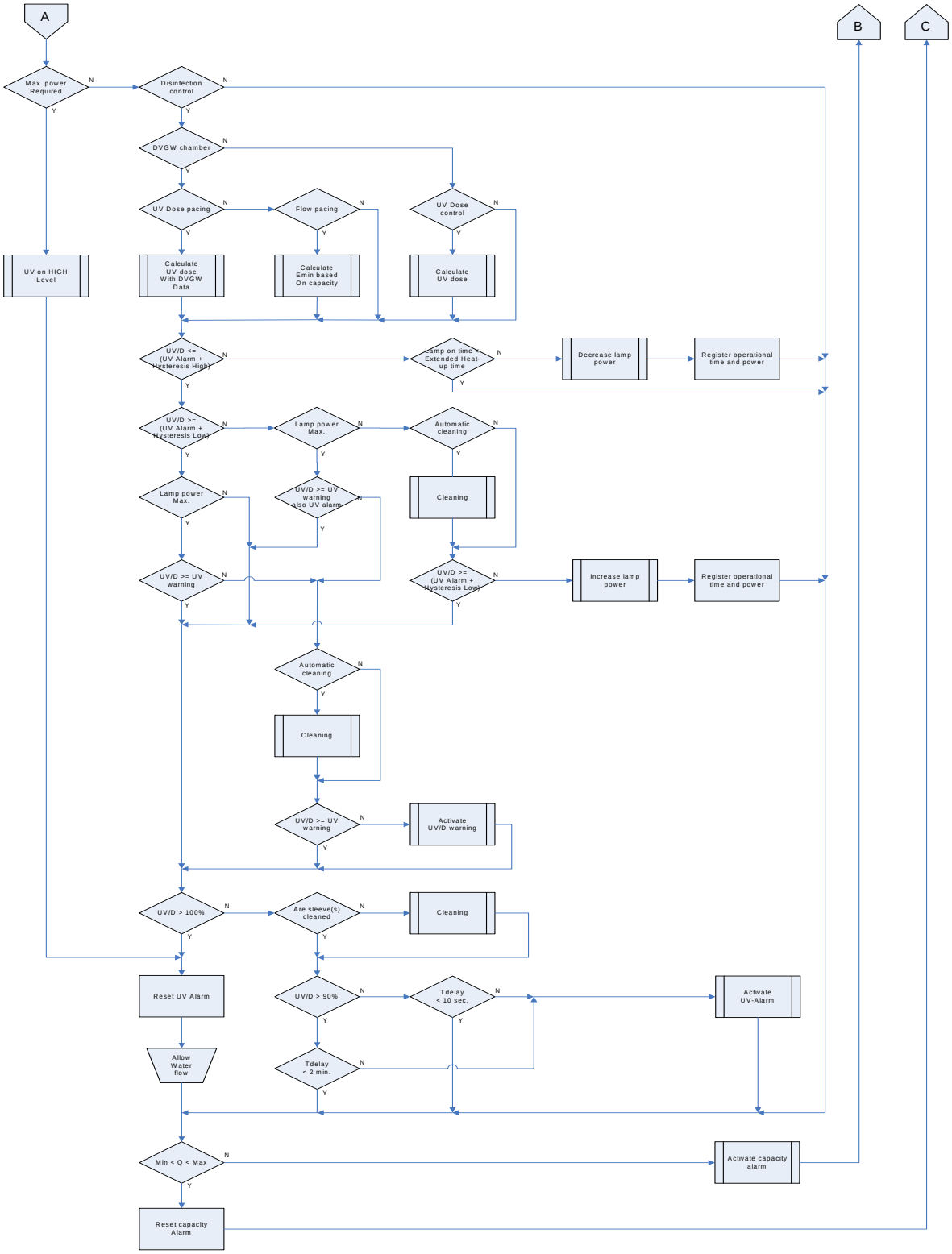
- The RS485 interface provides connectivity to:
  - Web technology via Wallace & Tiernan ChemWeb-Server
  - Wallace & Tiernan fieldbus converter
  - Higher level visualization systems through OPC Server Data Access V2.0
  - Visualization systems under Windows TM via Wallace & Tiernan CMS software

Block diagram



3.5.3 Functions diagram




A
B
C
Max. power Required
Disinfection control
DVGW chamber
UV Dose pacing
Flow pacing
UV Dose control
UV on HIGH Level
Calculate UV dose With DVGW Data
Calculate Emin based On capacity
Calculate UV dose
UV/D <= (UV Alarm + Hysteresis High)
Lamp on time = Extended Heat-up time
Decrease lamp power
Register operational time and power
UV/D >= (UV Alarm + Hysteresis Low)
Lamp power Max.
Automatic cleaning
Cleaning
UV/D >= UV warning also UV alarm
Increase lamp power
UV/D >= UV warning
Activate UV/D warning
Are sleeve(s) cleaned
UV/D > 100%
Reset UV Alarm
UV/D > 90%
Tdelay < 10 sec.
Activate UV-Alarm
Allow Water flow
Tdelay < 2 min.
Min < Q < Max
Activate capacity alarm
Reset capacity Alarm
N
Y

3.5.4 Menu structure

The Barrier M has three different menus:

- Operator menu
- Service menu, Level 1
- Service menu, Level 2

The menus are shown on the display. The menus are accessed with the UP key and the acknowledge key.

Operator menu

During normal operation, the user can only access the operator menu with the following functions:

- Reading off important unit values as well as error messages und current state of the alarms and digital inputs and outputs and values of analog inputs
- Resetting the elapsed time clock (switching cycles), for example after replacing lamps
- Programming or adjustment of the cleaning interval (only for automatic cleaning mechanisms)
- Manual start of a cleaning operation (only for automatic cleaning mechanisms)
- Performing an LED test
- Resetting the alarm messages after remedying the error
- Selecting test mode to perform a UV sensor test
- Selecting the language

Service menu

The service menu is password protected and is only accessible to trained and authorized technical personnel.

It is divided into two levels:

- Service Level 1 and
- Service Level 2

Service Level 1

In Service Level 1, the UV disinfection unit is configured at the factory in line with the specific order. The functions are specified and limit values set. In consultation with Evoqua, these factory settings can be changed and adapted to the conditions on site. These changes must be recorded in the setting data configuration sheet (page 2 of the operating manual). In addition, it is possible to view the total number of operating hours in the Service menu; this cannot be reset.

Service Level 2

Service Level 2 is a Factory menu that is accessible exclusively by Evoqua Water Technologies GmbH, Günzburg factory personnel after entering another password.

3.6 Disinfection control

The intensity of the lamps is infinitely variable:

The lamps are automatically adjusted to the ideal intensity for the prevailing conditions at all times, ensuring energy-efficient operation of the system, thus ensuring adequate UV intensity even if the lamps are old, the quartz sleeves are dirty, or the water quality changes.

The display shows the capacity at which the UV lamps are currently operating (in %).

3.7 Dose control

The UV dose is defined as the amount of energy required to deactivate the micro-organisms in the water. Depending on the area of application, different amounts of energy, specified in J/m², are prescribed. This value is 400 J/m² for drinking water, 250 J/m² in swimming pool water and 600 J/m² for the reduction of chloramine.

The dose control automatically determines the UV dose currently present in the disinfection chamber and this is shown in the operator menu on the display. For calculation of the UV dose, the following parameters are required:

- Intensity

  The UV sensor is used to measure the current UV intensity in the disinfection chamber
- Transmission

  If transmission measurement is available, the current transmission value T_{10} is used. Otherwise, a constant transmission value T_{10} is assumed.
- Flow rate

  If a flow rate measurement is available, the current flow rate value is used. Otherwise, a constant flow rate value is assumed.
- System type

If the dose control function is activated, the UV alarm level is specified via the UV dose in J/m². The disinfection control is then also governed by the UV dose and switches to the ideal power setting depending on the dose determined.

3.8 Flow rate monitoring

If flow rate measurement is available, the flow rate signal received from a sensor is recorded and compared with the entered minimum and maximum limit values. If this is exceeded or not reached, the following is triggered:

- The signal contact for the "FLOW RATE" alarm switches immediately
- Simultaneously, the red LED "FLOW RATE" lights up
- Simultaneously, the green LED "UV" disappears
- Simultanesouly, the text message „*Flow ?” appears on the display, depending on what screen the unit currently has open
- Simultaneously, the "pump on" signal contact closes
- The lamps are switched off after a time delay set in the Service menu (factory setting = 30 seconds)

In addition, the flow rate value determined here is used for calculation of the UV dose if the dose control function is activated.

3.9 Options

3.9.1 Cleaning mechanisms in general

The inorganic and organic substances contained in the water can form deposits on the quartz sleeves. These deposits absorb part of the UV radiation, resulting in a lower disinfection efficiency.

To remove these deposits, Evoqua supplies a mechanical cleaning device that works without chemicals, available either as a manual or an automatic version (Barrier M 80 and higher). Both systems can be used for cleaning during operation of the unit. It is not necessary to remove the quartz sleeves.

3.9.2 Manual cleaning

The manual cleaning mechanism is moved forwards and backwards over the quartz sleeves and the UV sensor with a handle and the deposits removed. The respective version depends on the number of lamps.



Bild 8 Treatment disinfection chamber (UV reactor) with manual cleaning

Please note

The maximum operating pressure for UV disinfection units with manual cleaning mechanism is 3 bar!

3.9.3 Automatic cleaning

The cleaning mechanism is moved backwards and forwards over the quartz sleeves and the UV sensor automatically by a motorized spindle to remove the deposits. The automatic system can be set depending on time and/or depending on the UV intensity or UV dose. If necessary, cleaning can be initiated from the operating panel at any time. The cleaning cycles performed are counted and can be read on the display.



Bild 9 Treatment disinfection chamber (UV reactor) with automatic cleaning

3.9.4 Bleed valve

The pipe system and the disinfection chamber must be completely filled with water and free of air. If the disinfection chamber is installed horizontally, a manually adjustable automatic bleed valve must be fitted to the air valve on the disinfection chamber (UV reactor). We supply a bleed valve set, part No. W3T170356.

3.9.5 Sacrificial anode

When the UV disinfection unit is exposed to increased corrosion, e. g. due to brine or salt water, the installation of a sacrificial anode, part No. W3T274659 is absolutely necessary as corrosion inhibitor. Sacrificial anodes are dissolving and must therefore be checked in regular intervals, depending on the application and the local conditions, and replaced if necessary.

A Sacrificial anode



Bild 10 UV disinfection unit with sacrificial anode

3.9.6 Wall brackets

For a stable wall mounting of the UV disinfection chamber we offer optionally one pair of wall brackets including fixing material to be mounted on both connection flanges. (For dimensions refer to the commissioning manual, chapter 5.1, dimension drawing).



Bild 11 Treatment disinfection chamber (UV reactor) with assembled wall brackets

A Wall brackets

Specifications	Flange connection	Part number
Assembling set consisting of 2 wall brackets and fixing material, without wall mounting auxiliaries	DN 80	W3T162514
	DN 125	W3T162515
	DN 200, 8“	W3T162516
	DN 250, 10“	W3T158861
	DN 350	W3T162517
	3“	W3T170327
	5“	W3T170328
	14“	W3T170329

3.9.7 Lamp tester



The lamp tester runs on a 9 V battery; it transmits a high-voltage pulse to the lamp. A brief flashing of the lamp indicates it is functional. (Optional; part number W2T507701)

Bild 12 UV lamp tester

3.9.8 Mercury collector



Mercury is toxic and must be collected immediately if it is spilt. The mercury collector is a screw-top container made of polyethylene. The lid contains a special foam insert and the container a mercury separation sheet. (Optional; part number W3T164613)

Bild 13 Mercury collector

3.9.9 Safety goggles

If the end caps are not mounted when the UV disinfection unit is switched on, it is always possible for a small amount of UV light, which is harmful to the eyes, to escape. Safety goggles should therefore be worn at all times (Optional, part number W3T168664).

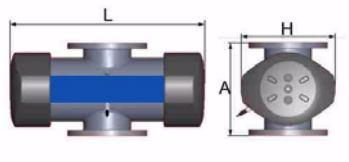
4. Technical Data

4.1 Disinfection chamber

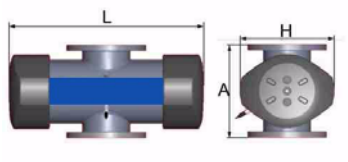
4.1.1 General data

Housing	
Surface, inside:	< 0.8 µm
Enclosure:	IP 54
Material: Standard A5 version: Barrier M 257, 525, 700, 900 and 1250	 1.4404 (AISI 316 L) 1.4462 (AISI 318 LN)
Operating pressure, max.: versions without cleaning or automatic cleaning: Barrier M 35, 80, 135, 210, 290 and 350 Barrier M 275, 525, 700, 900 and 1250 Barrier M 1400, 1700, 2000, 2600 and 3800 versions with manual cleaning, all sizes	 16 bar 10 or 16 bar 10 bar 3 bar
Sensor	
UV sensor:	calibrated to 200 W/m², 1000 W/m² or 2000 W/m² corresponds to 20 mA
Water temperature sensor:	Pt100
Connections	
Draining:	1/2" internal diameter,

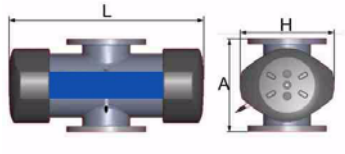
4.1.2 Type-specific data



	Lamps, number / type	Max. flow rate [1,2]	Flange connec-tion	Weight, with water	Weight, dry	Dimensions Chamber AxHxL[3]
Barrier M 35	1 x WTL1000	35	DN 80, 3“ ANSI	15 kg	14 kg	300x214x600
Barrier M 80	1 x WTL1000	80	DN 125, 5“ ANSI	81 kg	59 kg	350x306x1000
Barrier M 135	1 x WTL2000	135	DN 125, 5“ ANSI	81 kg	59 kg	350x306x1000
Barrier M 210	4 x WTL1000	210	DN 125, 5“ ANSI	82 kg	60 kg	350x306x1000
Barrier M 275	1 x WTL2000	275	DN 200, 8“ ANSI	86 kg	63 kg	400x406x900
Barrier M 290	3 x WTL2000	290	DN 125, 5“ ANSI	82 kg	60 kg	350x306x1000
Barrier M 350	4 x WTL2000	350	DN 125, 5“ ANSI	82 kg	60 kg	350x306x1000
Barrier M 525	2 x WTL2000	525	DN 200, 8“ ANSI	86 kg	64 kg	400x406x900



	Lamps, number / type	Max. flow rate [1,2]	Flange connec-tion	Weight, with water	Weight, dry	Dimensions Chamber AxHxL[3]
Barrier M 700	3 x WTL2000	700	DN 200, 8“ ANSI	86 kg	64 kg	400x406x900
Barrier M 900	4 x WTL2000	900	DN 200, 8“ ANSI	86 kg	64 kg	400x406x900
Barrier M 950	3 x WTL2000	950	DN 250, 10“ ANSI	94 kg	72 kg	400x406x900
Barrier M 1200	4 x WTL2000	1200	DN 250, 10“ ANSI	94 kg	72 kg	400x406x900
Barrier M 1250	6 x WTL2000	1250	DN 200, 8“ ANSI	87 kg	64 kg	400x406x900
Barrier M 1400	2 x WTL3500	1400	DN 350, 14“ ANSI	260 kg	160 kg	600x590x1000
Barrier M 1700	4 x WTL2000	1700	DN 350, 14“ ANSI	260 kg	160 kg	600x590x1000
Barrier M 2000	3 x WTL3500	2000	DN 350, 14“ ANSI	260 kg	160 kg	600x590x1000



	Lamps, number / type	Max. flow rate [1,2]	Flange connec-tion	Weight, with water	Weight, dry	Dimensions Chamber AxHxL[3]
Barrier M 2600	4 x WTL3500	2600	DN 350, 14“ ANSI	260 kg	160 kg	600x590x1000
Barrier M 3800	6 x WTL3500	3800	DN 350, 14“ ANSI	260 kg	160 kg	600x590x1000

T[1] Theoretical flow rate in m³/h at T_{10} = 100 % and a dose* of 400 J/m², the practical hydraulic flow rate will be limited to 3 m/s
[2] in m³/h
[3] Assembly dimension x depth x width in mm

***Explanation of fluence (UV dose):**

Depending on the area of application, prescribed and required amount of energy for deactivation of micro-organisms in water, specified in J/m². In contrast to this, the unit for the fluence rate is W/m².

