

# DUV-N Series

Ultraviolet Equipment for  
Small and Medium Capacities



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# ABOUT LIT



LIT is the leading developer and manufacturer of UV systems for water, air and surface disinfection.

Founded in 1991, LIT is a global operating company with production and support facilities in various countries. Clients will find LIT's local presence with Sales and Service support through LIT offices or through subsidiary offices around the world.

The full equipped production sites provide LIT necessary control on all components and all elements of the production process and ensure that a high quality standard of the products is carefully maintained. Swift response to customers' design requests, short on-time equipment delivery and service support are considered standard.

We provide expert solutions for clean and safe water, air and surface treatment.

The LIT UV products are the result of the vast knowledge base and application experience in UV technology. Our expert team of scientists and application engineers within Research, Development and Design Engineering Departments is dedicated to deliver the best UV disinfection products and solutions.

We offer UV equipment for various water applications:

- Municipal drinking water
- Municipal and industrial wastewater
- Wastewater re-use for agriculture irrigation
- Industrial water re-use
- Food & Beverage industry
- Pharmaceutical industry
- Swimming pools and recreational water parks

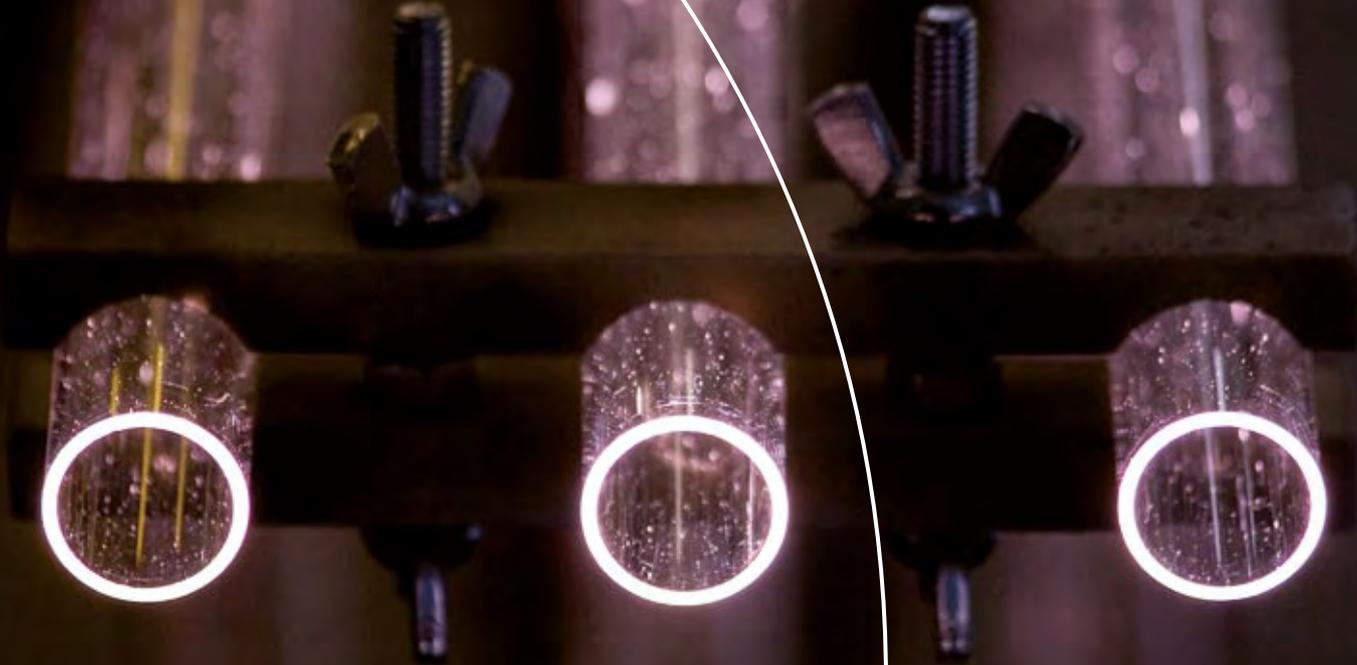
LIT UV systems for air treatment are designed for:

- Air and surface disinfection in Food & Beverage industry, public, medical and educational facilities
- Odor removal

Today, thanks to our researches and long-term experience, we own the innovative technologies for water, air and surface disinfection.

Our products are designed, carefully considering, UV system efficiency, ease of installation, user-friendly operation and to provide the most economic solution to protect public health and the environment.

LIT UV THE BEST CHOICE





### LIT Production Facilities

LIT has two production sites to manufacture amalgam UV lamps and UV systems for treatment and disinfection of water, air and surfaces.

Our production facilities are equipped with cutting edge manufacturing technologies and utilize components from major brands.



### Research and Development

Our highly-skilled team of R&D professionals and high-tech machining techniques enable us to provide innovative technical solutions and turn-key projects for our customers.

The Research, Development and Design Engineering Departments are scientifically empowered by top-level experts including Professors and Doctors of Science. LIT Development and Design team can adapt the off-the-shelf equipment or design new solutions according to the customer specific requirements.



### Quality that Meets Global Standards

The quality of products is our top priority. That is why each of our production sites has in-house Quality Control Department and Testing Laboratory that allow our engineering staff to evaluate and calibrate materials, components and every complete UV system to comply with global standards including ISO 9001, CE and TÜV.



### Professional Solutions

LIT UV disinfection systems are state-of-the-art water disinfection solutions. Dozens of field tests have been conducted with different water qualities, which provide a unique expertise of UV installations for different applications.

LIT has put into successful operation more than 8,000 UV plants over all continents, including the world's largest UV plant for wastewater disinfection at the Kuryanovskiye Wastewater Treatment Plant (with capacity of 3,125 million m<sup>3</sup>/day), and Europe's largest UV plant for drinking water in Budapest (with capacity of 600,000 m<sup>3</sup>/day).



