Recommendations for the use of FUV sensor-ports

Sensor-ports (measuring windows) are designed for use in drinking water disinfection systems according to DVGW Worksheet W294-3 and ÖNORM M5873-1. In accordance with the provisions of both standards the measuring windows are waterproof in a temperature range from +2...+40°C and up to 16 bar. The geometric requirements of both standards ensure a minimization of the enclosed air volume when using standard-compliant sensors and allow comparison tests of field sensors against a reference sensor during operation. For the use in FUV measurement windows we recommend field sensors of the SUV20 series as well as the reference instrument MUV2.4WR. These components are optimally matched and guarantee reliable measured values over a long period of time.

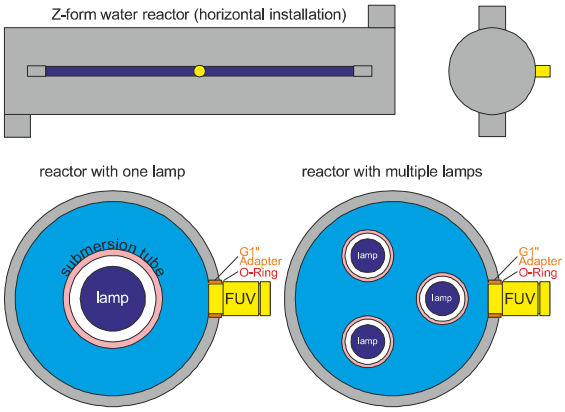
Our measurement windows are also used in water disinfection systems which are not required to fulfill to the above standards. So different specification requirements are known for different applications, which exceed the specified values, mentioned in the data sheet:

- Increased water pressure > 16 bar
- Increased operating temperature > 40°C
- Additional vacuum load, under-pressure
- Additional pressure and temperature load due to specific cleaning procedures during maintenance work

Our measurement windows are designed to withstand loads well above the requirements of the drinking water standards. We therefore assume that temporarily exceeding individual parameters does not lead to quality problems. Our quality management system and the feedback from our customers confirms this. Nevertheless, measurement windows and sensors require careful maintenance. The following notes should help to avoid operating errors and the identification of problems.

Installation of the measuring window

FUV38 measuring windows are designed to be screwed into a G1" flange, which must be welded in an appropriate position of the system (aligned central and directly in front of the lamp). Welding on measurement windows is not allowed since it could cause small changes in geometric tolerances and result in leakage. The measuring windows should preferably be installed in a horizontal position and flush with the inner wall of the water system (see picture 1). This avoids the formation of air bubbles in front of the measuring window or deposits which do influence sensor readings negatively. If a cleaning mechanism is in place, the measurement window can be cleaned in that installation position optimally.



Picture 1

Please note the following additional guidance for installation:

- Installation under water is **not** allowed, since only the front of the sensor-port is waterproof.
- During installation, the O-ring 33x1,5 mm **must** be installed. The O-ring is available different materials (NBR, EPDM, FKM with KTW/DVGW/FDA approval) and must be ordered separately.
- An alternative sealing around the thread with Teflon tape is allowed.
- When installing the measuring window, screw wrenches made of stainless steel and a wrench size 32 mm must be used. A tightening torque of 20-30 Nm is sufficient (if O-ring is used).
- The standard material of our measurement window is stainless steel 1.4404. For saltwater applications, special types with 1.4462 are available. The materials of screw-in-flange and reactor or open channel wall must not be nobler to avoid damages on the measurement window by electrochemical processes. For details, please see cleaning and maintenance.
- If the measuring window is installed in the suction side of an installation our under-pressure resistant types must be used. The same is recommended in applications with hot steam sterilizations.

Installation and replacement of sensors

When installing the sensor in the measuring window please ensure that the installation space is free of condensate and the sensor is dry. If a sensor is inserted prior to removal of moisture, moisture will, due to the small gap (tolerances) between the quartz glasses of sensor and measuring window, be compressed and penetrate into the sensor. The sensor is damaged as a consequence. Depending on the ambient air temperature, the existing humidity and the water temperature in the system, such condensation happens sometimes very quickly. For wiping the sensor area, absorbent and lint-free cloth (textile or paper) are suitable. The use of soaked towels with detergent is not allowed, because residues influence the correct UV value reading.