4.2 UV lamps

Power / length	
WTL 1000	1000 W, 230 mm
WTL 2000	2000 W, 332 mm
WTL 3500	3000 W, 460 mm

4.3 Controller

4.3.1 General data

Housing	
Protection rating	IP 43
Material	Sheet steel, painted or stainless steel
Color shade	RAL 7035
Max. sound pressure level control cabinet 1125 x 800 x 400 control cabinet 700 x 500 x 300	 65 db 62 db
Ambient conditions	
Ambient temperature	+5 ... +40°C
Environment	No direct sunlight, protected against rain
Installation height	Max. 2,000 m
Storage temperature	-20 ... +80°C
Digital input signal	• Release contact for switching on and off • Disinfection MIN Switching to maximum UV lamp power
Analog input signal	• UV sensor (4 - 20 mA) • Flow rate (4 - 20 mA) • SEC 254 (4 - 20 mA) • for recording the water temperature (Pt100) • for recording the motor position (impulses)
Analogue output signal	• for UV intensity (4-20 mA) Accuracy: +/- 5% relative to measurement/calculated value

Floating relay outputs with shared potential terminal refer to chapter 3.5.2, Functions, section „Safety functions”	Contact load capacity 8 A / 250 V ~ / AC 1 • Advance UV alarm • Advance water temperature alarm • Flow rate alarm • Failure of UV lamp • Control cabinet temperature alarm • Water temperature alarm • UV alarm • Cleaning alarm
Floating relay outputs	• Pump on • System ready
Interfaces	• RS485 interface (data transfer)
Operating panel	• LEDs for displaying operating and error messages • Operating keys • LCD display (16 characters)

4.3.2 Type-specific data

	Mains connection	**Connection power**	**Dimensions control cabinet HxWxD in mm**	**Weight**
Barrier M 35	1/N/PE AC 208-277 V 50/60 Hz 2/PE AC 208-277 V, 50/60 Hz	Approx. 1.2 kVA	700 x 500 x 300	40 kg
Barrier M 80	1/N/PE AC 208-277 V 50/60 Hz 2/PE AC 208-277 V, 50/60 Hz	Approx. 1.2 kVA	700 x 500 x 300	40 kg
Barrier M 135	1/N/PE AC 208-277 V 50/60 Hz 2/PE AC 208-277 V, 50/60 Hz	Approx. 2.2 kVA	700 x 500 x 300	40 kg

Barrier M 210	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 4.3 kVA	1125 x 800 x 400	120 kg
Barrier M 275	1/N/PE AC 208-277 V 50/60 Hz 2/PE AC 208-277 V, 50/60 Hz	Approx. 2.2 kVA	700 x 500 x 300	40 kg
Barrier M 290	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 6.8 kVA	1125 x 800 x 400	110 kg
Barrier M 350	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 8.5 kVA	1125 x 800 x 400	120 kg
Barrier M 525	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 4.6 kVA	1125 x 800 x 400	100 kg
Barrier M 700	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 6.8 kVA	1125 x 800 x 400	110 kg
Barrier M 900	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 8.5 kVA	1125 x 800 x 400	120 kg
Barrier M 950	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 6.8 kVA	1125 x 800 x 400	110 kg
Barrier M 1200	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 8.5 kVA	1125 x 800 x 400	120 kg

Barrier M 1250	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 12.6 kVA	1125 x 800 x 400	130 kg
Barrier M 1400	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 6.9 kVA	1125 x 800 x 400	100 kg
Barrier M 1700	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 8.5 kVA	1125 x 800 x 400	120 kg
Barrier M 2000	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 10.5 kVA	1125 x 800 x 400	120 kg
Barrier M 2600	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 13.9 kVA	1125 x 800 x 400	120 kg
Barrier M 3800	3/N/PE AC 360/208-480/277 V, 50/60 Hz 3/PE AC 208-277 V 50/60 Hz	Approx. 20.5 kVA	1125 x 800 x 400	130 kg



Please note

Other mains voltages require the use of matching transformers to adjust the voltage.

5. Operation

5.1 Switching on the UV disinfection unit



Please note

Damage to the UV disinfection unit!

The UV disinfection unit may only be operated under the ambient conditions specified in chapter 2.1.1 of the commissioning manual!



Please note

Damage to the UV disinfection unit!

Before starting the UV disinfection unit, ensure that there is a sufficient flow through the disinfection chamber!



Attention!

Risk of injury!

Only switch the UV disinfection unit on if the end caps are in place. If the end caps are not mounted, it is always possible for a small amount of UV light to escape. UV light is harmful to the eyes and to the skin! Never look directly into a UV lamp when it is switched on! Do not expose your skin unnecessarily to UV radiation! Wear protective clothing and a protective mask respectively safety goggles (part No. W3T168664)!



Danger!

Risk of injury and damage to the UV disinfection unit!

The UV disinfection unit may only be started up when the end caps are mounted and the control cabinet is closed and it is connected to the protective earth conductor.
Only authorized and qualified technical personnel may start up the UV disinfection unit.

1 Switch the UV disinfection unit on using the emergency OFF main switch.

The version information "UV-Control V x.x" appears on the graphics display. Then "Barrier M" is displayed on the operator menu.

The green LED "POWER" lights up.

Please note

If the UV disinfection unit is controlled from a major control system via the external release contact, the message „*ext. release ?" appears on the display of the operating panel. Only after this external release is activated, the operation of the UV disinfection unit starts and the first cleaning cycle is triggered.

On the version with automatic cleaning mechanism, triggering of one cleaning cycle. The green LED „CLEANING" lights up.

The lamps commence heating immediately once they are turned on. The corresponding number of green LEDs "Lamps....active" light up, depending on the number of lamps on.

After a heating-up period of approximately 4 minutes the lamps reach full intensity - and thus full disinfection efficiency. The green LED UV lights up. The UV measurement is activated.

The signal contact for „pump on" is activated if after 4 minutes heating-up period the minimum UV intensity (100 %) is reached.

After a warm-up period of another 10 minutes the lamps regulate into the optimal power range.

The remaining running time of the heating-up („Start-up") and the warm-up („no dim") period is shown on the display in a submenu of the status menu „Stat.: xxxxx".

Please note

If the lamps are switched off, they need about 15 minutes to cool down. Only after that time the lamps may be switched back on again. Frequent switching on and off reduces the service life of the lamps considerably!

Please note

If the lamps are switched off via the external voltage-free release contact, the fans in the control cabinet run on for 10 minutes.

Please note

Stand-by UV disinfection units have to be tested at regular intervals. We suggest once a month.The lamps must be on for a minimum of 1 hour. A short running time may have a negative impact on the service life of the lamps.

5.2 Operation

5.2.1 Operating panel

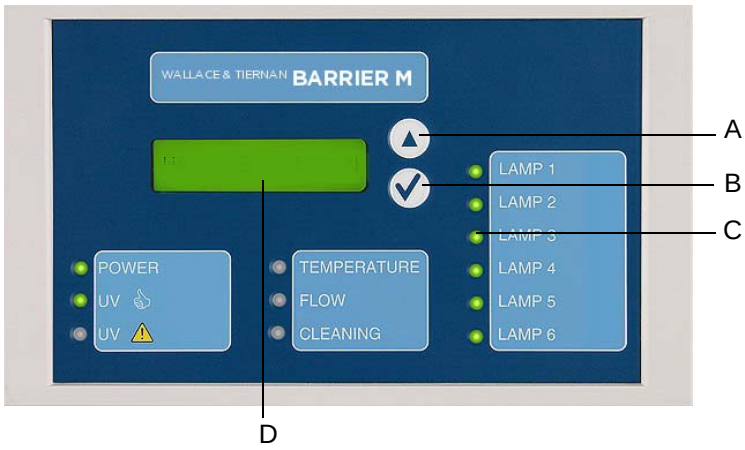


Fig. 1 Barrier M operating panel

A UP key
B Acknowledge key
C LED
D Display

UP key

- Scroll within one menu level and return to the next higher menu level
- Change value

Acknowledge key

- Change the position of the cursor on the display
- Change to sub-menus
- Start reset (e.g. set operating hours or switching cycles to zero)
- Trigger an immediate cleaning operation (only if „Automatic cleaning“ option is available)
- Confirm alarm signal
- Run an LED test

Display Displays the menus (operator and service menu)

LED A number of yellow, red and green LEDs are provided, depending on the unit specifications. The LEDs have the following meanings:

Power	The "POWER" LED lights up green when the emergency OFF main switch is switched on.
UV 👍 UV active	The LED "UV 👍" lights up green when the UV intensity in the chamber (UV reactor) has exceeded the preset minimum value. (When switching on, wait until the heat-up period of approx. 4 minutes has elapsed!)
UV ⚠ UV pre-alarm	The LED "UV ⚠" lights up yellow when the UV intensity in the chamber reaches 103 % of the min. intensity set in the service menu. A voltage-free relay contact is activated at the same time.
UV ⚠ UV Alarm	The LED "UV ⚠" lights up red when the UV intensity in the chamber has fallen below the preset minimum value. A voltage-free contact is activated at the same time. Optionally, the lamps (optional time delay) can still be additionally switched off.
Temperature pre-alarm	The LED "TEMPERATURE" lights up yellow when the advance water temperature alarm value entered in the service menu is exceeded. A voltage-free relay contact is activated at the same time.
Temperature alarm	The LED "TEMPERATURE" lights up red when the water temperature measured at the PT100 temperature sensor rises above the set value or when the max. temperature permanently set in the control cabinet is exceeded. The lamp(s) is/are automatically switched off. A voltage-free contact is activated at the same time. The green LED "UV 👍" disappears. The status display of the output relays in the operator menu indicates which of the two temperatures has led to the alarm.
Flow rate alarm	The LED "FLOW" lights up red if the measured flow rate value falls below the minimum or exceeds the maximum limit value. At the same time, the lamps are automatically switched off (optional time delay) and a voltage-free contact is activated. The green LED "UV 👍" disappears.

Cleaning active	The LED "CLEANING" lights up green when the automatic cleaning mechanism is active.
Cleaning alarm	The LED "CLEANING" lights up red if the automatic cleaning mechanism is faulty. The lamp(s) is/are automatically switched off and a voltage-free contact is activated. The green LED "UV" disappears.
Lamp … active	The number of lamps used varies between 1 and 6, depending on the unit configuration. The green LED lights up when the respective lamp is active.
UV lamp failure	The green LED flashes when the respective lamp failed. A voltage-free contact is activated at the same time. Optionally, the other lamps can also be switched off at the same time (optional time delay). As soon as the UV value is fallen below the alarm value the green LED „UV“ disappears and the LED „UV ⚠“ lights up red.

Please note

The respective error messages are shown as text messages on the display depending on what screen the unit currently has open.

5.2.2 Operating menu

When the UV disinfection unit has been switched on, the user is automatically in the operator menu.

During normal operation, the user can only access the operator menu with the following functions:

- Viewing important system values as well as the state of the alarms and messages and inputs and outputs
- Resetting the operating hours (switching cycles), for example after replacing lamps
- Programming or adjustment of the cleaning interval s(only for automatic cleaning mechanisms)
- Manual start of a cleaning operation (only for automatic cleaning mechanisms)
- Performing an LED test
- Resetting the alarm messages after remedying the error
- Selecting test mode to perform a UV sensor test
- Selecting the language



Please note

The units are changed in the service menu and may only be changed by customer services!

When the UP key is pressed, the following menu items appear on the display in the sequence described below:

Start operator menu

Barrier M



Hours run: xxxxxh



Display	Range / unit	Factory setting
Hours of operation counter. Total number of operating hours at all power levels	1 - 99999 h	---

When the lamps are active, the counter is updated every 10 minutes. This value can be reset in the "Reset" submenu by pressing the acknowledge key, after replacing a lamp, for example.



Press the acknowledge key to access the following submenus:

< 70%: xxxxxh	Number of operating hours at a lamp output of < 70%
70-80 %: xxxxxh	Number of operating hours at a lamp output of between 70 and 80%
81-90 %: xxxxxh	Number of operating hours at a lamp output of between 81 and 90%
91-100 %: xxxxxh	Number of operating hours at a lamp output of between 91 and 100%
Reset	Reset total operating hours (e.g. after replacing lamps)
	Start reset. After the reset has been carried out, you are automatically returned to the main "Operating hours" menu. If you do not wish to reset the system, press the UP key to go to "Lamp1 xxxxxh" on the menu.
Lamp 1: xxxxxh	Number of operating hours per lamp, depending on the number of lamps installed between 1 and 6. Each display can be reset individually.
Reset Lamp 1	Reset the operating hours of the corresponding lamp (1 to 6).
	Start reset. After the operating hours have been reset, you are automatically returned to the previous menu item "Lamp (1 to 6):xxxxxh". If you do not wish to reset the operating hours, press the UP key to access the menu of the next lamp "Lamp2 (to 6): xxxxxh", depending on the number of lamps, or return to the "Hours run" menu.