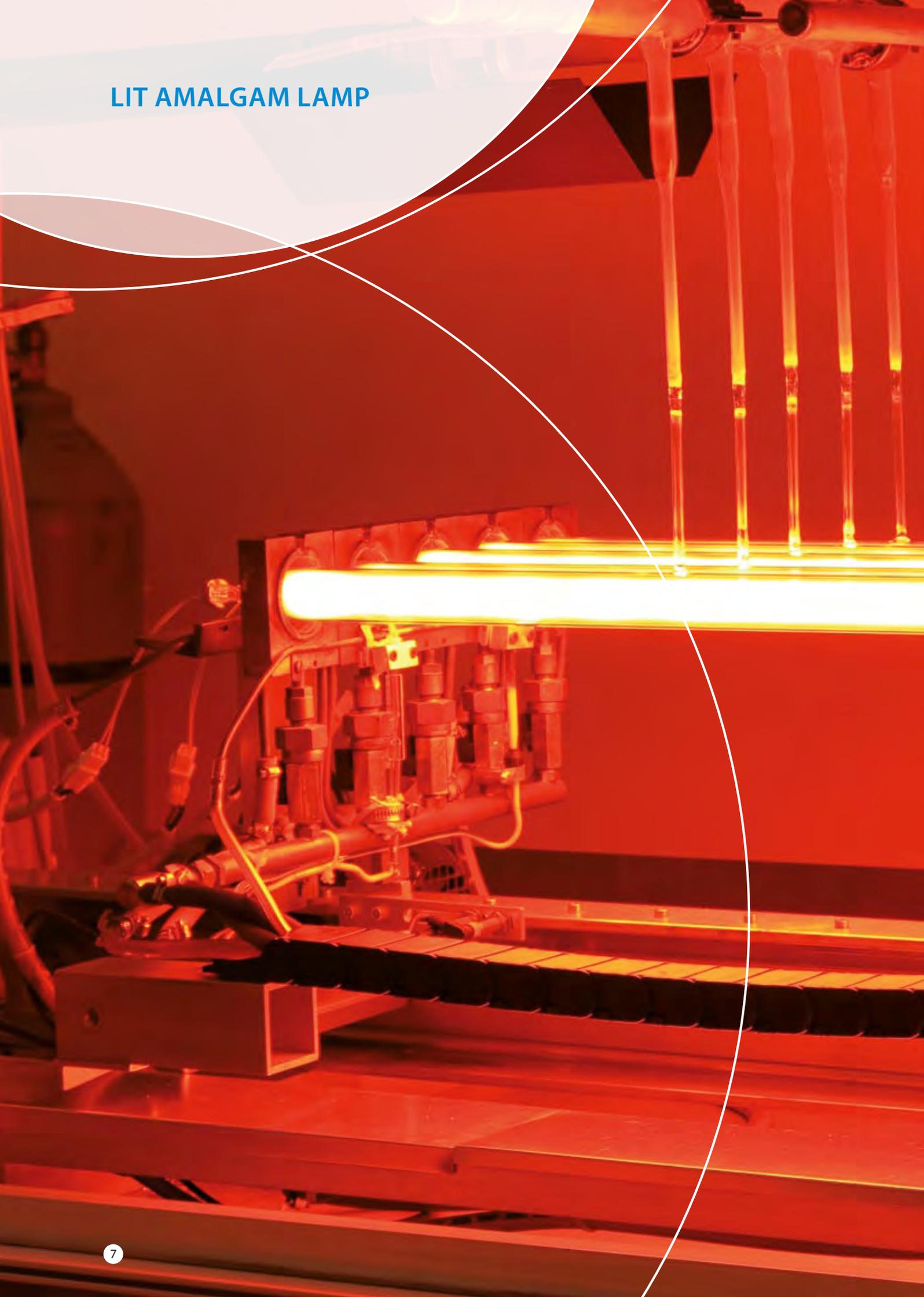
### Corporate Social Responsibilities

LIT has become a market leader with knowledge-intensive production and a high social responsibility.

We focus on raising global standards in the field of water supply and water treatment. The initial goal of the company is to implement eco-friendly and eco-efficient technologies of UV disinfection for various applications.

Therefore we pay great attention to UV application studies and constantly improve our production quality from product development, material selection, production process and service support to certification according to international standards: ÖVGW, DVGW, USEPA.

LIT AMALGAM LAMP



In 1995, LIT was one of the first to introduce the amalgam UV lamp technology. Since then, we have made significant research efforts to further improve the amalgam lamp technology, resulting in more powerful lamps and better UV-C efficiency. Our current state-of-the-art amalgam lamp technology provides amalgam lamps with power consumptions of 15 – 900 Watt per lamp and efficiencies of ~ 40% and a nominal lamp life of up to 16,000 hours.

## ENERGY-EFFICIENT TECHNOLOGIES



Recently LIT launched a new HIGH OUTPUT (HO) lamp series. This is a unique UV source, with UV output density per unit of length which is 1.5–2 times higher compared to previous lamp generations. The efficiency is maintained at a level of ~40%. All lamp components of HO lamps fully comply with the requirements of the EU Directive 2002/95/EC *Restriction of Hazardous Substances*. The customer can adjust the HO lamp power between 50% and 100% of the nominal lamp power and hence optimize the energy consumption according to fluctuations of flow rate and changing water quality.

With LIT new developed short HO lamps the complete HO lamp series now ranges from 400 mm to 2000 mm with power consumption from 120 to 900 W.

**The in-house lamp development and lamp production enable us to match the strict requirements of the water supply industry and optimize the operating characteristics of the UV equipment.**

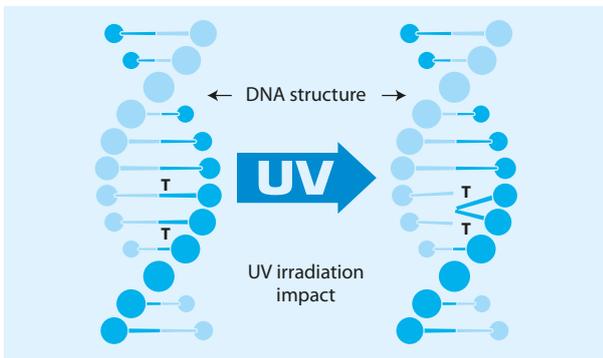
- High efficiency against a wide range of pathogenic microorganisms
- Environmentally safe; no impact on physical, chemical or organoleptic water properties, no by-product formation and no risk for overdosing
- Safe operation of the equipment, since the lamps do not contain liquid mercury
- Cost-effectiveness due to low capital costs and low power consumption
- Compact dimensions to install the equipment in areas with limited space

UV DISINFECTION  
TECHNOLOGY



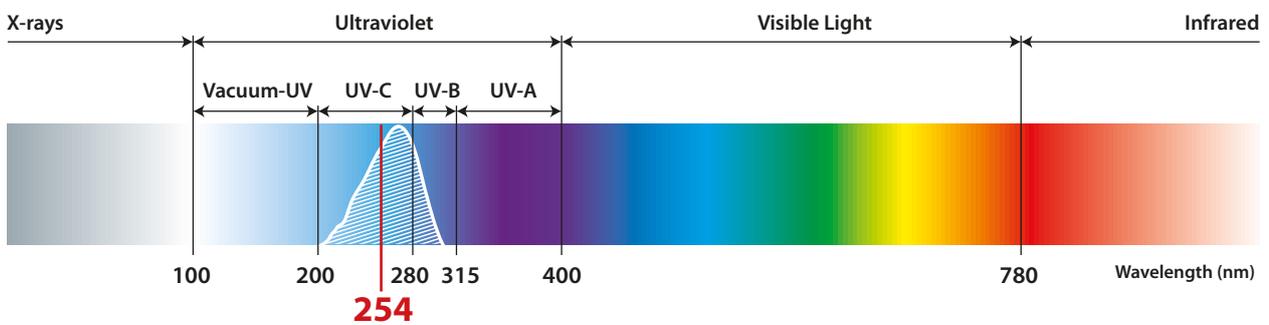
Over the past 60 years germicidal UV-C irradiation has been used intensively for disinfection applications.