Cleaning/drying of the sensor area must be executed carefully. As an option, the sensor chamber shall be dried with compressed air (e.g. compressed air 67 from Kontakt Chemie, No. 85513) before inserting a sensor. Metallic tools with wrapped cloth should not be used under any circumstances. The risk of scratching the surfaces or damaging the quartz window are too large. Furthermore, only a very low pressure from the inside of the system against the quartz of the measuring window is allowed to avoid damages. Due to this, the insertion of the sensor should be done slowly, so that the pressure inside the measurement window can slowly escape along the fit. For comparisons of the field sensor against the reference instrument MUV2.4WR during operation, it must be ensured, that the measurement window does not stand open for a long time without a sensor. Besides the risk of condensation, UV-radiation might reflect back from the empty window. Please **do not** look directly into it, as there is a real risk of harm to eyes or skin! We strongly recommend to fix appropriate warnings on the system.

Cleaning and maintenance

Usually, UV-systems should have regular cleaning/ inspections, minimum with each lamp exchange. Similar to the quartz sleeves of the lamps, the measuring window should also be removed and cleaned regularly, according to its load in its specific application. Approved are common non-abrasive cleaners, as used for the quartz sleeves. To remove stubborn layers (e.g. Iron), weak acids are also allowed. Cleaning the inside of the measuring window should, as already described, be carried out with dry cloth. The cleaning of the quartz window must be done very carefully and not only by visual inspection. Several field installations have showed that thin but invisible layers already cause significant errors in measurements. The sealing O-ring of the measuring window must not get in contact with the detergent. The aggressive characteristics of such a cleaner can damage the O-ring material and lead to a loss of its sealing function. During replacement, the quartz glass of the sensor-port should not be touched because sweat/skin oil strongly attenuates UV radiation, can burn in under UV irradiation and massively influences the measurement results.

Our standard measurement windows are designed so that the cleaning process in the system can be completed with wiper systems during operation.

In systems with special purification procedures such as sanitisation or hot steam disinfection, we recommend vacuum-proof measuring windows, which are available. In every case, the sensor needs to be taken out of operation or removed during such cleaning procedures, if the allowed operating conditions are exceeded.

Overhaul and Repair

Despite the selection of specific highly stable materials the sealing rings at the quartz glass of the measuring window are subject to aging by UV radiation and water constituents. Based on our experience, we recommend a preventive maintenance of the measuring window, preferably before leaks occur and water can damage the sensor. Our measurement windows are designed so that they can be refurbished/repaired cost-effectively, assuming there are no damages at the stainless steel rotating parts. Depending on the operating conditions, we recommend a replacement of the sealing rings latest after 5 years for MP applications respectively after 10 years for LP applications. Own repair attempts are not advisable. Beside the special seals also special tools and test equipment are required which does not have the user.

If leaks occur during the warranty period, please return both the measuring window and the built-in sensor. In case our examination shows a manufacturing defect at the measuring window, the repair of the harmed sensor is free of charge.

Detecting leaks

Usually, leaks inside measuring windows are minimal leaks, where dripping water is very seldom visible. Leakage in measuring windows can easily be recognized on the sensors. The following symptoms may indicate leakages:

- Strong drop of displayed UV output in a short period
- Moisture inside the sensor
- Yellow-brown discoloration in front of the sensors or sporadic staining inside the sensors (see Picture 2)
- Iridescent water stains inside the measurement window by trapped moisture or leaks (see Picture 3)
- Moisture in the sensor chamber or leakage of water

Picture 2

Picture 3

Should you suspect a leakage, a new sensor must not be installed under any circumstances. Consequential damages to the sensors are not covered by our warranty in such a case. As described in the previous point, it is best if both, measuring windows and sensor are returned for inspection. A final assessment can only be made after testing in the factory.