UV: xxxx %

Display	Range / unit	Factory setting
Currently measured UV intensity in %	either as W/m² or %. Range 0 - 9999, either a 4-figure or a 3-figure number with one digit after the decimal point or a 2-figure number with two digits after the decimal point	in %

With the display in %, 100% corresponds to the preset minimum UV intensity.

With the display in W/m², the displayed value must exceed the preset minimum UV intensity (in accordance with enclosed table for the UV alarm level, Chapter 7.)

Please note

The next two menus, "Dose: xxx.x J/m²" and "Transmis.: xxx%" are only displayed if the "Dose Control" function is activated in the service menu.

Dose: xxxx J/m²

Display	Range / unit	Factory setting
Currently determined fluence (UV dose)	0 - 9999 J/m², either a 4-figure or a 3-figure number with one digit after the decimal point or a 2-figure number with two digits after the decimal point	---

The target value for the fluence (UV dose) can be taken from the setting data configuration sheet on page 2 of the operating manual.

Transmis.: xxx%

Display	Range / unit	Factory setting
Transmission T10	in %	---

Parameter necessary to determine the fluence (UV dose). This is either the constant transmission value T_{10} specified by the customer and set at the factory - see data configuration sheet on page 2 of the operating manual or - if transmission measurement is available - the current transmission as measured.



Please note

The next menu "Q meas: xxxx m³/h" is only displayed if the "Flow Rate Monitoring" and/or "Dose Control" function is activated in the service menu and the "Q signal" setting is either "Auto" or "Man".

Q meas: xxxx m³/h

Display	Range / unit	Factory setting
Flow rate	0 - 9999 m³/h or USGPM (gallons per minute	m³/h

Parameter necessary to determine the fluence (UV dose). This involves either the constant flow rate value specified by the customer and set at the factory - see setting data configuration sheet, page 2 of the operating manual - or if flow rate measurement is available the currently measured flow rate. If the “Flow Rate Monitoring” function is active **(Service menu - Display Q signal: auto)** this is always the currently measured flow rate.

Watertemp.: xx°C

Display	Range / unit	Factory setting
Currently measured water temperature	0 - 99°C 32 - 199°F	°C

EPS Power: xxx %

Display	Range / unit	Factory setting
Displays the current lamp power in percent	70 - 100 %	---

Lamp switch: xxx

Display	Range / unit	Factory setting
Number of switching cycles	0 - 9999	---

The counter is increased by 1 each time the lamps are switched on. This is used to monitor the service life of the lamps and can be reset.

Press the acknowledge key to access the "Reset" sub-menu

Reset

Resetting switching cycles (e.g. after replacing lamps)

Start reset. After the system has been reset, you are automatically returned to the "Lamp switch" main menu.

If you do not wish to reset the system, press the UP key to return to the "Lamp switch" menu item



Please note

The next three menus "Clean: xxxxx", "Cleaning" and "Cleaning action" are only displayed if the "Automatic cleaning" option is fitted.

Clean: xxxxxx

Display	Range / unit	Factory setting
Number of cleaning cycles completed	0 - 999999	---

Each automatic cleaning cycle increases the counter by 1. Can be reset.

Press the acknowledge key to access the "Reset" sub-menu

Reset

Reset cleaning cycles (e.g. after replacing the cleaning ring)

Start reset. After the system has been reset, you are automatically returned to the main "Clean" menu.

If you do not wish to reset the system, press the UP key to return to the "Clean" menu item.

Cleaning

The cleaning intervals for an automatic cleaning cycle in operation and standby mode are set and/or adjusted in this menu. There are two submenus, operation and standby.

Display	Range / unit	Factory setting
Cleaning interval during operation	0 - 999 minutes	720 min
Cleaning interval during standby	0 - 48 h	0 h

Press the acknowledge key to access the submenus:

Operation: 720min

Cleaning interval during operation. If you only want the automatic cleaning mechanism to be activated depending on the minimum UV intensity, set the interval time to "0". Change the interval by pressing first the acknowledge key and then the UP key.

Standby: 24h

Cleaning interval during standby. If you want no cleaning at all during standby, set the interval time to "0". Change the interval by pressing first the acknowledge key and then the UP key.

Press the UP key to access the next menu.

Cleaning action

From this menu, the acknowledgement key can be used to trigger an immediate cleaning operation.

Please note

To operate the cleaning mechanism make sure that the chamber is completely filled with water all the time. Operating the cleaning mechanism in a not (completely) filled chamber will damage the system.

LED Test

From this menu, the acknowledge key can be used to run an LED test.

LED test on

LED test off

Stat.: 00111111/1



Display	Range / unit
Status display of the individual output relays for alarm messages and status display of the input signal for the external release	0 means relay deactivated 1 means relay active

Display when running without any errors									
Status display	0	0	1	1	1	1	1	1	1
Output relay for alarm messages	Water temperature pre-alarm (Pre-alarm at 1)	UV pre-alarm (pre-alarm at 1)	Flow rate alarm MIN or MAX (Alarm at 0)	Lamp alarm (alarm at 0)	Alarm temperature (alarm at 0)	Water temperature alarm (Alarm at 0)	UV alarm (disinfection) (alarm at 0)	Cleaning alarm (alarm at 0)	Status display of release contact ON / OFF, 0 means OFF, 1 means ON



Press the acknowledge key to access the following submenus:

Counter xxxxPuls

Number of pulses counted during running cleaning process.



Info 11111000

Status display of digital outputs and inputs, e. g.:



Status display	1	1	1	1	1	0	0	0
	Pump (digital output / 1 = on)	System ready (digital output / 1 = active)	Fan (digital output/ 1 = on)	Lamp EVG remote ON (digital output / 1 = on)	Bimetallic switch temperature cabinet (digital input / 1 = ok)	Disinfection MIN (digital input / 0 = active)	Cleaning motor runs counter-clockwise (digital output /1 = runs counter-clockwise)	Cleaning motor runs clockwise (digital output / 1 = runs clockwise)

Please note

For further details please see the „Diagnosis" menu!

Please note

The next submenu is only displayed during switching the UV disinfection system on.

When switching the UV disinfection lamps on the lamps commence heating immediately and reach full disinfection efficiency after a heating-up period of approximately 4 minutes. After the warm-up period of another 10 minutes the lamps regulate into the optimal power range.

Start up 0240s

no dimming 0600s

The remaining running time of both heating-up („Start-up") and warm-up („no dimming") period is displayed in this submenu.

At the end of the warm-up period the display switches automatically to the „Diagnosis" menu.

Diagnosis

In the „Diagnosis" menu active errors or messages are stored and can be viewed at any time. For diagnostic purposes you can view the current signal state of the alarms and digital outputs and inputs as well as the current values of the analog inputs.

Press the acknowledge key to change to the submenus. With the UP key you scroll within one menu level or return to the next higher menu level.

Press the acknowledge key to access the following submenus:

- **Messages**
- **Pre-Alarms**
- **Alarms**
- **Digital outputs**
- **Digital inputs**
- **Analog in**

****Messages****

***** Messages *****

Active messages can be viewed.

Press the acknowledge key to access the messages submenu. The following messages can be displayed. If there are several active messages at the same time the respecitve messages are displayed alternately.

****Flow ?***

****Temp. Cabinet ?***

****Water Temp. ?***

****Cleaning ?***

****ext. release ?***

****UV value ?***

****Lamp xx ?***

****UV dose ?***

This message is displayed only with dose control function.

no Message

If there is no active message „no Message" is displayed.

Press the UP or acknowledge key to access the next submenu „**Pre-Alarms**".

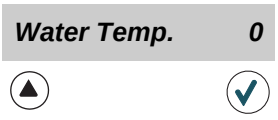
****Pre-Alarms****



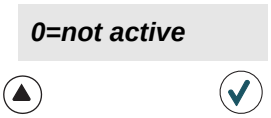
There are two pre-alarms, for water temperature and UV. The current signal state of the pre-alarm contacts can be viewed. They are NO (normally open) contacts.

Signal status	Display	Description
0	0=not active	no pre-alarm (warning)
1	1=active	voltage is applied, there is an alarm

Press the acknowledge key to access the pre-alarm contacts submenus.



Signal status of the pre-alarm contact for the water temperature



Legend of the signal status



Signal status of the pre-alarm contact for the UV signal



Legend of the signal status

Press the UP or acknowledge key to access the next submenu „**Alarms**".

****Alarms****



There are six alarms:

- Flow rate
- Lamps
- Temperature cabinet
- Water Temperature
- UV
- Cleaning

The current signal state of the alarm contacts can be viewed. They are NC (normally closed) contacts.

Signal status	Display	Description
1	1=not active	no voltage, no alarm
0	0=active	there is an alarm

Press the acknowledge key to access the alarm contacts submenus.



Signal status of the alarm contact for the flow rate



Legend of the signal status



Signal status of the alarm contact for the lamps



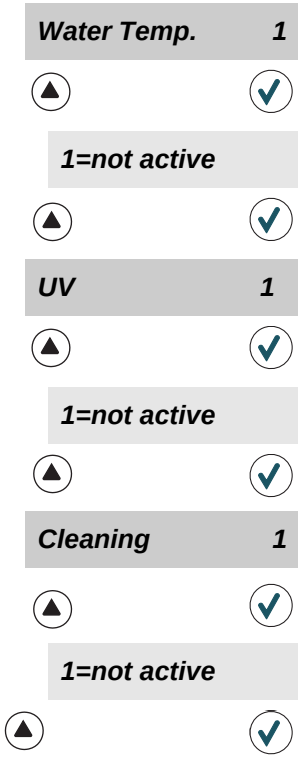
Legend of the signal status



Signal status of the alarm contact for the cabinet temperature



Legend of the signal status



Signal status of the alarm contact for the water temperature

Legend of the signal status

Signal status of the alarm contact for the UV signal

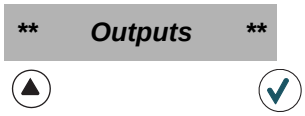
Legend of the signal status

Signal status of the alarm contact for the cleaning

Legend of the signal status

Press the UP or acknowledge key to access the next submenu „**Outputs**".

****Outputs****



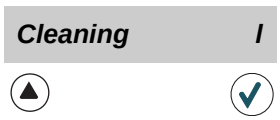
There are five digital outputs:

- Cleaning
- Fan
- Lamps
- Pump
- System ready

The current signal state of the digital outputs can be viewed.

Digital output	Signal status	Display	Description
Cleaning	--	l	motor shaft rotates counter-clockwise
		r	motor shaft rotates clock-wise
Fan/ Lamps/ Pump	1	1=on	fan/lamps/pump run
	0	0=off	fan/lamps/pump are off
System ready	1	1=active	system is ready for opera-tion
	0	0=not active	system is not ready for ope-ration

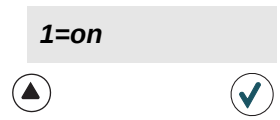
Press the acknowledge key to access the digital outputs submenus.



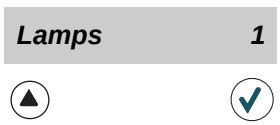
Display of the rotating direction of the cleaning mechanism motor shaft



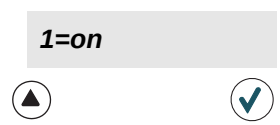
Signal status of the digital output for the fan



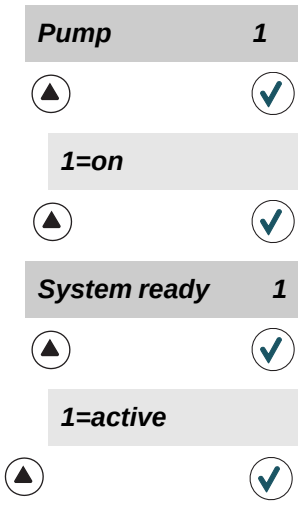
Legend of the signal status



Signal status of the digital output for the lamps



Legend of the signal status



Signal status of the digital output for the pump

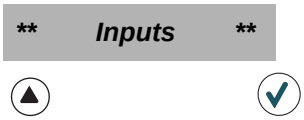
Legend of the signal status

Signal status of the digital output for system ready

Legend of the signal status

Press the UP or acknowledge key to access the next submenu „**Inputs**”.

****Inputs****



There are five digital inputs:

- Cabinet temperature
- Ext. release
- Desinfection min
- Lamp 1-6: 111111
- DIP 0101000000

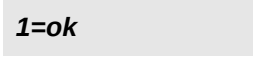
The current signal state of the digital inputs can be viewed.

Digital input	Signal status	Display	Description
Temp. cabinet	1	1=ok	Contact closed, temperature ok
	0	0=not ok	Contact open, max. temperature exceeded
Ext. release	1	1=on	Contact closed, unit in operation
	0	0=off	Contact open, unit in standby
Desinf. min	0	0=active	lamps regulate into the optimal power range between 70 and 100 %
	1	1=not active	no regulation, the lamps run at full intensity (100 %)
Lamps 1-6 111111	1	1=on / 0=off	feedback from the EPS that lamp is on resp. off
	0		

Press the acknowledge key to access the digital inputs submenus.



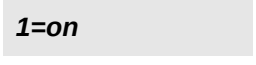
Signal status of the digital input for the cabinet temperature



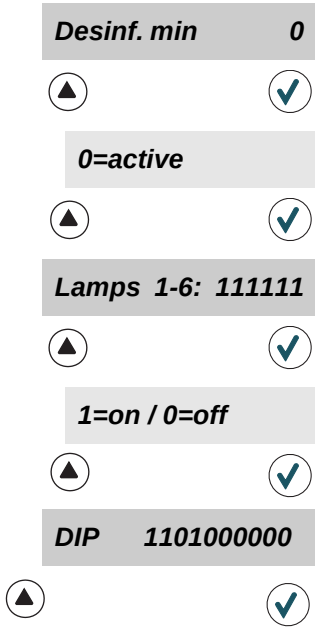
Legend of the signal status



Signal status of the digital input for the external release



Legend of the signal status



Signal status of the digital input for the Desinfection min.