UV irradiation is a physical method of disinfection. The germicidal effect is based on photon absorption by DNA and RNA molecules. Photochemical reaction provokes dimerization of DNA and RNA bonds, which inhibits the ability of microorganisms to replicate. This process is known as inactivation of microorganisms.



## Advantages of UV Technology

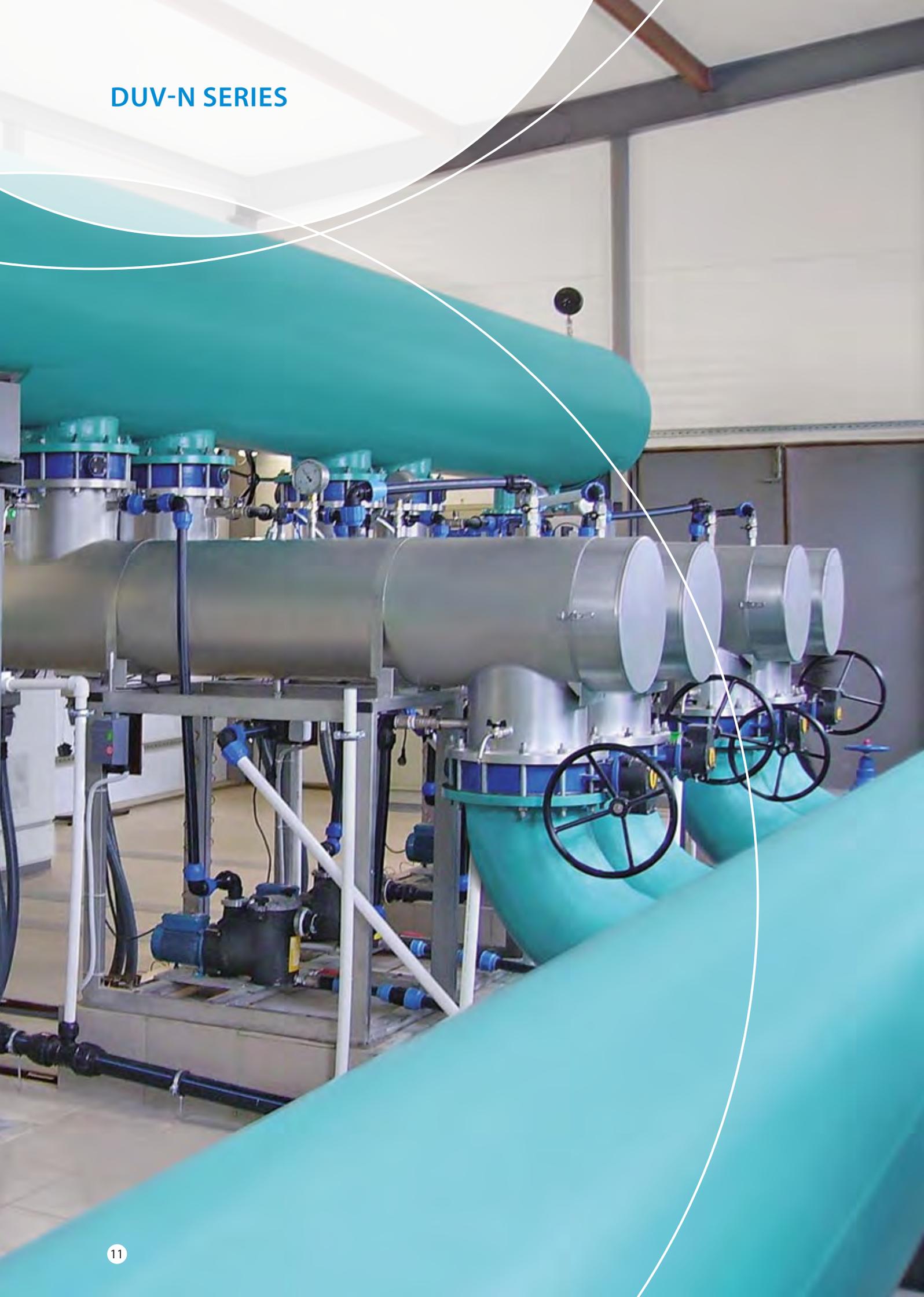
- High disinfection efficiency against a wide range of microorganisms: bacteria, viruses, spores and parasite protozoa, including resistant forms to chemical disinfectant
- Environmentally safe: no impact on physical, chemical or organoleptic water properties, no side effects that are hazardous for human health and environment
- Fast disinfection process: UV has an immediate effect
- Power and cost efficiency: low power consumption and operational costs



The germicidal effect of UV radiation is highest in the 205–280 nanometers range of the electromagnetic spectrum. The light of this range is well absorbed by DNA and RNA molecules. The wavelength generated by low

pressure germicidal UV lamps is 254 nm. This wavelength is within the germicidal range and very close to the peak of the germicidal UV sensitivity curve.

**DUV-N SERIES**



The DUV-N Series is multi-purpose and off-the-shelf UV disinfection equipment intended for drinking water, industrial and wastewater, as well as water in swimming pools and recreational water parks.

We strive to meet each and every customer's needs therefore we manufacture customized series of UV equipment for various markets. For those who seeking versatility, we offer the flagship series DUV-N MASTER or the sophisticated series DUV-N ADVANCED. The DUV-N BASIC series provides standard and well-priced UV systems.

Key differences per series are:

- Control system type
- Monitoring parameters
- Scope of supply

The DUV-N equipment range is intended for water disinfection of small and medium flow rates from 1 to 400 m<sup>3</sup>/hr and for UV transmittance of 50–90% per 1 cm. DUV-N systems are equipped with LIT High-Output amalgam lamps. The UV reactor design is based on CFD modeling for various flow and water quality conditions. The DUV-N equipment can be mounted vertically or horizontally. The DUV-N units have been designed with a maximum head loss of < 0.5 m.

## Advantages of DUV-N Series

- High disinfection efficiency (99,9–99,99%)
- No danger for overdosing, no formation of by-products allow for easy operation, service and maintenance
- High quality components; environmentally safe, corrosion-proof and long-life materials (food grade stainless steel AISI 304, AISI 316, duplex, super-duplex, polymeric materials PTFE)
- Low power consumption due to high efficient low pressure UV lamps and optional dose pacing system
- Easy to operate and service due to continuous monitoring of UV intensity and chemical and automatic mechanical cleaning of UV lamps
- Optimized hydrodynamic system design assures efficient water flow through the UV reactor and minimizes head loss
- Compact designs and various flange orientations allow customized equipment installation
- User-friendly interface with remote control and monitoring
- Electronic ballasts have a power factor corrector which improves noise reduction and operational stability of other electronic devices
- Electrical equipment is certified according to TÜV standard

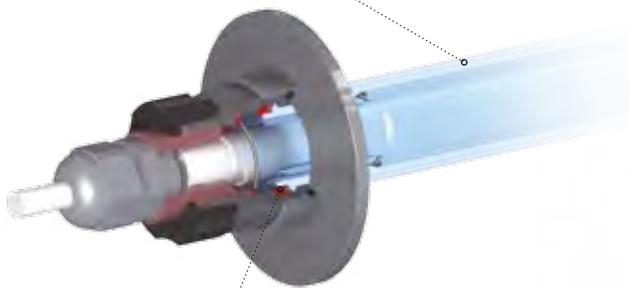
# MAIN COMPONENTS OF DUV-N SYSTEMS

## UV Lamps

The DUV/N series units apply non-ozone low pressure germicidal lamps. LIT offers highly efficient and environmentally safe short amalgam HO lamps. Amalgam lamps allow us to significantly reduce the equipment size and required service area.

## Quartz Sleeve

A protective quartz sleeve with a high UV transmittance at a wavelength of 254 nm provides thermal and electrical isolation between the HO lamp and the water.



## Lamp Sealing

Ultra-reliable and long-life lamp sealing assures water tightness.

## UV Reactor

The standard UV reactor is made of food grade stainless steel AISI 304 and designed for operating pressure of 10 bar. Depending on the customer application LIT provides customization options: UV reactor of stainless steel AISI 316, duplex and superduplex, inlet/outlet flange orientation L, Z, U and operating pressure up to 16 bar.

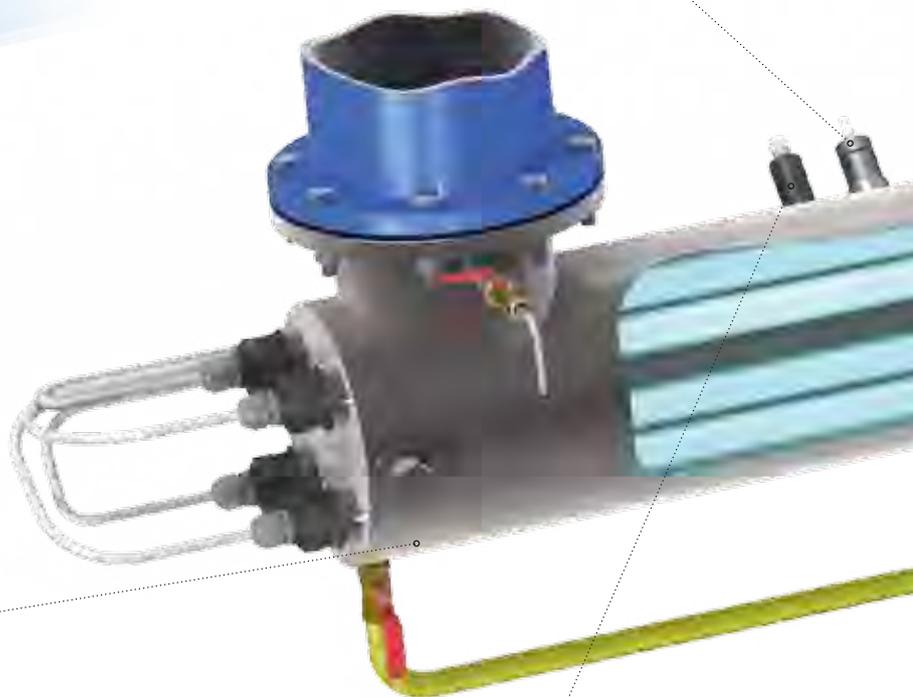
## UV Sensor

The UV sensor continuously monitors the UV intensity in the disinfection area.

UV units can be equipped with various UV intensity sensor types including ÖNORM\* certified types. The control system uses the UV sensor's signal to adjust the applied UV dose.

\* UV sensor certified according to ÖNORM:

- The sensor is selective, i.e. it measures only germicidal UV (254 nm).
- The UV sensor design enables the operator to verify the UV sensor performance by replacing it with a reference sensor without interrupting the disinfection process in UV system.



## Temperature Sensor

To prevent the UV system from overheating, the reactor temperature sensor automatically shuts down the UV system, when exceeding the maximum temperature.





## Control Panel

The control panel consists of electronic ballasts and process controller which is based on industrial standard renowned PLC brands like VIPA, SIEMENS, Schneider Electric and others.

A user-friendly operator interface is available to monitor lamp operating hours and the number of ON/OFF cycles. The UV intensity is monitored, to indicate when the UV system needs to be cleaned or the UV lamp needs to be replaced.

## Hydraulic Optimization

The hydraulic optimization provides hydraulic flow distribution and equalizing of water flow over the entire range of the system's flow capacities, which increases disinfection efficiency and minimizes the head losses.

## State-of-the-Art Electronic Ballasts

The LIT developed ballast technology is uniquely optimized to achieve the best performance in combination with the LIT HO lamp technology. The result is a long nominal lamp life of 12,000–16,000 hours and an almost unlimited number of ON/OFF cycles. These features allow end-clients easy integration into their process control philosophy with minimal annual maintenance of the UV system. When operating conditions permit, the ballast's dimming option helps to reduce energy consumption. With this, the lamp power can be adjusted from 50% to 100% and it assures the required UV dose is maintained with minimum energy consumption and an extended lamp life.



## Sample Ports

The sample ports at the inlet and outlet flanges of the UV system are available for quick and easy water sampling to make microbiological tests.

## Chemical Cleaning and Mechanical Cleaning Systems

Organic and inorganic compounds in the treated water can lead to fouling and deposits on the surface of quartz sleeves; hence UV intensity will be reduced. For easy service and maintenance UV systems are equipped with chemical cleaning system that can quickly and efficiently clean the whole system without the necessity to disassemble the UV unit.

Optionally UV systems can be equipped with an automatic mechanical cleaning system, which cleans the quartz sleeves in the UV unit, without interrupting the disinfection process and extend the interval between chemical cleaning cycles significantly.

# 1

## DRINKING WATER

UV disinfection in municipal water supply systems is a reliable barrier against the spread of human infectious diseases caused by bacteria, protozoa or viruses. The most common ones nowadays are the group of Coliform bacteria, Cryptosporidium, Giardia and viruses such as Hepatitis A.

UV disinfection provides a solution to comply with various microbiological drinking water regulations, without changing the physical, chemical or organoleptic characteristics of the water and without the formation of by-products.

UV disinfection fills the disinfection gap, where conventional chlorination methods do not provide the same level of protection.



## DESIGN ASPECTS

Generally a UV disinfection system is installed as close as possible to the point of use (the consumer).

A UV system is recommended to be installed after clean water reservoirs and feed pumps which supply the water directly to distribution network. With this scenario the risk of recontamination before water distribution is minimized and the best water quality is flowing through the UV system, i.e. the best possible UV transmittance, which reduces the dimensioning of the UV disinfection.