Legend of the signal status

Signal status of the digital input for the lamps 1 to 6

Legend of the signal status

Display of the DIP switches

Press the UP or acknowledge key to access the next submenu „**Analog inputs**".

****Analog inputs****

**** *Analog In.* ****

There are four analog inputs:

- Water temperature Pt100
- Transmission
- Flow
- UV signal

The current values of the analog inputs can be viewed. The values for transmission, flow and UV signal are always between 4 and 20 mA, the value for the Pt100 water temperature is between 0 and 20 mA.

Press the acknowledge key to access the analog inputs submenus.

AD1 xxxx/ xx.xx mA

Current value of the analog input AD1 for the Pt100 water temperature

AD1=Pt100

Legend of the analog input AD1

AD2 xxxx/ xx.xx mA

Current value of the analog input AD2 for the transmission

AD2=Transmission

Legend of the analog input AD2

AD3xxxx/ xx.xx mA

Current value of the analog input AD3 for the flow

AD3=Flow

Legend of the analog input AD3

AD4 xxxx/ xx.xx mA

Current value of the analog input AD4 for the UV signal

AD4=UV-Signal

Legend of the analog input AD4

Press the UP key to return to the „Diagnosis” menu.

Alarm Reset

After remedying the error, pressing the acknowledge key in this menu resets the alarm messages and switches the UV lamps on again.

Sample mode s

For regular checks of the UV sensors with a reference radiometer, the "Test mode" function can be selected by pressing the acknowledge key. For the duration of the check measurement **(factory setting 120 s)**, the alarm and switching functions are disabled.

Language: DE

Display	Language selection
selected language	• German (DE) • English (EN) • French (FR) • Swedish (SE) • Nederland (NL) • Polish (PL)

V03.12_08/15

Version display

- END -

End of the operator menu.

Password: xxxx

A password has to be entered to access the service menu, Level 1, which is only accessible to trained and authorized technical personnel.

Press the UP key to return to the "Operating hours" menu item at the top of the operator menu.

5.3 Service life of UV lamps

The number and type of the lamps installed can be laid out according to the flow rate and the condition of the water to be treated.

The UV lamps are wear parts. The operating life of the UV lamps is normally up to about 9,000 hours, provided that the UV disinfection unit is operated according the described operating conditions that are defined in the setting data configuration sheet on page 2 of the operating manual.

Primarily, this includes the following factors:

- Operation in disinfection control mode (standard)
- stable flow rate
- stable water quality (transmission T_{10}, SSK)
- non-adjustable alarm value for min. UV intensity
- Switching operations (max. 4 per day)

5.4 Manual cleaning mechanism (option)

Manual cleaning can be performed when the system is switched on. The cleaning frequency depends on the water requiring treatment and on the radiation intensity shown on the display. Cleaning should be carried out after an advance alarm or a UV alarm.

For manual cleaning proceed as follows:

1 Unlock the bayonet catch.



2 Pull the cleaning mechanism out completely with the handle and then push it back again. Repeat several times if necessary.

3 Relock the bayonet catch.

Warning!

Risk of injury!

When the bayonet catch is opened, the handle of the cleaning mechanism may be forced outwards by the pipe pressure.

Please note

The maximum operating pressure for UV disinfection units with manual cleaning mechanism is 3 bar!

Please note

The cleaning rod is sealed with a shaft seal. The shaft seal is a wear part. After a certain amount of time, the formation of drops can occur. The wear is dependent upon the operation of the cleaning mechanism. Improper operation accelerates wear.
The function of the UV disinfection unit has not been jeopardized. Replace the shaft seal soon! Refer to chapter Spare parts, 6.1.3 Housing/Lamps.

5.5 Automatic cleaning mechanism (option)

The automatic cleaning mechanism can be set to operate depending on the time and/or depending on the radiation intensity.

The automatic cleaning mechanism is factory set to start after 720 minutes according to the interval time set in the operator menu and also before the minimum UV intensity or minimum UV dose reaches 102% of the limit value during normal operation. The interval time can be altered in the operator menu.



Please note

Two successive cleaning cycles must be at intervals of at least 60 minutes!

If you only want the automatic cleaning mechanism to be activated depending on the minimum UV intensity, set the interval time to "0" in the operator menu.

If you only want the automatic cleaning mechanism to be activated depending on the time, this must be set using the DIP switches (this can only be done by customer services or authorized and trained technical personnel). The interval time can be set in the operator menu.

In standby mode an automatic cleaning may be initiated as well. The interval time can be set in the operator menu. Factory setting is „0”. This means, that no automatic cleaning takes place in standby mode.

Cleaning can be started immediately, at any time, by pressing the acknowledge key in the "Start cleaning" menu.



Warning!

Risk of injury!

Never touch the automatic cleaning mechanism when the UV disinfection unit is switched on! Only switch the UV disinfection unit on if the end caps are in place!



Please note

The cleaning rod is sealed with a shaft seal. The shaft seal is a wear part. After a certain amount of time, the formation of drops can occur.
The function of the UV disinfection unit has not been jeopardized. Replace the shaft seal soon! Refer to chapter Spare parts, 6.1.2 Housing/Lamps, rod seal.

5.6 Sacrificial anode

Please note

Sacrificial anodes are dissolving and must therefore be checked in regular intervals, depending on the application and the local conditions, and replaced if necessary. Refer to chapter Spare parts, chapter 6.1.3 Housing/Lamps.

5.7 Disinfection monitoring

The automatic disinfection monitoring, the lamps are always run automatically at the ideal level in accordance with the prevailing conditions. The display shows the capacity at which the UV lamps are currently operating (in %).

If the UV intensity at 100 % capacity is lower than the minimum UV intensity limit value, the green LED "UV" disappears and the red LED for "UV ⚠" lights up and the error message „*UV value?" is displayed (see 5.12 Errors).

5.8 Dose control

If the dose control function is activated, the following additional displays appear in the operator menu

Display	
Dose:	xxxJ/m² (UV dose)
Transmis.:	xxx% (transmission value T_{10})
Q meas.:	xxxm³/h (flow rate value)

The UV alarm and disinfection monitoring are now based on the UV dose. If the mesured UV dose is below the factory preset alarm value for the UV (see setting data configuration sheet, page 2 of the operating manual), the green LED "UV" disappears and the red LED for "UV ⚠" lights up and the error message „*UV dose?" is displayed (see 5.12 Errors). At the same time, a voltage-free contact is activated and you can also switch the lamps off.

5.9 Flow rate monitoring

If the flow rate monitoring function is activated, the following displays appear in the operator menu

Display	
Q meas.:	xxxm³/h (flow rate value)

If values are below or above of the maximum and minimum limit values set at the factory (see setting data, page 2 of the operating manual), the red LED for the "FLOW RATE" alarm lights up (see 5.12 Errors). At the same time, the „pump on“ signal contact closes and the lamps are switched off (time delay option) and a voltage-free contact is activated. The green LED "UV" disappears.

5.10 Temperature monitoring

Please note

Please bear in mind that the value shown on the display for the water temperature can be influenced by lamp heat and cable resistance!

Please note

Risk of damage to the UV disinfection unit!

The water temperature must not exceed 45° C! Temperatures in excess of 60° C will damage the unit!

Warning!

Risk of burns!

Hot surface of treatment disinfection chamber (UV reactor)! The alarm value for the maximum water temperature is programmed at the factory to 45° C. Higher temperatures causes burns when contacting the treatement disinfection chamber. To avoid this, for temperatures in excess of 45° C safety measures must be taken by the client (e. g. fix a safety guard)!

5.11 Messages

5.11.1 Alarms

The following alarm messages (pre-alarms and error messages) are configured:

- *UV value?
- *Temp. Water?
- *Temp. Cabinet?
- *Flow?
- *Cleaning?
- *Lamp x?
- *UV Dose? (with activated dose function only)
- Pre-alarm UV
- Pre-alarm water temperature

The alarms are output via red or yellow (pre-alarm) LEDs on the operating panel and / or voltage-free relay contacts. The error messages are displayed as a text message and can also be viewed in the diagnosis menu. Safety deactivation of the lamps is also configured (optional time delay). (For details on the criteria for triggering safety deactivation, see 3.7.2 Safety functions, controller).

The contacts for the pre-alarms are NO (normally open), i. e. they are open, when there is no pre-alarm. The contacts for the alarms are NC (normally closed), i. e. they are closed, when there is no alarm. The signal status can be viewed in the „Diagnosis” menu.

Alarm message	triggered by	Alarm output
*UV value?	• Value below the minimum UV intensity set in the service menu (at lamp power: 100 %)	• The red "UV ⚠" LED lights up • The error message „*UV value?” appears on the display • Voltage-free relay contact de-energizes • Safety shutdown of the lamps, optional • The green LED "UV 👍" disappears
*UV dose?	• Value below the alarm value for the UV dose set in the service menu (at lamp power: 100 %)	• The red "UV ⚠" LED lights up • The error message „UV dose?” appears on the display • Voltage-free relay contact de-energizes • Safety shutdown of the lamps, optional • The green LED "UV 👍" disappears

Alarm message	triggered by	Alarm output
*Temp. Cabinet? *Temp. Water?	• Temperature alarm values set in the service menu exceeded	• The red "TEMPERATURE" LED lights up • The error message „*Temp. Water?" or *Temp. Cabinet?" appear on the display • Voltage-free relay contact de-energizes • Safety deactivation of the lamps. The green "Lamp ...active" LEDs disappear • The green LED "UV 👍" disappears
*Flow?	• The maximum and minimum alarm values for the flow rate set in the Service menu have been exceeded or not reached	• The red "FLOW RATE" LED lights up • The error message „*Flow?" appears on the display • Voltage-free relay contact de-energizes • Safety deactivation of the lamps. The green "Lamp ...active" LEDs disappear • The green LED "UV 👍" disappears
*Cleaning?	• Values set in the service menu, level 2, have been exceeded or not reached	• The red "CLEANING" LED lights up • The error message „*Cleaning?" appears on the display • Voltage-free relay contact de-energizes • Safety deactivation of the lamps. The green "Lamp ...active" LEDs disappear • The green LED "UV 👍" disappears
*Lamp?	• Faulty lamp	• The green "Lamp ...active" LEDs flash • The error message „*Lamps xx?" appears on the display • Voltage-free relay contact de-energizes • Safety shutdown of the lamps, optional. • The green LED "UV 👍" disappears
UV pre-alarm	• If the UV intensity is below the minimum UV intensity set in the service menu (at a capacity of 100%), an pre-alarm is triggered.	• The yellow "UV ⚠" LED lights up • Voltage-free relay contact energizes

Alarm message	triggered by	Alarm output
Pre-alarm Water temperature	• If the pre-alarm value for the water temperature set in the Service menu is exceeded	• The yellow "TEMPERATURE " LED lights up • Voltage-free relay contact energizes

5.11.2 Operating message

There is one operating message:

- „Ext. Release?

The UV disinfection unit can e. g. be controlled from an external control room. To this the contact for the external release must be closed.

Operating message	triggered by	Message output
*Ext. Release?	• Contact for external release e. g. from an external control room is not closed or is not bridged	• The green "Lamp ...active" LEDs disappear • The green LED "UV  " disappears

5.12 Errors

Error messages are indicated on the operating panel by the respective LEDs and are shown as text on the display depending on what screen the unit currently has open. If there are several errors at the same time the respecitve messages are displayed alternately. The error message is shown on the display until it is acknowledged by pressing the acknowledge key. Active errors can be read off in the diagnosis menu.

Alarm Reset

When the error has been remedied, the error must be reset under the menu item "Alarm Reset" using the acknowledge key on the operating panel. The error message is deleted from the diagnosis menu.

Each signaled error, except a cleaning alarm can also be reset by the external release contact e. g. from a switching room. An automatic reset takes place by switching the unit off first and, after removal of the malfunction, restart it again. To this the DIP switch 10 „Alarm reset via external release” must be in position „ON” (this can only be done by customer services or authorized and trained technical personnel).

If it is not possible to remedy the fault or error yourself, please contact us directly.

Error message / Fault	**Cause**	**Remedy**
Display dark and LEDs do not light up	• No power supply	• Have an electrician check whether • power is supplied

No lamp LEDs light up	• The lamp does not switch itself on	• Have an electrician check whether
		  • the enable input is connected or bridged (refer to wiring diagram)
		  • the power circuit breaker in the control cabinet is switched on.
		  • the fuse on the controller is faulty - replace the fuse (see chapter 6.1, Spare parts).
		• Replace faulty lamps

Error message / Fault	Cause	Remedy
Lamp failure ***Lamps xx ?** Lamp LEDs flash **if the optional automatic safety shutdown is activated in the service menu, in the event of lamp failure, the UV disinfection unit switches off immediately**	• Lamp failure or faulty lamp	• Press the acknowledge key under the menu item "Alarm Reset" in the operator menu to reset the alarm. If the alarm is still permanent, replace the faulty lamp respectively clear the fault.
UV pre-alarm LED "UV ⚠" lights up yellow	• The UV intensity is below 103% of the factory preset minimum UV intensity	• On the version with the manual cleaning mechanism perform a manual cleaning. • If all the LEDs light up, check the capacity in the operator menu. If it is at 100%, replace all of the lamps. • Check the total number of operating hours in the operator menu. Replace all lamps if necessary due to their age. • Ensure that the SEC value (or transmission $T_{10)}$ is within the prescribed range (see setting data sheet on page 2 of the operating manual) • If transmission measurement is available, check the measured value and whether the measuring unit is functional • If there is a flow rate alarm at the same time, check the flow rate (see the "Flow rate alarm" error message) • If there is a cleaning alarm at the same time, check the automatic cleaning mechanism (see the "CLEANING" alarm error message) • On the version without the cleaning mechanism, have the service technicians clean the quartz sleeves and the UV sensor window, if necessary

Error message / Fault	Cause	Remedy

UV alarm
 	
***UV value ? or *UV dose ?** -
 	
The "UV ⚠" LED lights up red
 	
if the optional automatic safety shutdown is activated in the service menu, in the event of a UV alarm, the UV disinfection unit switches off immediately
	• UV intensity is lower than the limit value for the minimum UV intensity set at the factory
	
	or if the "dose control" function is activated
	• UV dose is lower than the limit value for the UV dose set at the factory
		• On the version with the manual cleaning mechanism perform a manual cleaning.
		• Switching the UV disinfection unit on again:
		  • Check at the LEDs on the operating panel whether individual lamps are faulty and replace any faulty lamps.
		  • If all the LEDs light up, check the power level in the operator menu. If it is at 100 %, replace all of the lamps.
		  • Check the total number of operating hours in the operator menu. Replace all lamps if necessary due to their age.
		