Common practice is the combination of UV disinfection with post-chloramination to provide a multi barrier against pathogenic microorganisms and viruses. In this combination, UV is the main stage of disinfection and chloramination provides low but strong prolonged disinfection effect to protect the distribution network, also against the bio-film formation.

The compact design and high electrical protection grade allow UV system installation in underground water well chambers and basements.

During UV installation air-pockets should be avoided (an air-vent or waterlock after UV system could be applied). Also make sure, the necessary service area is provided in order to access the UV equipment and stop valves for removal of UV lamps and quartz sleeves.

It is recommended to design a duty/stand-by UV solution with 2 UV systems, to provide uninterrupted supply of safe disinfected drinking water. It creates the option to do the technical maintenance of one of the UV systems and still delivering safe water. Most of the global applied potable water standards demand to design a UV disinfection process with a minimum UV dose of 40 mJ/cm<sup>2</sup>.

### The Main Parameters for UV Equipment Selection

- Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The daily flow rate generally refers more to an average figure, where disinfection needs to be provided under all (worst-case) conditions.
- UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1cm water layer. It can be measured by special photometers or spectrophotometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. Common range of the UV transmittance of drinking water is 70-99%. To some extent the UV transmittance can be derived from the following water quality parameters: turbidity, color index and permanganate value. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental guidelines. Alternatively the required UV dose for specific project conditions is defined in a pre-project microbiological UV response study.
 

The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavourable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N MASTER SERIES

The DUV-N MASTER Series is a group of professional UV units with a capacity up to 400 m<sup>3</sup>/hr. The UV units are equipped with a certified UV intensity monitoring system and chemical cleaning system. The control panel of multi-lamp systems is provided with a touch panel that displays and monitors equipment parameters.

- User-friendly interface
- Remote control and monitoring is suited for SCADA
- The chemical cleaning system can only be activated through the control panel; this avoids the spontaneous start of the chemical cleaning process when UV lamps are still on and prevents operator's error
- Dose pacing by means of external control signal is an optional feature
- Power efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N MST	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N MST	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N MST	10	6,3	8	5	5,8	3,6	140	G 2"
DUV-1A250-N MST	20	13	17	11	12,2	7,7	230	G 2"
DUV-1A350-N MST	30	19	27	17	19	12	330	G 2"
DUV-1A500-N MST	50	32	44	28	28	18	440	DN 100
DUV-1A700-N MST	70	44	61	39	39	24	540	DN 100
DUV-2A500-N MST	100	63	82	52	51	32	1 100	DN 100
DUV-2A700-N MST	-	-	115	72	71	45	1 300	DN 100
DUV-3A500-N MST	175	110	143	90	83	52	1 600	DN 150
DUV-4A500-N MST	260	165	210	130	116	73	2 000	DN 200
DUV-5A500-N MST	-	-	268	170	147	92	2 500	DN 200
DUV-5A500-NE MST	360	225	-	-	-	-	2 500	DN 250
DUV-6A500-N MST	-	-	315	200	172	108	2 900	DN 200
DUV-6A500-NE MST	420	265	-	-	-	-	2 900	DN 250
DUV-7A500-N MST	-	-	384	240	207	130	3 400	DN 200

## DUV-N ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 70 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N ADV	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N ADV	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N ADV	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N ADV	20	13	17	11	12,2	7,7	340	G 2"
DUV-1A350-N ADV	30	19	27	17	19	12	400	G 2"
DUV-1A500-N ADV	50	32	44	28	28	18	550	DN 100
DUV-1A700-N ADV	70	44	61	39	39	24	730	DN 100

## DUV-N BASIC SERIES

The DUV-N BASIC Series is a group of compact single-lamp UV units with a capacity up to 20 m<sup>3</sup>/hr equipped with power-efficient and environmentally safe amalgam lamp with a nominal lamp life of 12,000 – 16,000 hours.

- The compact control panel indicates system failure and lamp elapsed time
- The compact UV reactors can handle an operational pressure up to 10 bar
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-21-N BSC	2,1	1,3	2	1,3	1,4	0,9	24	G 1"
DUV-1-48-N BSC	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N BSC	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N BSC	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N BSC	20	13	17	11	12,2	7,7	340	G 2"

# 2

## WASTE AND PROCESS WATER

UV technology is the most efficient method of wastewater disinfection and provides an eco-friendly, safe and more extensive alternative to chlorination. UV disinfection for wastewater treatment completely eliminates the need for chlorination and, as a result, excludes expensive safety measures and de-chlorination. UV disinfection provides microbiological safety of wastewater discharged into receiving water bodies, without negatively impact on the environment and ensures compliance with large number of international discharge regulations.



## DESIGN ASPECTS

UV disinfection is a final stage of wastewater treatment prior to its release into the receiving water body. UV disinfection is placed at the end of the treatment train, after secondary (biological) or tertiary treatment.

A well operated secondary sedimentation tank reduces the suspended solids coming into the UV system. A good functioning sedimentation process is a good pre-treatment for a UV disinfection system. In general it is recommended to optimize the design for suspended solids of less than 10 mg/l, however it is possible to apply UV even at levels as high as 35 mg/l.

UV units can be built into pressurized or gravity wastewater discharge line. When integrating a UV unit into an existing treatment plant, the maximum allowable head loss should be checked carefully, especially in gravity flow system.

The compact design and high electrical protection grade allow UV system installation in underground pump stations and basements.

During UV installation air-pockets should be avoided (an air-vent or waterlock after UV system could be applied). Also make sure, the necessary service area is provided in order to access the UV equipment and stop valves for removal of UV lamps and quartz sleeves.

After UV disinfection the effluent can be re-used, for example for irrigation.

The regular UV dose for wastewater disinfection is 30 mJ/cm<sup>2</sup>.

UV disinfection helps to minimize the fouling of inner surfaces of heat exchangers and other components in an industrial cooling water loop; with less fouling the heat exchangers efficiency is better maintained.

When applying membrane technologies, UV disinfection can be beneficial to slow down microbiological growth on the membranes. As membranes are not complete effective barrier against all protozoa and viruses, UV disinfection can also be an additional barrier after membrane technology. In this scenario, UV also creates an additional disinfection safety in case a membrane is damaged.

### The Main Parameters for UV Equipment Selection

- Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The daily flow rate generally refers more to an average figure, where disinfection needs to be provided under all (worst-case) conditions.
- UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1 cm water layer. It can be measured by special photometers or spectrophotometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. Common range of the UV transmittance of wastewater is 50-90%. To some extent the UV transmittance can be derived from the COD value of disinfected water. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental guidelines. Alternatively the required UV dose for specific project conditions is defined in a pre-project microbiological UV response study. The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavorable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N MASTER SERIES

The DUV-N MASTER Series is a group of professional UV units with a capacity up to 150 m<sup>3</sup>/hr. The UV units are equipped with a certified UV intensity monitoring system and chemical cleaning system. The control panel of multi-lamp systems is provided with a touch panel that displays and monitors equipment parameters.

- User-friendly interface
- Remote control and monitoring is suited for SCADA
- The chemical cleaning system can only be activated through the control panel; this avoids the spontaneous start of the chemical cleaning process when UV lamps are still on and prevents operator's error
- Dose pacing by means of external control signal is an optional feature
- Power efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings



UV unit	Capacity, m <sup>3</sup> /hr			Power consumption, W	Connection
	Tertiary effluent (Suspended solids 3 mg/l)	Secondary effluent (Suspended solids 15 mg/l)	Secondary effluent (Suspended solids 35 mg/l)		
	UVT = 70%	UVT = 65%	UVT = 50%		
	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>		
DUV-1-48-N MST	1,7	-	-	52	G 1"
DUV-1-87-N MST	3,6	3,3	-	95	G 2"
DUV-1A120-NK MST	4	3,5	2,1	140	G 2"
DUV-1A120-N MST	4,2	-	-	140	G 2"
DUV-1A250-NK MST	7	6,5	4,3	230	G 2"
DUV-1A250-N MST	9	-	-	230	G 2"
DUV-2A120D-N MST	8,5	7,5	4,8	400	G 2"
DUV-1A350-NK MST	11	10	7	330	G 2"
DUV-1A350-N MST	13	-	-	330	G 2"
DUV-1A500-NK MST	15	13,5	9	440	DN 65
DUV-2A250D-N MST	18	16	10,3	600	G 2"
DUV-1A500-N MST	20	-	-	440	DN 100
DUV-1A700-NK MST	22	19	12,5	540	DN 65
DUV-1A700-N MST	32	28	-	540	DN 100
DUV-2A500-N MST	35	32	-	1 100	DN 100
DUV-2A500D-N MST	40	36	21	1 100	DN 100
DUV-2A700-N MST	50	45	-	1 300	DN 100
DUV-3A500-N MST	60	52	-	1 600	DN 150
DUV-4A500-N MST	80	71	-	2 000	DN 200
DUV-5A500-N MST	105	90	-	2 500	DN 200
DUV-6A500-N MST	125	108	-	2 900	DN 200
DUV-7A500-N MST	150	130	-	3 400	DN 200

## DUV-N ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 30 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr			Power consumption, W	Connection
	Tertiary effluent (Suspended solids 3 mg/l)	Secondary effluent (Suspended solids 15 mg/l)	Secondary effluent (Suspended solids 35 mg/l)		
	UVT = 70%	UVT = 65%	UVT = 50%		
	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>		
DUV-1-48-N ADV	1,7	-	-	52	G 1"
DUV-1-87-N ADV	3,6	3,3	-	95	G 2"
DUV-1A120-NK ADV	4	3,5	2,1	210	G 2"
DUV-1A120-N ADV	4,2	-	-	210	G 2"
DUV-1A250-NK ADV	7	6,5	4,3	340	G 2"
DUV-1A250-N ADV	9	-	-	340	G 2"
DUV-1A350-NK ADV	11	10	7	400	G 2"
DUV-1A350-N ADV	13	-	-	400	G 2"
DUV-1A500-NK ADV	15	13,5	9	550	DN 65
DUV-1A500-N ADV	20	-	-	550	DN 100
DUV-1A700-NK ADV	22	19	12,5	730	DN 65
DUV-1A700-N ADV	32	28	-	730	DN 100

## DUV-N BASIC SERIES

The DUV-N BASIC Series is a group of compact single-lamp UV units with a capacity up to 10 m<sup>3</sup>/hr equipped with power-efficient and environmentally safe amalgam lamp with a nominal lamp life of 12,000 – 16,000 hours.

- The compact control panel indicates system failure and lamp elapsed time
- The compact UV reactors can handle an operational pressure up to 10 bar
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr			Power consumption, W	Connection
	Tertiary effluent (Suspended solids 3 mg/l)	Secondary effluent (Suspended solids 15 mg/l)	Secondary effluent (Suspended solids 35 mg/l)		
	UVT = 70%	UVT = 65%	UVT = 50%		
	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>	30 mJ/cm <sup>2</sup>		
DUV-1-21-N BSC	1,2	-	-	24	G 1"
DUV-1-48-N BSC	1,7	-	-	52	G 1"
DUV-1-87-N BSC	3,6	3,3	-	95	G 2"
DUV-1A120-NK BSC	4	3,5	2,1	210	G 1"
DUV-1A120-N BSC	4,2	-	-	210	G 2"
DUV-1A250-N BSC	9	8	-	340	G 2"

# 3

## INDUSTRIAL, FOOD & BEVERAGE WATER

UV disinfection can be beneficially applied in almost any production process which uses water as raw material for the end product, or as supplementary element for the production process. The disinfection standards applied in such industries like Food & Beverage and micro-electronics, generally are more stringent compared to potable water standards. These industries do not allow any impurities in water (such as chlorination and ozonation products), since this is effecting immediately the end-products quality. The UV disinfection technology is not adding any substances to the water and therefore is a highly appreciated disinfection method for industrial water treatment processes.



## DESIGN ASPECTS

UV disinfection is an integral part of industrial processes. This method improves the quality of the manufactured products and increases their shelf-life. UV disinfection complies with industrial and governmental health regulations and contributes to a better product safety.

When applying membrane technologies, UV disinfection can be beneficial to slow down microbiological growth on the membranes. As membranes are not a complete effective barrier against all protozoa and viruses, UV disinfection can also be an additional barrier after membrane technology. In this scenario, UV also creates an additional disinfection safety in case a membrane is damaged.

The compact design and high electrical protection grade, allow UV system installation in underground water well chambers and basements.

During UV installation air-pockets should be avoided (an air-vent or waterlock after UV system could be applied). Also make sure, the necessary service area is provided in order to access the UV equipment and stop valves for removal of UV lamps and quartz sleeves.

To monitor UV disinfection process we offer to equip the UV systems with a UV sensor.

We can manufacture a UV disinfection unit out of more corrosion-resistant steel: 316, 316L, duplex, super duplex, upon the request.

The common recommended UV dose for bottled water and water in the Food & Beverage industry is 40 mJ/m<sup>2</sup>.

### The Main Parameters for UV Equipment Selection

- Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The daily flow rate generally refers more to an average figure, where disinfection needs to be provided under all (worst-case) conditions.
- UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1 cm water layer. It can be measured by special photometers or spectro-photometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. Range of the UV transmittance of industrial water is very wide – from 50 to 99%. To some extent the UV transmittance can be derived from the following water quality parameters: turbidity, color index, permanganate value or COD. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental or industrial guidelines. Alternatively the required UV dose for specific project conditions is defined in a pre-project microbiological UV response study. The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavorable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N MASTER SERIES

The DUV-N MASTER Series is a group of professional UV units with a capacity up to 400 m<sup>3</sup>/hr. The UV units are equipped with a certified UV intensity monitoring system and chemical cleaning system. The control panel of multi-lamp systems is provided with a touch panel that displays and monitors equipment parameters.