		• Check the SEC value (or transmission $T_{10)}$) and adjust the flow rate if necessary (see the "Alarm level" table in chapter 7)
		• If the turbidimeter is available, check the measured value and whether the measuring unit is functional
		• If there is a flow rate alarm at the same time, check the flow rate (see the "Flow rate alarm" error message)
		• If there is a cleaning alarm at the same time, check the automatic cleaning mechanism (see the "CLEANING" alarm error message)
		• On the version without the cleaning mechanism, have the service technicians clean the quartz sleeves and the UV sensor window, if necessary

Pre-alarm Temperature LED "TEMPERATURE" lights up yellow	• Water temperature is higher than the programmed limit value for the water temperature advance alarm	• Check whether the water flow rate is sufficient. Provide a sufficient flow rate. • Check the bleed valve to ensure that it is functioning correctly. Water should be dripping from the bleed hose at a steady rate (only when flowing horizontally)! • Measure the water temperature using an external thermometer to check whether the temperature sensor is working and have the temperature sensor replaced by a service technician if necessary.

Error message / Fault	Cause	Remedy
Temperature alarm ***Water Temp. ?** LED "TEMPERATURE" lights up red **UV disinfection unit switches off immediately**	• Water temperature is higher than the programmed limit value for the water temperature.	• Check whether the water flow rate is sufficient. Provide a sufficient flow rate. • Check the bleed valve to ensure that it is functioning correctly. Water should be dripping from the bleed hose at a steady rate (only when flowing horizontally)! • Measure the water temperature using an external thermometer to check whether the temperature sensor is working and have the temperature sensor replaced by a service technician if necessary.
Temperature alarm ***Temp. Cabinet ?** LED "TEMPERATURE" lights up red **UV disinfection unit switches off immediately**	• The control cabinet temperature on the mounting plate is higher than the permanently set limit value of approximately 65°C.	• Check that the control cabinet fan is able to draw in and discharge air freely.
Cleaning alarm ***Cleaning ?** - LED "CLEANING" lights up red **UV disinfection unit switches off immediately**	• The automatic cleaning mechanism has failed	• If the motor fails for thermal reasons, it must first cool down before it can be switched on again. Once it has cooled down, press the acknowledge key under the menu item "Alarm Reset" in the operator menu to reset the alarm. If the alarm persists, notify Evoqua customer service.
Flow rate alarm ***Flow ?** LED "FLOW RATE" lights up red **UV disinfection unit switches off immediately**	• The set minimum or maximum limit values for the flow rate have been exceeded or not reached	• Check whether the flow rate measurement is working properly • Ensure that flow rate is within the prescribed range (see setting data configuration sheet on page 2 of the operating manual)
"UV  " LED does not light up	• The programmed minimum UV intensity is not yet reached during a heat-up time of approximately 4 minutes.	• Wait for the heat-up time of 4 minutes to elapse!

Error message / Fault	Cause	Remedy
• UV alarm • Failure of lamp • Water runs out of the end cap	• Quartz pipe defective • Quartz pipe break	• Switch the disinfection unit off • Close the valves • Notify customer service
• UV alarm • Failure of all lamps (LEDs flash) **- the UV unit initiates the valve closing process and stops after a delay**	• Exceeding the fixed temperature limit of 65°C on the lamp flange governed by the bi-metallic switch.	• Switch the UV disinfection unit off using the emergency off / main switch. • Notify customer service

Please note

In the case of a temperature alarm (water temperature and controller), a flow rate alarm, a cleaning alarm and optionally in the case of a UV alarm and failure of lamps alarm, the UV disinfection unit is switched off.

Please note

Document all modifications and other work performed in the logbook in chapter 6.3.

5.13 Maintenance performed by the operator

Maintenance is divided into two levels:

- Maintenance level 1
  To be performed by trained operators who have received appropriate instruction.
- Maintenance level 2
  To be performed by Evoqua service personnel or by technical personnel trained and authorized by Evoqua.

Liability for defects can only be accepted if maintenance work is performed as specified.

Maintenance overview

Period/Interval	**Activity** (Maintenance level 1, performed by the operator)

Daily	• Functional check
	  • LED
	  • Are alarms pending?
	• Visually inspect entire UV disinfection unit for leaks
	• Perform a visual inspection of the bleed valve to ensure that it is functioning correctly
	  • Water should be dripping out of the bleed hose at a steady rate

Monthly	• Check the number of lamp operating hours and replace the lamps if necessary • Test run of stand-by units. The lamps must be on for a minium of 1 hour
Annually	• Request service technician (Maintenance level 2)
Every 2 years	• Have the UV sensor calibrated at the factory and replace if necessary
As required	• Replacing lamps - Chapter 5.14
	• Clean the surface of the disinfection chamber with a suitable cleaning agent (non corrosive!)

Please note

Chapter 6.1 Spare parts in this operating manual lists all of the spare parts together with their part numbers. Chapter 3.3 Maintenance part sets in the commissioning manual lists all of the maintenance part sets needed for the one-year maintenance together with their part numbers.

Please note

Document all modifications and other work performed in the logbook in chapter 6.3.

Please note

The cleaning rod is sealed with a shaft seal. The shaft seal is a wear part. After a certain amount of time, the formation of drops can occur.
The function of the UV disinfection unit has not been jeopardized. Replace the shaft seal soon! See chapter 6.1.2, rod seal.

Warning!

Risk of injury!

If the UV disinfection unit is found to be leaking or damaged in any way, switch it off using the the emergency OFF main switch immediately and notify Evoqua customer service!

5.14 Replacing the UV lamps

Defective lamps should only be replaced with brand new lamps. The lamps are always supplied in the original packaging and should not be unpacked until they are ready for mounting.



Warning!

Risk of burns!

Remember that the lamps are hot when they have been in use. After use, leave them to cool down for at least 15 minutes.



Warning!

Risk of injury!

The UV lamps contain a small amount of toxic mercury that must be bound immediately in the event of lamp breakage using either a mercury collector or a powerful pipette (see 2.5 and 5.15 Lamp breakage).



Attention!

Risk of damaging the lamp!

When working with the lamps, always wear clean cotton gloves. Only touch the lamps at both ends if possible.



Please note

On versions with several lamps:
At the end of their service life lamps that have aged are only to be replaced in sets.



Please note

On versions with several lamps:
If lamp 1 which is immediately in front of the UV sensor is defective, replace this with the next lamp in the row which has already been in use. Then mount the new lamp into the empty fitting. This ensures that UV measurement is affected as little as possible by irregularly illuminated lamps.

Please note

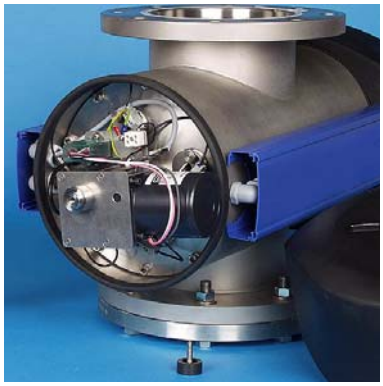
On versions with several lamps:
Numbers are punched into the lamp flange next to the openings for the lamps. The wires of the connection cable are also numbered. Ensure correct assignment during connection.

1 Switch the UV disinfection unit off using the emergency OFF main switch and make sure the unit cannot be switched on again.



2 Remove the black end caps on both sides by unscrewing the securing screws. On the version with a manual cleaning mechanism the end cap is secured on one side by the cleaning mechanism. Proceed as follows:

- Pull out the handle
- Unscrew the handle and locking screw
- Unscrew the securing nut
- Remove the end cap



3 Ensure unit is not connected to mains power and free of voltage.

4 Release the connection wires of the lamp from the terminals on both sides. If necessary, remove the motor.

5 Unscrew the terminal mounting plate on one side (on units with an automatic cleaning mechanism, the side without the motor should be used preferably as the service side).

6 Remove the spring.

7 Carefully remove the used lamp from the quartz sleeve. Ensure that the lamps are always disposed of correctly.



8 Put on the supplied cotton gloves. Never touch the lamps with your bare hands!

9 Carefully remove the lamp from the packaging. New lamps are supplied in a box together with a cleaning cloth (part number W3T166566) and instructions.

10 Clean the glass with the supplied cleaning cloth or with alcohol. Never hold the lamp at one end only. Hold the lamp at both outer ends.



11 Carefully push the lamp back into the quartz sleeve. The connection wires of the lamp must be routed through the opening provided to this purpose on the opposite side in the terminal mounting plate. Always keep the lamp in an absolutely horizontal position! The sealing point of the lamp which is immediately in front of the UV sensor may not show to the UV sensor!

12 Insert the spring.



13 On the mounting side, push the connection wires of the lamp through the opening on the terminal mounting plate and screw into place.

14 Connect the wire to the terminal. With a slot screwdriver push the terminal spring down until the wire can be inserted into the terminal.

15 On units with an automatic cleaning mechanism remount the motor if necessary.

16 Push the end caps onto the treatment disinfection chamber. Screw the end caps into place.

17 With the manual cleaning mechanism

- Tighten the securing screw
- Tighten the handle and locking screw

18 Switch the UV disinfection unit on using the emergency OFF main switch.



Attention!

Risk of injury!

Only switch the UV disinfection unit on if the end caps are in place. If the end caps are not mounted, it is always possible for a small amount of UV light to escape. UV light is harmful to the eyes and to the skin! Never look directly into a UV lamp when it is switched on! Do not expose your skin unnecessarily to UV radiation! Wear protective clothing and a protective mask respectively safety goggles (part No. W3T168664)!

Please note

Document all modifications and other work performed in the logbook in chapter 6.3.

Please note

Frequent switching on and off reduces the service life of the lamps considerably!

Please note

There is no disinfection during replacing the lamps!

5.15 Lamp breakage

Environmental hazard!

The UV lamps contain a small amount of mercury. If a lamp is broken, the mercury must be bound immediately with either the mercury collector (option, see chapter 3.9.8 Mercury collector) or with a powerful pipette. The bound mercury must be disposed of at a collection point for chemical waste in accordance with locally applicable regulations.
Avoid contact with your skin and hair; do not breathe in any fumes and ensure adequate ventilation!

If necessary, faulty or used lamps can be returned to Evoqua Water Technologies GmbH, Günzburg.

5.16 Disposal

General information

Dispose of the lamps, the disinfection chamber (UV reactor) and the control cabinet in accordance with applicable local regulations. Observe the hazards described in chapter 5.15 if a lamp breaks.

Returning used lamps

Faulty or used lamps can be returned to Evoqua Water Technologies GmbH, Günzburg.

6. Spare parts, maintenance schedule

6.1 Spare parts

Please note

For reasons of safety, only use original spare parts. Please contact our customer service if you need any spare parts.

Please note

Document all changes and other performed tasks in the logbook included in this chapter.

Please note

Chapter 3.3 Maintenance part sets in the commissioning manual lists all of the maintenance part sets needed for the one-year maintenance together with their part numbers.

Please note

The item numbers in the bills of materials refer to the pictured graphics respectively to the explosion drawings included in chapter „Drawings“ of the commissioning manual.

6.1.1 Controller

		Barrier M 35	Barrier M 80	Barrier M 135	Barrier M 210	Barrier M 275	Barrier M 290	Barrier M 350	Barrier M 525	Barrier M 700	Barrier M 900	Barrier M 950	Barrier M 1200
Part No.	Designation	Quantity											
W3T304765	Controller, programmed	1	1	1	1	1	1	1	1	1	1	1	1
W3T168274	Display	1	1	1	1	1	1	1	1	1	1	1	1
W3T160825	Front membrane	1	1	1	1	1	1	1	1	1	1	1	1
W3T162712	EPS, 1 kW	1	1		4								
W3T162713	EPS, 2 kW			1		1	3	4	2	3	4	3	4
W2T506812	Fine-wire fuse, controller 1,0 A, delay-action	1	1	1	1	1	1	1	1	1	1	1	1
W3T162742	EPS cooling fan	1	1	1	4	1	3	4	2	3	4	3	4
W3T162864	EPS fan	1	1	1	4	1	3	4	2	3	4	3	4
W2T506888	Control cabinet fan	1	1	1		1							
W2T505851	Control cabinet fan				1		1	1	1	1	1	1	1

		Barrier M 1250	Barrier M 1400	Barrier M 1700	Barrier M 2000	Barrier M 2600	Barrier M 3800						
Part No.	Designation	Quantity											
W3T304765	Controller, programmed	1	1	1	1	1	1						
W3T168274	Display	1	1	1	1	1	1						
W3T160825	Front membrane	1	1	1	1	1	1						
W3T162713	EPS, 2 kW	6		4									
W3T162714	EPS, 3 kW		2		3	4	6						
W2T506812	Fine-wire fuse, controller 1,0 A, delay-action	1	1	1	1	1	1						
W3T162742	EPS cooling fan	6	2	4	3	4	6						
W3T162864	EPS fan	6	2	4	3	4	6						
W2T505851	Control cabinet fan	1	1	1	1	1	1						