- User-friendly interface
- Remote control and monitoring is suited for SCADA
- The chemical cleaning system can only be activated through the control panel; this avoids the spontaneous start of the chemical cleaning process when UV lamps are still on and prevents operator's error
- Dose pacing by means of external control signal is an optional feature
- Power efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis )		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N MST	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N MST	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N MST	10	6,3	8	5	5,8	3,6	140	G 2"
DUV-1A250-N MST	20	13	17	11	12,2	7,7	230	G 2"
DUV-1A350-N MST	30	19	27	17	19	12	330	G 2"
DUV-1A500-N MST	50	32	44	28	28	18	440	DN 100
DUV-1A700-N MST	70	44	61	39	39	24	540	DN 100
DUV-2A500-N MST	100	63	82	52	51	32	1 100	DN 100
DUV-2A700-N MST	-	-	115	72	71	45	1 300	DN 100
DUV-3A500-N MST	175	110	143	90	83	52	1 600	DN 150
DUV-4A500-N MST	260	165	210	130	116	73	2 000	DN 200
DUV-5A500-N MST	-	-	268	170	147	92	2 500	DN 200
DUV-5A500-NE MST	360	225	-	-	-	-	2 500	DN 250
DUV-6A500-N MST	-	-	315	200	172	108	2 900	DN 200
DUV-6A500-NE MST	420	265	-	-	-	-	2 900	DN 250
DUV-7A500-N MST	-	-	384	240	207	130	3 400	DN 200

## DUV-N ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 70 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N ADV	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N ADV	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N ADV	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N ADV	20	13	17	11	12,2	7,7	340	G 2"
DUV-1A350-N ADV	30	19	27	17	19	12	400	G 2"
DUV-1A500-N ADV	50	32	44	28	28	18	550	DN 100
DUV-1A700-N ADV	70	44	61	39	39	24	730	DN 100

## DUV-N BASIC SERIES

The DUV-N BASIC Series is a group of compact single-lamp UV units with a capacity up to 20 m<sup>3</sup>/hr equipped with power-efficient and environmentally safe amalgam lamp with a nominal lamp life of 12,000 – 16,000 hours.

- The compact control panel indicates system failure and lamp elapsed time
- The compact UV reactors can handle an operational pressure up to 10 bar
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-21-N BSC	2,1	1,3	2	1,3	1,4	0,9	24	G 1"
DUV-1-48-N BSC	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N BSC	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N BSC	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N BSC	20	13	17	11	12,2	7,7	340	G 2"

# 4

## WATER IN PHARMACEUTICAL INDUSTRY

Advanced and reliable water disinfection directly affects the product quality in the pharmaceutical industry. The pharmaceutical high quality standards demand the basic requirements to be extended with additional pharma specific requirements with respect to disinfection level, equipment quality and functionality. The DUV-N Pharma Series matches all these requirements. UV units are used for disinfection of pharmaceutical process water (i.e. rinsing, cleaning) and for ultra pure process water preparation (purified water, water for injection). UV disinfection as a chemical-free process, prevents the formation of by-products or addition of impurities in the water.



## DESIGN ASPECTS

DUV-N Pharma Series design:

- UV reactor made of stainless steel 316L
- High grade material finish of the UV reactors inner surface (Ra 0,4–0,8 micron)
- Sanitary fittings or tri-clamp water connections
- 254 nm selective UV sensor certified according to ÖNORM.

This design complies with GMP (Good Manufacturing Practice) and industry requirements. A UV reactor can be regularly sanitized with hot water and steam when UV lamps are off.

Depending on the production process, the clamp-connection seal material can be silicone, NBR, EPDM, Viton or PTFE.

Where necessary, we can offer UV reactor housings manufactured of more corrosion-resistant steel qualities like: 316Ti, duplex, or super duplex.

When applying membrane technologies, UV disinfection can be beneficial to slow down microbiological growth on the membranes. As membranes are not a complete effective barrier against all protozoa and viruses, UV disinfection can also be an additional barrier after membrane technology. In this scenario, UV also creates an additional disinfection safety in case a membrane is damaged.

The compact design and high electrical protection grade, allow the DUV-N series to fit easily in a wide variety of production processes. Remote control and monitoring provide easy integration of a UV unit in the overall manufacturing SCADA-system.

### The Main Parameters for UV Equipment Selection

- **Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The daily flow rate generally refers more to an average figure, where disinfection needs to be provided under all (worst-case) conditions.
- **UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1 cm water layer. It can be measured by special photometers or spectrophotometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. The UV transmittance of water in pharmaceutical industry may vary within a wide range – from 70 to 99%. However after reverse osmosis the UV transmittance is higher – more than 95%. To some extent the UV transmittance can be derived from the following water quality parameters: turbidity, color index, permanganate value. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- **UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental or industrial guidelines. The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavorable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N PHARMA MASTER PLUS SERIES

The DUV-N PHARMA MASTER Plus Series is a group of professional UV units with a capacity up to 25 m<sup>3</sup>/hr. The UV units are GMP manufactured products. The control panel is provided with a touch panel that displays and monitors equipment parameters.

- The compact UV reactors are made of stainless steel 316L with advanced finishing of the inner surfaces and equipped with clamp-connectors
- Control panel with user-friendly interface is made of stainless steel with IP 65-rated protection
- Remote control and monitoring is suited for SCADA
- Displayed UV dose is calculated based on the readings of the UV sensor, external flow-meter and  $\tau$ -meter
- Light and audible indication of failures
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr



UV unit	Capacity, m <sup>3</sup> /hr					Power consumption, W	Connection
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	60 mJ/cm <sup>2</sup>	80 mJ/cm <sup>2</sup>	120 mJ/cm <sup>2</sup>		
$\tau = 95\%$							
DUV-1A50-N PH MST Plus	4,5	3	2	1,5	1	260	Clamp DN 50
DUV-1A120-N PH MST Plus	9	6	4	3	2	290	Clamp DN 50
DUV-1A250-N PH MST Plus	19	12	8	6	4	380	Clamp DN 50
DUV-1A500-N PH MST Plus	25	25	18	14	9	580	Clamp DN 50
DUV-1A700-N PH MST Plus	25	25	24	19	12	680	Clamp DN 50
$\tau = 90\%$							
DUV-1A50-N PH MST Plus	3,5	2,5	1,5	1,3	-	260	Clamp DN 50
DUV-1A120-N PH MST Plus	7	5	3	2,5	-	290	Clamp DN 50
DUV-1A250-N PH MST Plus	14	10	6	5	3	380	Clamp DN 50
DUV-1A500-N PH MST Plus	25	25	16	13	8	580	Clamp DN 50
DUV-1A700-N PH MST Plus	25	25	22	17	11	680	Clamp DN 50
$\tau = 85\%$							
DUV-1A50-N PH MST Plus	3	2	1,3	1	-	260	Clamp DN 50
DUV-1A120-N PH MST Plus	6	4	2,5	2	-	290	Clamp DN 50
DUV-1A250-N PH MST Plus	12	8	5	4	2,5	380	Clamp DN 50
DUV-1A500-N PH MST Plus	25	22	15	11	7,5	580	Clamp DN 50
DUV-1A700-N PH MST Plus	25	25	20	15	10	680	Clamp DN 50
$\tau = 80\%$							
DUV-1A50-N PH MST Plus	2,5	1,8	1	-	-	260	Clamp DN 50
DUV-1A120-N PH MST Plus	5	3,5	2	-	-	290	Clamp DN 50
DUV-1A250-N PH MST Plus	10	7	4	3,5	2	380	Clamp DN 50
DUV-1A500-N PH MST Plus	25	20	13	10	6,5	580	Clamp DN 50
DUV-1A700-N PH MST Plus	25	25	18	14	9	680	Clamp DN 50