6.1.2 Manual cleaning
Automatic cleaning

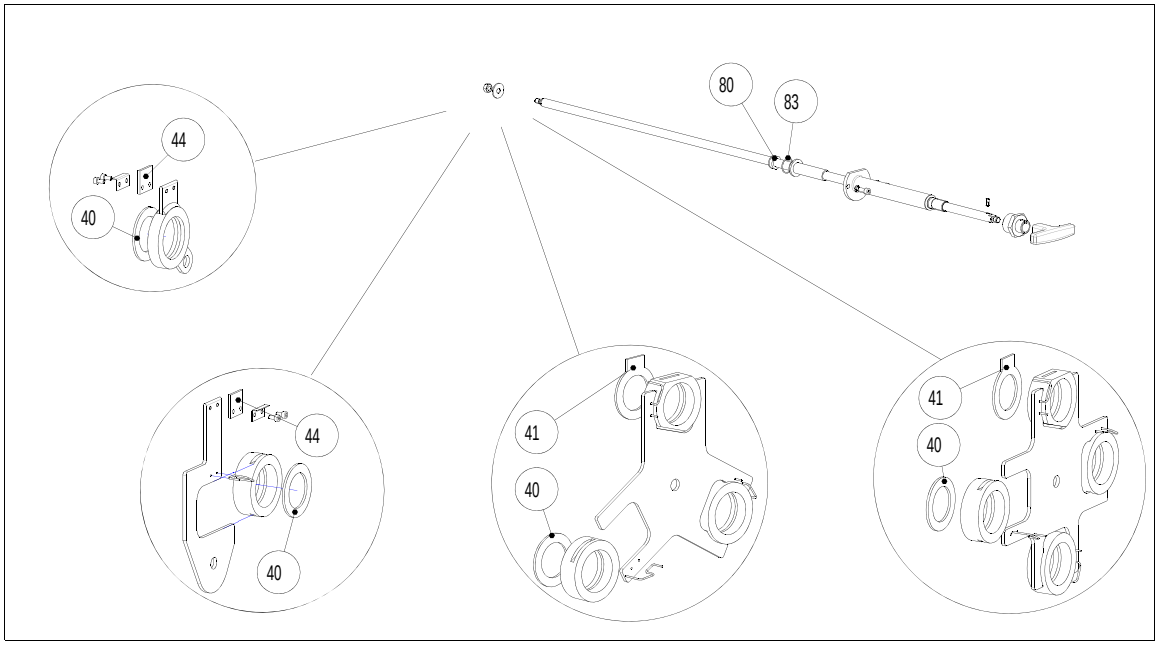
			Barrier M 35	Barrier M 80	Barrier M 135	Barrier M 210	Barrier M 275	Barrier M 290	Barrier M 350	Barrier M 525	Barrier M 700	Barrier M 900	Barrier M 950
Part No.	Item	Designation	Quantity										
W3T168284	40	Cleaning ring	1	1	1	4	1	3	4	2	3	4	3
W3T160690	41	UV sensor cleaning ring				1		1	1				
W3T160689	44	UV sensor cleaner	1	1	1		1			1	1	1	1
W3T160696	48	Metal sheet UV sensor cleaner	1	1	1		1			1	1	1	1
W2T504963	49	Screw, DIN 912, M3x6	2	2	2		2			2	2	2	2
W3T166221	55	Threaded socket /4	1	1	1	1	1	1	1	1	1	1	1
W3T166222	56	Threaded socket /4	1	1	1	1	1	1	1	1	1	1	1
W2T505979	58	Securing pin	2	2	2	2	2	2	2	2	2	2	2
W2T504943	80	Rod seal, manual cleaning	1	1	1	1	1	1	1	1	1	1	1
W3T164606	83	O-ring	1	1	1	1	1	1	1	1	1	1	1
W3T160852	112	O-ring	1	1	1	1	1	1	1	1	1	1	1
W2T504944	116	Rod seal, automatic cleaning [1]	2	2	2	2	2	2	2	2	2	2	2
W3T172507	145	Motor					1			1	1	1	1
W3T172508	145	Motor		1	1	1		1	1				
W3T172335	150	PCB	1	1	1	1	1	1	1	1	1	1	1

1) Use maintenance parts set W3T166537 to replace the rod seals.

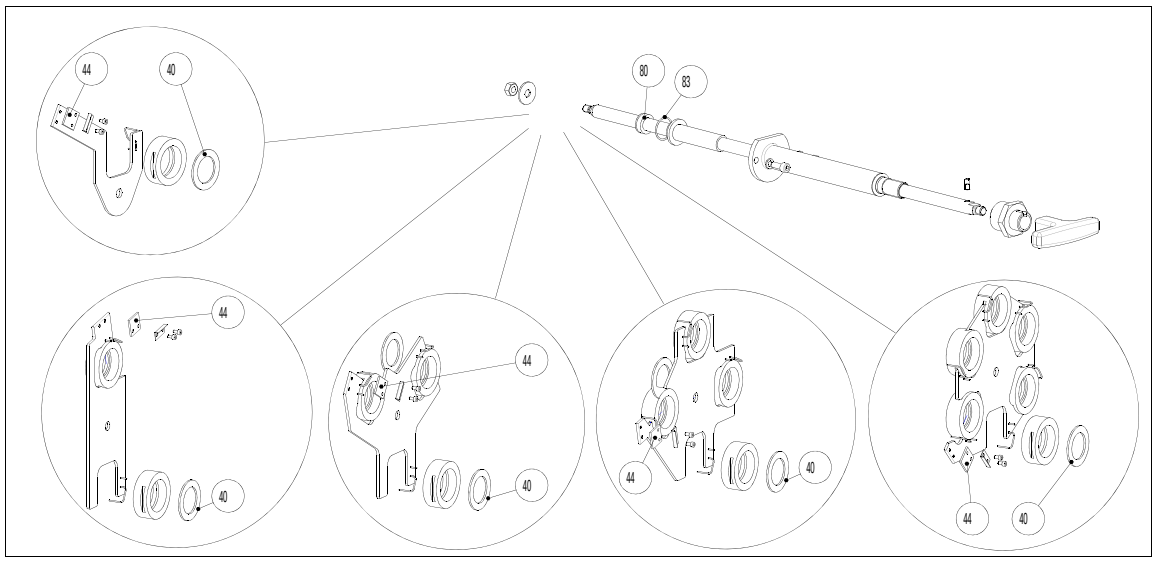
			Barrier M 1200	Barrier M 1250	Barrier M 1400	Barrier M 1700	Barrier M 2000	Barrier M 2600	Barrier M 3800				
Part No.	Item	Designation	Quantity										
W3T168284	40	Cleaning ring	4	6	2	4	3	4	6				
W3T160690	44	UV sensor cleaner	1	1	1	1	1	1	1				
W3T160696	48	Metal sheet UV sensor cleaner	1	1	1	1	1	1	1				
W2T504963	49	Screw, DIN 912, M3x6	2	2	2	2	2	2	2				
W3T166221	55	Threaded socket /4	1	1	1	1	1	1	1				
W3T166222	56	Threaded socket /4	1	1	1	1	1	1	1				
W2T505979	58	Securing pin	2	2	2	2	2	2	2				
W2T504943	80	Rod seal, manual cleaning			1	1	1	1	1				
W3T164606	83	O-ring	1	1	1	1	1	1	1				
W3T160852	112	O-ring	1	1	1	1	1	1	1				
W2T504944	116	Rod seal, automatic cleaning [1]	2	2	2	2	2	2	2				
W3T172507	145	Motor	1	1	1	1	1	1	1				
W3T172335	150	PCB	1	1	1	1	1	1	1				

1) Use maintenance parts set W3T166537 to replace the rod seals.

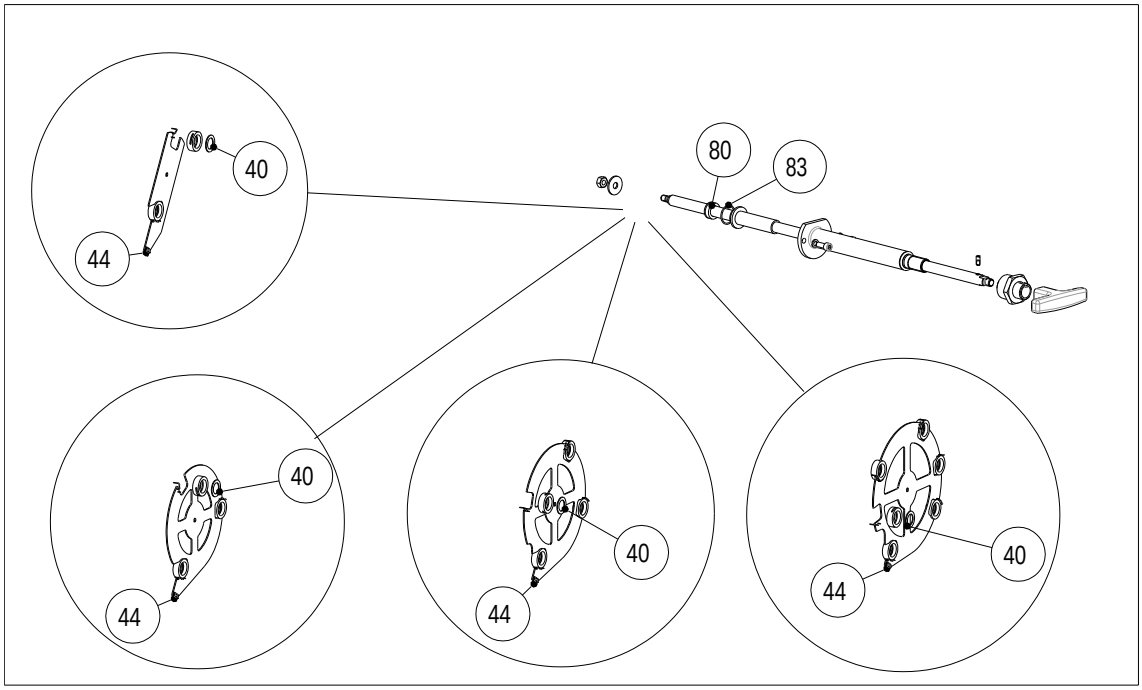
Manual cleaning
Barrier M 35, 80, 135, 210, 290 and 350



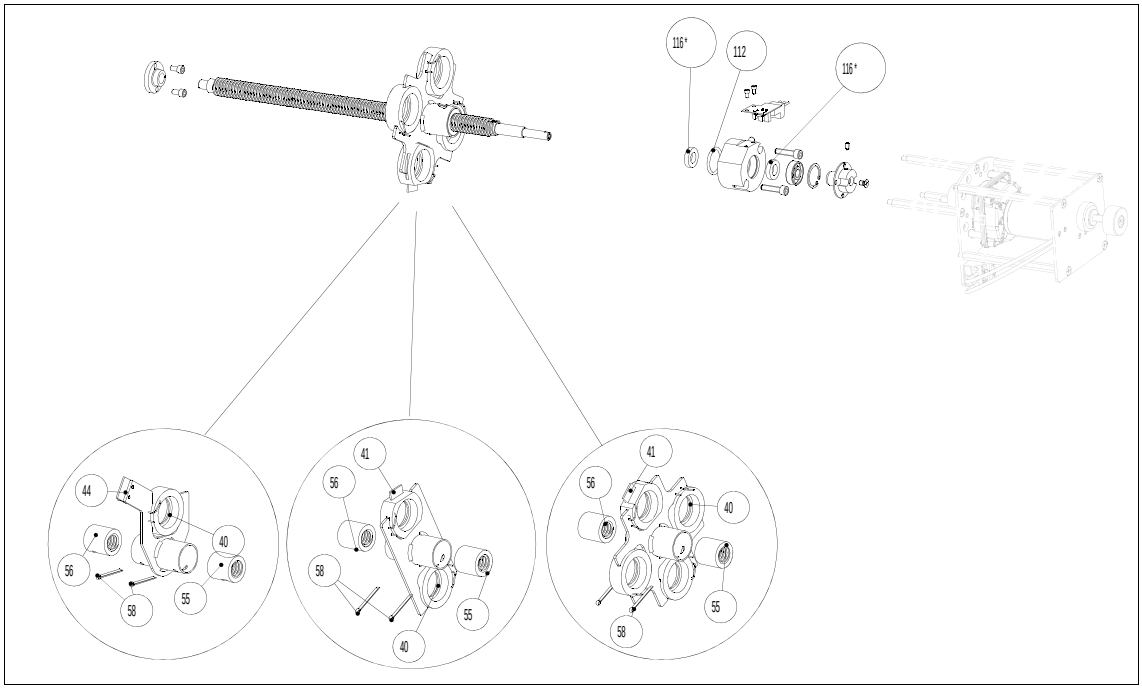
Manual cleaning
Barrier M 275, 525, 700, 900, 950, 1200 and 1250



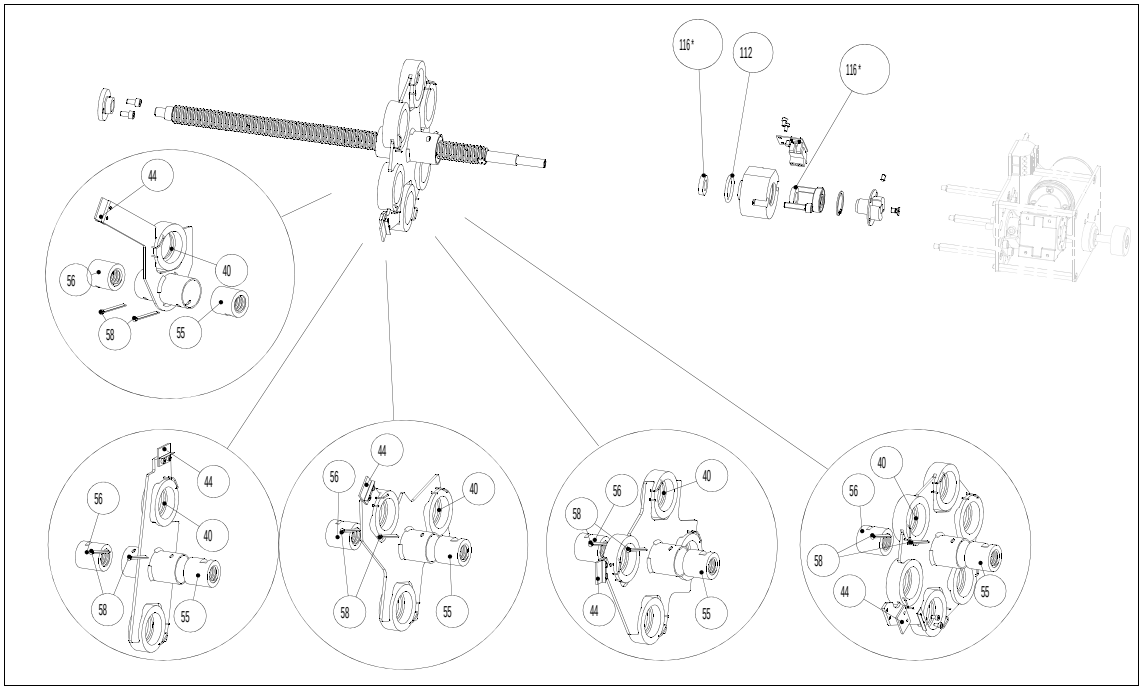
Manual cleaning
Barrier M 1400, 1700, 2000, 2600 and 3800



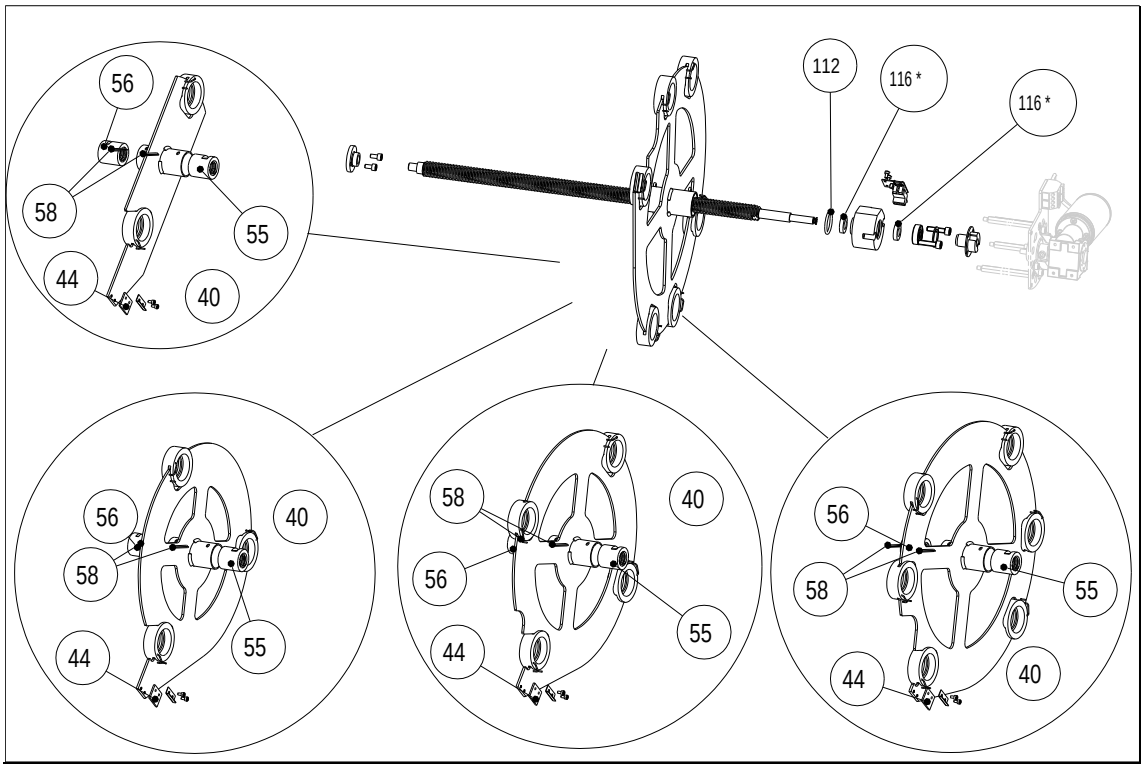
Automatic cleaning
Barrier M 80, 135, 210, 290 and 350



Automatic cleaning
Barrier M 275, 525, 700, 900, 950, 1200 and 1250



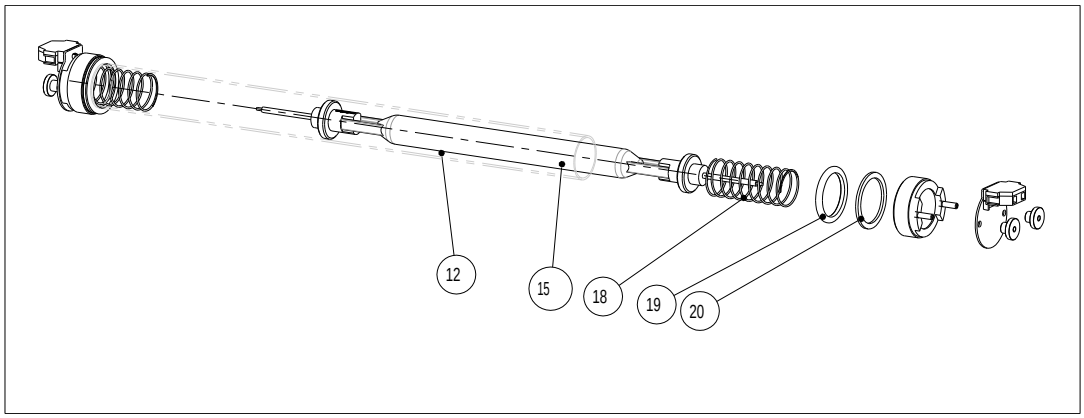
Automatic cleaning
Barrier M 1400, 1700, 2000, 2600 and 3800



6.1.3 Housing / Lamp

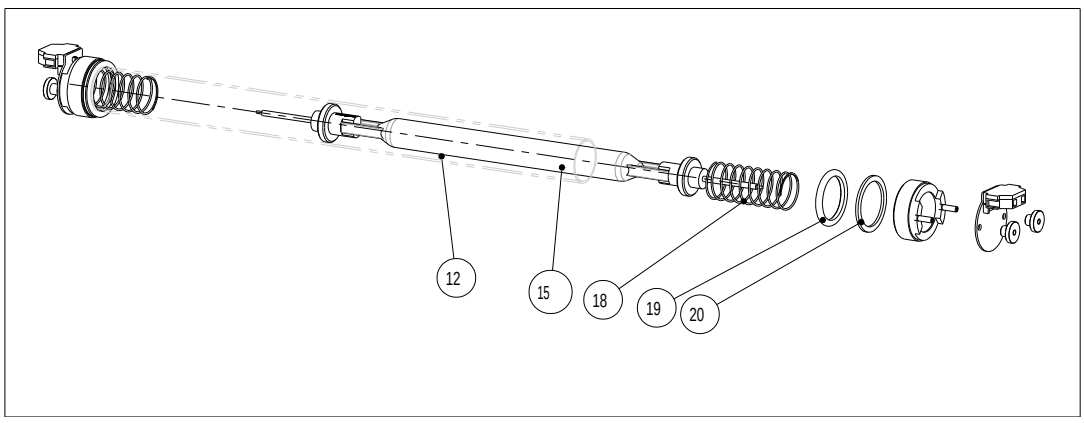
			Barrier M 35	Barrier M 80	Barrier M 135	Barrier M 210	Barrier M 275	Barrier M 290	Barrier M 350	Barrier M 525	Barrier M 700	Barrier M 900	Barrier M 950
Part No.	Item No.	Designation	Quantity										
W3T164603		Cotton gloves	1	1	1	1	1	1	1	1	1	1	1
W3T164593	3	Flat gasket for lamp flange	1										
W3T168263	3	O-ring for lamp flange, d164x3		2	2	2		2	2				
W3T168264	3	O-ring for lamp flange, d215x5					2			2	2	2	2
W3T168248	12	Quartz sleeve WTQ200, L 310 mm	1										
W3T168249	12	Quartz sleeve WTQ200, L 410 mm		1	1	4	1	3	4	2	3	4	3
W3T168261	15	UV lamp WTL1000	1	1		4							
W3T168262	15	UV lamp WTL2000			1		1	3	4	2	3	4	3
W3T168277	18	Spring	2	2	2	8	2	6	8	4	6	8	6
W3T168272	19	O-ring, d32x5	2	2	2	8	2	6	8	4	6	8	6
W3T168283	20	Pressure ring	2	2	2	8	2	6	8	4	6	8	6
W3T168286	220	Temperature sensor PT -100	1	1	1	1	1	1	1	1	1	1	1
W3T161407	221	Flat gasket for temperature sensor	1	1	1	1	1	1	1	1	1	1	1
W3T161407	229	Flat gasket for UV sensor	1	1	1	1	1	1	1	1	1	1	1
W3T168289	230**	UV sensor 1 (1000 W/m²)	1	1	1	1	1	1	1	1	1	1	1
W3T168365	230	UV sensor 2 (2000 W/m²)				1		1	1				1
W3T172180	230	UV sensor 3 (200 W/m²)	1	1	1	1	1			1	1	1	1
W2T505639	234	Bimetallic switch	1	1	1	1	1	1	1	1	1	1	1
W3T168664		Safety goggles	1	1	1	1	1	1	1	1	1	1	1
W3T162878		Scriber (tool for removing O-rings from the quartz sleeve)	1	1	1	1	1	1	1	1	1	1	1

**** Item No. 230 UV sensor**:
Depending on the version of the unit, we recommend keeping 1 spare UV sensor in stock (see type plate or data sheet).



			Barrier M 1200	Barrier M 1250	Barrier M 1400	Barrier M 1700	Barrier M 2000	Barrier M 2600	Barrier M 3800	
Part No.	Item No.	Designation	Quantity							
W3T164603		Cotton glove	1	1	1	1	1	1	1	
W3T168264	3	O-Ring Strahlerflansch, d215x5	2	2						
W3T168303	3	O-Ring Strahlerflansch, d396x5			2	2	2	2	2	
W3T168249	12	Quartz sleeve WTQ200, L 410 mm	4	6						
W3T168256	12	Quartz sleeve WTQ200, L 530 mm			2	4	3	4	6	
W3T164658	15	UV lamp WTL3500			2		3	4	6	
W3T168262	15	UV lamp WTL2000	4	6		4				
W3T168277	18	Spring	8	12	4	8	6	8	12	
W3T168272	19	O-ring, d32x5	8	12	4	8	6	8	12	
W3T168283	20	Pressure ring	8	12	4	8	6	8	12	
W3T168286	220	Temperature sensor PT -100	1	1	1	1	1	1	1	
W3T161407	221	Flat gasket for temperature sensor	1	1	1	1	1	1	1	
W3T161407	229	Flat gasket for UV sensor	1	1	1	1	1	1	1	
W3T168289	230**	UV sensor 1 (1000 W/m²)	1	1	1	1	1	1	1	
W3T168365	230	UV sensor 2 (2000 W/m²)		1						
W3T172180	230	UV sensor 3 (200 W/m²)	1	1	1	1	1	1	1	
W2T505639	234	Bimetallic switch	1	1	1	1	1			
W3T168664		Safety goggles	1	1	1	1	1	1	1	
W3T162878		Scriber (tool for removing O-rings from the quartz sleeve)	1	1	1	1	1	1	1	

**** Item No. 230 UV sensor**:
Depending on the version of the unit, we recommend keeping 1 spare UV sensor in stock (see type plate or data sheet).



Maintenance schedule for Wallace & Tiernan UV disinfection units Barrier M

Period/Interval	Maintenance level *	Work to be performed	Resources	OK	Not OK	Corrected

Daily	1	• Functional check
		  • Do all LEDs light up
		  • Are alarms pending
		• Inspect the entire unit for leaks
		• Perform a visual inspection of the bleed valve to ensure that it is functioning correctly.
		  • Water should be dripping out of the bleed hose at a steady rate.				

Monthly	1	• Check lamp service hours and replace if necessary • Test run of stand-by units. The lamps must be on for a minium of 1 hour				

Annually	2	• Customer services
		  • Clean the quartz sleeve and replace if necessary
		  • Clean the UV sensor
		  • Check the number of cleaning cycles. Replace wear parts such as cleaning rings, UV sensor cleaner, seals
		  • Check the lamp operating hours and replace if necessary
			• T wrench
			• Quartz sleeve pusher			

Every 2 years	2	• Have the UV sensor calibrated at the factory and replace if necessary				

Every 3 years	2	• Customer services
		  • Replace quartz sleeve(s)
		Replace the fan
		  • Replace flat gasket for the Pt100 temperature sensor
			• T wrench
			• Quartz sleeve pusher			

* Maintenance level 1 can be performed by the operator/operating personnel.

Maintenance level 2 must be performed by technicians specially trained by Evoqua or by Evoqua customer service technicians.

Before performing any other work, always contact Evoqua customer services.

Document all modifications and other work performed in the enclosed logbook!

6.3 Logbook

Logbook

Date	Total operating hours	Performed work	Maintenance level *	Reason (Error message)	Performed by

***** Maintenance Level 1 can be performed by the operator/operating personnel.

Maintenance level 2 must be performed by technicians specially trained by Evoqua or by Evoqua customer service technicians.

7. Table of UV alarm levels

Please note

The listed UV alarm level are for the specific UV system operating at a flow rate according the selection capacity tables for an average calculated UV dose of 400 J/m².

UV sensor - alarm limit value for minimum UV intensity												
Minimum UV intensity in W/m²												
Transmission T_{10}	**Barrier M 35**	**Barrier M 80**	**Barrier M 135**	**Barrier M 210**	**Barrier M 275**	**Barrier M 290**	**Barrier M 350**	**Barrier M 525**	**Barrier M 700**	**Barrier M 900**	**Barrier M 950**	**Barrier M 1200**
100	324	198	283	595	158	754	737	346	449	444	511	346
99	308	187	266	584	138	741	722	326	414	409	477	326
98	294	176	249	572	120	728	707	306	383	376	445	308
97	280	165	234	561	104	715	692	288	353	346	415	290
96	267	155	219	550	90	703	678	270	326	319	387	274
95	255	145	205	539	78	690	664	254	301	293	361	258
94	243	136	192	528	67	678	650	238	278	270	336	243
93	231	128	180	518	58	666	636	223	257	248	312	230
92	220	120	168	507	50	655	623	209	237	229	290	216
91	210	112	157	497	43	643	610	195	219	210	269	204
90	200	105	146	487	37	632	598	183	202	194	250	193
89	191	98	137	478	32	621	585	171	187	178	232	182
88	182	92	127	468	27	610	573	159	172	164	215	171
87	173	85	118	459	23	599	561	149	159	151	199	161
86	165	80	110	450	20	589	549	139	147	139	184	152
85	158	74	102	441	17	578	538	129	136	128	170	144
84	150	69	95	432	14	568	527	120	125	118	157	135
83	143	64	88	424	12	558	516	112	116	108	144	128
82	136	60	82	415	10	549	505	104	107	100	133	120
81	130	55	76	407	09	539	495	96	99	92	122	114
80	124	51	70	399	07	530	484	89	91	84	112	107
79	118	48	65	391	06	520	474	83	84	78	103	101
78	113	44	60	383	05	511	464	77	78	72	95	95
77	107	41	52	376	04	502	454	71	72	66	87	90
76	102	38	51	368	04	493	445	66	66	61	79	85
75	97	35	47	361	03	485	436	60	61	56	73	80
74	93	32	43	354	03	476	427	56	56	51	66	75
73	89	30	40	347	02	468	418	52	52	47	60	71

UV sensor - alarm limit value for minimum UV intensity												
Minimum UV intensity in W/m²												
Transmission T_{10}	**Barrier M 35**	**Barrier M 80**	**Barrier M 135**	**Barrier M 210**	**Barrier M 275**	**Barrier M 290**	**Barrier M 350**	**Barrier M 525**	**Barrier M 700**	**Barrier M 900**	**Barrier M 950**	**Barrier M 1200**
72	84	27	36	340	02	460	409	47	48	43	55	67
71	80	25	33	331	01	452	401	43	44	40	50	63
70	77	23	30	327	01	444	393	40	41	37	45	60
69	73	21	28	320	01	436	384	36	38	34	41	56
68	70	19	25	314	01	428	376	33	35	31	37	53
67	66	18	23	308	01	421	369	31	32	29	34	50
66	63	16	21	301	01	414	361	28	30	26	31	47
65	60	15	19	295	01	406	353	25	28	24	28	44
64	58	13	17	290	01	399	346	23	25	22	25	42
63	55	12	16	284	01	392	339	21	23	21	22	40

UV sensor - alarm limit value for minimum UV intensity											
Minimum UV intensity in W/m²											
Transmission T_{10}	**Barrier M 1250**	**Barrier M 1400**	**Barrier M 1700**	**Barrier M 2000**	**Barrier M 2600**	**Barrier M 3800**					
100	528	190	280	310	314	353					
99	484	172	262	287	297	330					
98	445	156	246	266	281	310					
97	408	141	231	245	266	290					
96	374	128	216	227	251	272					
95	343	116	203	209	237	254					
94	315	105	190	193	224	238					
93	289	95	178	178	211	223					
92	265	86	167	164	199	209					
91	243	78	157	150	188	196					
90	223	71	147	138	177	183					
89	205	64	138	127	166	172					
88	188	58	129	116	156	161					
87	173	52	121	106	147	151					
86	158	47	114	97	138	141					
85	145	43	106	89	130	132					
84	133	39	100	81	121	124					
83	122	35	94	74	113	116					
82	112	32	88	68	106	109					
81	103	29	82	61	99	102					

UV sensor - alarm limit value for minimum UV intensity											
Minimum UV intensity in W/m²											
Transmission T_{10}	**Barrier M 1250**	**Barrier M 1400**	**Barrier M 1700**	**Barrier M 2000**	**Barrier M 2600**	**Barrier M 3800**					
80	95	26	77	56	93	95					
79	87	24	72	51	87	89					
78	80	21	68	46	81	83					
77	73	19	64	42	75	78					
76	67	18	60	38	70	73					
75	61	16	56	34	65	69					
74	56	14	52	31	61	64					
73	52	13	49	28	56	60					
72	48	12	46	25	52	56					
71	44	11	43	22	48	53					
70	40	10	41	20	45	49					
69	37	9	38	18	41	46					
68	34	8	36	16	38	43					
67	31	7	33	14	35	41					
66	28	7	31	13	32	38					
65	26	6	29	11	30	36					
64	24	5	28	10	27	33					
63	22	5	26	9	25	31					

8. Certificates, declarations and statements

8.1 EC Declaration of Conformity

EVOQUA WATER TECHNOLOGIES

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration CE de conformité

No. MAE1335

Ausgabe/*issue*/**édition** 01

Hersteller/*Manufacturer*/**Constructeur:**	Evoqua Water Technologies GmbH
Anschrift/*Address*/**Adresse:**	Auf der Weide 10, D-89312 Günzburg
Produktbezeichnung: *Product description:* **Description du produit:**	UV-Desinfektionsgeräte Serie Barrier M/Barrier M DVGW *UV Disinfection units serie Barrier M/Barrier M DVGW* **Générateurs de rayons UV type Barrier M/Barrier M DVGW**

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender europäischer Richtlinien überein:
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:
Le produit désigné est conforme, dans la version que nous avons mise en circulation, avec les prescriptions des directives européennes suivantes :

2006/42/EG	Richtlinie des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung). *Directive of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/ED (recast).* **Directive du Parlement européen et du Conseil du 17 mai 2006 relative aux machines et modifiant la directive 95/16/CE (refonte).**
2004/108/EG	Richtlinie des Europäischen Parlaments und des Rates vom 15. Dezember 2004 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit. *Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility.* **Directive du Parlement européen et du Conseil du 15 décembre 2004 relative au rapprochement des législations des Etats membres concernant la compatibilité électromagnétique.**
2006/95/EG	Richtlinie des Europäischen Parlaments und des Rates vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen. *Directive of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.* **Directive du Parlement européen et du Conseil du 12 décembre 2006 concernant le rapprochement des législations des Etats membres relatives au matériel électrique destiné à être employé dans certaines limites de tension.**

CE-Kennzeichnung / *CE marking* / **Marquage CE**: 2014

Ersteller : SR
Ausgabe : 13.05.2014
Dokument: VD130-1_CE_Konformitätserklärung.doc

Evoqua Water Technologies GmbH
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Deutschland

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Seite 1 von 2

EVOQUA WATER TECHNOLOGIES

Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung der in der Nachweisdokumentation aufgelisteten Normen.
Evidence of conformity to the Directives is assured through the application of the standards listed in the relevant documentation.
La conformité avec les directives est assurée par le respect des normes listés dans la documentation téchnique correspondante.

		Referenznummer *Reference number* **No. réf.**	Ausgabedatum *Date* **Date**
2006/42/EG	MRL *Machinery* **Machines**	ISO3864-1 bis 3 DIN EN 626	08-2008 09-2008
97/23/EG	Druckgeräterichtlinie *Pressure Equipment* **Equipement sous pression**	Artikel 3 / Abs.3	05-1997
2004/108/EG	EMV *Electromagnetic compatibility* **Compatibilité électromagnétique**	DIN EN55011 Gruppe/Group 1 Klasse/Class A DIN EN61000-6-2 DIN EN61000-3-2 DIN EN61000-3-3	11-2007 03-2006 10-2006 06-2006
2006/95/EG	Niederspannung *Low voltage directive* **Directive basse tension**	DIN EN61010-1	08-2002
DVGW Arbeitsblatt *German Technical and Scientific Association for Gas and Water, Technical rule* **Association téchnique et scientifique de gaz et de l'eau, règle technique**		W294	06-2006

Benannte Person für technische Unterlagen:
Authorized person for the technical file:
Personne désignée pour la documentation technique:

Name / *name* / **nom:** Evoqua Water Technologies GmbH

Adresse / *address* / **adresse:** Auf der Weide 10, D-89312 Günzburg

Günzburg, den / *the* 2014-08-14

Evoqua Water Technologies GmbH

i.V. .....

Klaus Andre
Technischer Leiter / *Director Engineering*
Unterschrift
signature / **signature**

i.V. .....

Helmut Fischer
Leiter QM / *Quality Manager*
Unterschrift
signature / **signature**

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but does not imply any warranty for properties. The safety documentation accompanying the product shall be considered in detail..
La présente déclaration atteste de la concordance avec les directives citées, elle n'offre cependant pas de garantie quant à la nature ou la durabilité selon l'article 443 du code civil allemand. Les consignes de sécurité de la documentation du produit fournie sont à respecter.

Dokument: VD130-1_CE_Konformitätserklärung.doc Seite 2 von 2

8.2 QPS certificate

QPS Evaluation Services Inc.
Testing, Certification and Field Evaluation Body
Accredited in Canada, the USA, and Internationally

File
LR1143-1R2

CERTIFICATE OF COMPLIANCE
(ISO TYPE 3 CERTIFICATION SYSTEM)

Issued to	Evoqua Water Technologies GmbH
Address	Auf der Weide 10 89312 Günzburg Germany
Project Number	LR1143-1R2
Product	UV Disinfection Units; permanently connected
Model Number	As noted on Page 2
Ratings	As noted on Page 2
Applicable Standards	• **UL61010-1:** Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements; Second Edition (2004) including revisions through October 28, 2008; and • **CAN/ CSAC22.2 No.61010-1-04:** Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements; Second Edition, including revisions through October 28, 2008
Factory/Manufacturing Location	Evoqua Water Technologies GmbH Auf der Weide 10 89312 Günzburg Germany

Statement of Compliance: The product(s) identified in this Certificate and described in the Report covered under the above referenced project number have been investigated and found to be in compliance with the relevant requirements of the above referenced standard(s). As such, they are eligible to bear the QPS Certification Mark shown below, in accordance with the provisions of QPS's Service Agreement.

CERTIFIED
ELECTRICAL SAFETY

Issued By: Scott Airdrie

Signature: Date: June 4, 2014

81 Kelfield St., Units 7-9, Toronto, ON M9W 5A3 Tel: 416-241-8857; Fax: 416-241-0682
www.qps.ca

QSD 34 Rev. 03 Issue Date: 7/05 Rev. Date: 9/11

QPS Evaluation Services Inc.

Testing, Certification and Field Evaluation Body
Accredited in Canada, the USA, and Internationally

File
LR1143-1R2

System	Mains Power Supply	Active Power	Apparent Power	Full load Ampere	Max. Fuse size	VA
Barrier M 35	208 V~, 50/60Hz, 1-phase, 2-wire	1170W	1194VA	6	15	1194
Barrier M 35	240 V~, 50/60Hz, 1-phase, 2-wire	1170W	1194VA	5	15	1194
Barrier M 80	208 V~, 50/60Hz, 1-phase, 2-wire	1170W	1194VA	6	15	1194
Barrier M 80	240 V~, 50/60Hz, 1-phase, 2-wire	1170W	1194VA	5	15	1194
Barrier M 135	208 V~, 50/60Hz, 1-phase, 2-wire	2190W	2230VA	11	15	2230
Barrier M 135	240 V~, 50/60Hz, 1-phase, 2-wire	2190W	2230VA	9	15	2230
Barrier M 210	208 V~, 50/60Hz, 3-phase, 3-wire	4230W	4316VA	15	20	4316
Barrier M 210	240 V~, 50/60Hz, 3-phase, 3-wire	4230W	4316VA	13	20	4316
Barrier M 210	480/277 V~, 50/60Hz, 3-phase, 4-wire	4230W	4316VA	8	15	4316
Barrier M 275	208 V~,50/60Hz, 1 Phase, 2-wire	2190W	2230VA	11	15	2230
Barrier M 275	240 V~, 50/60Hz, 1-phase, 2-wire	2190W	2230VA	9	15	2230
Barrier M 290	208 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	19	30	6820
Barrier M 290	240 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	16	25	6820
Barrier M 290	480/277 V~, 50/60Hz, 3-phase, 4-wire	6700W	6820VA	8	15	6820
Barrier M 350	208 V~,50/60Hz, 3-phase, 3-wire	8310W	8480VA	28	40	8480
Barrier M 350	240 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	24	35	8480
Barrier M 350	480/277 V~, 50/60Hz, 3-phase, 4-wire	8310W	8480VA	16	25	8480
Barrier M 525	208 V~, 50/60Hz, 3-phase, 3-wire	4500W	4580VA	16	25	4580
Barrier M 525	240 V~, 50/60Hz, 3-phase, 3-wire	4500W	4580VA	18	30	4580
Barrier M 525	480/277 V~, 50/60Hz, 3-phase, 4-wire	4500W	4580VA	8	15	4580
Barrier M 700	208 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	19	30	6820
Barrier M 700	240 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	16	25	6820
Barrier M 700	480/277 V~, 50/60Hz, 3-phase, 4-wire	6700W	6820VA	8	15	6820
Barrier M 900	208 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	28	40	8480
Barrier M 900	240 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	24	35	8480
Barrier M 900	480/277 V~, 50/60Hz, 3-phase, 4-wire	8310W	8480VA	16	25	8480
Barrier M 950	208 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	19	30	6820
Barrier M 950	240 V~, 50/60Hz, 3-phase, 3-wire	6700W	6820VA	16	25	6820
Barrier M 950	480/277 V~, 50/60Hz, 3-phase, 4-wire	6700W	6820VA	8	15	6820
Barrier M 1200	208 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	28	40	8480
Barrier M 1200	240 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	24	35	8480
Barrier M 1200	480/277 V~, 50/60Hz, 3-phase, 4-wire	8310W	8480VA	16	25	8480
Barrier M 1250	208 V~, 50/60Hz, 3-phase, 3-wire	12390W	12643VA	35	50	12643
Barrier M 1250	240 V~, 50/60Hz, 3-phase, 3-wire	12390W	12643VA	30	40	12643
Barrier M 1250	480/277 V~, 50/60Hz, 3-phase, 4-wire	12390W	12643VA	15	25	12643
Barrier M 1400	208 V~, 50/60Hz, 3-phase, 3-wire	6500W	6920VA	29	40	6920
Barrier M 1400	240 V~, 50/60Hz, 3-phase, 3-wire	6500W	6920VA	25	35	6920
Barrier M 1400	480/277 V~, 50/60Hz, 3-phase, 4-wire	6500W	6920VA	13	20	6920
Barrier M 1700	208 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	28	40	8480
Barrier M 1700	240 V~, 50/60Hz, 3-phase, 3-wire	8310W	8480VA	24	35	8480
Barrier M 1700	480/277 V~, 50/60Hz, 3-phase, 4-wire	8310W	8480VA	16	25	8480
Barrier M 2000	208 V~, 50/60Hz, 3-phase, 3-wire	9700W	10450VA	29	45	10450
Barrier M 2000	240 V~, 50/60Hz, 3-phase, 3-wire	9700W	10450VA	25	40	10450
Barrier M 2000	480/277 V~, 50/60Hz, 3-phase, 4-wire	9700W	10450VA	13	20	10450
Barrier M 2600	208 V~, 50/60Hz, 3-phase, 3-wire	12900W	13870VA	44	60	13870
Barrier M 2600	240 V~, 50/60Hz, 3-phase, 3-wire	12900W	13870VA	38	50	13870
Barrier M 2600	480/277 V~, 50/60Hz, 3-phase, 4-wire	12900W	13870VA	25	35	13870
Barrier M 3800	208 V~, 50/60Hz, 3-phase, 3-wire	19300W	20470VA	58	63	20740
Barrier M 3800	240 V~, 50/60Hz, 3-phase, 3-wire	19300W	20470VA	50	63	20740
Barrier M 3800	480/277 V~, 50/60Hz, 3-phase, 4-wire	19300W	20470VA	25	35	20740

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QSD 34 Rev. 03 Issue Date: 7/05 Rev. Date: 9/11

8.3 NSF certficate

NSF International

RECOGNIZES

SIEMENS WATER TECHNOLOGIES CORP.

Facility: GUENZBURG, GERMANY

AS COMPLYING WITH NSF/ANSI 50.

PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE AUTHORIZED TO BEAR THE NSF MARK.

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David Purkiss, General Manager
Water Distribution Systems

December 10, 2007
Certificate# 3W191 - 01

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