– maximal permissible flow rate

## DUV-N PHARMA ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 25 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit
- High grade material finish of the UV reactors inner surface (Ra 0,4–0,8 micron)
- Sanitary fittings or tri-clamp water connections
- Clamp-connection seal materials: silicone, NBR, EPDM, Viton or PTFE



UV unit	Capacity, m <sup>3</sup> /hr					Power consumption, W	Connection
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	60 mJ/cm <sup>2</sup>	80 mJ/cm <sup>2</sup>	120 mJ/cm <sup>2</sup>		
UVT = 95%							
DUV-1A50-N PH ADV	4,5	3	2	1,5	1	110	Clamp DN 50
DUV-1A120-N PH ADV	9	6	4	3	2	140	Clamp DN 50
DUV-1A250-N PH ADV	19	12	8	6	4	230	Clamp DN 50
DUV-1A500-N PH ADV	25	25	18	14	9	440	Clamp DN 50
DUV-1A700-N PH ADV	25	25	24	19	12	540	Clamp DN 50
UVT = 90%							
DUV-1A50-N PH ADV	3,5	2,5	1,5	1,3	-	110	Clamp DN 50
DUV-1A120-N PH ADV	7	5	3	2,5	-	140	Clamp DN 50
DUV-1A250-N PH ADV	14	10	6	5	3	230	Clamp DN 50
DUV-1A500-N PH ADV	25	25	16	13	8	440	Clamp DN 50
DUV-1A700-N PH ADV	25	25	22	17	11	540	Clamp DN 50
UVT = 85%							
DUV-1A50-N PH ADV	3	2	1,3	1	-	110	Clamp DN 50
DUV-1A120-N PH ADV	6	4	2,5	2	-	140	Clamp DN 50
DUV-1A250-N PH ADV	12	8	5	4	2,5	230	Clamp DN 50
DUV-1A500-N PH ADV	25	22	15	11	7,5	440	Clamp DN 50
DUV-1A700-N PH ADV	25	25	20	15	10	540	Clamp DN 50
UVT = 80%							
DUV-1A50-N PH ADV	2,5	1,8	1	-	-	110	Clamp DN 50
DUV-1A120-N PH ADV	5	3,5	2	-	-	140	Clamp DN 50
DUV-1A250-N PH ADV	10	7	4	3,5	2	230	Clamp DN 50
DUV-1A500-N PH ADV	25	20	13	10	6,5	440	Clamp DN 50
DUV-1A700-N PH ADV	25	25	18	14	9	540	Clamp DN 50

– maximal permissible flow rate

The aquatic life highly depends on the water quality. The water should not accumulate dangerous toxics and should be free from infectious organisms. Chemical disinfection methods have significantly limited disinfection effectiveness and the disadvantage of potential toxic by-product formation.

UV disinfection in the water supply systems to (shell-) fish farms, prevents diseases to disturb the sensitive and valuable growth and reproduction process. UV disinfection does not affect the physical and chemical water characteristics. Where viruses are the biggest fear of a fish farm, the strongest advantage of UV disinfection technology over any other method is its effective log reduction of viruses.

## DESIGN ASPECTS

UV disinfection allows reducing the use of antibiotics and other aquaculture medicines, which reduces the mortality rate and saves costs. The UV technology is the only choice for organic aquaculture.

The best possible position for a UV disinfection stage is the end of the treatment train (after filters, degasifiers and other treatment stages that are used to improve water quality), prior to supply the water to the aquaculture farm. This provides the best protection against intrusion of unwanted organisms, protozoa and viruses.

The above described benefits allow re-using a larger portion of the aquaculture water, which reduces the freshwater intake and prevents the discharge of useful nutrients and thermal load to the process water.

UV units can be built into pressurized or gravity wastewater discharge line. When integrating a UV unit into an existing treatment plant, the maximum allowable head loss should be checked carefully, especially in gravity flow system.

The compact design and high electrical protection grade, allow the DUV-N series to fit easily in a wide variety of production processes. Remote control and monitoring provide easy integration of a UV unit in the overall manufacturing SCADA-system.

During UV installation air-pockets should be avoided (an air-vent or waterlock after UV system could be applied). Also make sure, the necessary service area is provided in order to access the UV equipment and stop valves for removal of UV lamps and quartz sleeves.

Where necessary, we can offer UV reactor housings manufactured of more corrosion-resistant steel qualities like: 316Ti, duplex, or super duplex.

The main objective of UV disinfection is to prevent aquaculture diseases. It is essential to know the target organisms, protozoa or viruses, in order to advise the correct UV system capacities.

Depending on the specific disinfection target, the UV dose may vary from 6 to 320 mJ/cm<sup>2</sup> for aquaculture applications.

UV equipment can be used for destruction of ozone that is very dangerous and even lethal for aquaculture. Ozone is commonly applied in the water treatment of a fish farm as an oxidation process. The residual ozone with concentrations up to 1 mg/l can be effectively destructed with a UV dose of 120 mJ/cm<sup>2</sup>.

### The Main Parameters for UV Equipment Selection

- **Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The daily flow rate generally refers more to an average figure, where disinfection needs to be provided under all (worst-case) conditions.
- **UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1 cm water layer. It can be measured by special photometers or spectro-photometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. The UV transmittance of water in pharmaceutical industry may vary within a wide range – from 50 to 95% – and usually it is sufficiently high. To some extent the UV transmittance can be derived from the following water quality parameters: turbidity, color index, permanganate value or COD. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- **UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental or industrial guidelines. Alternatively the required UV dose for specific project conditions is defined in a pre-project microbiological UV response study. The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavorable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N MASTER SERIES

**MASTER** is a series of professional UV units with a capacity up to 400 m<sup>3</sup>/hr. The UV units are equipped with a certified UV intensity monitoring system and chemical cleaning system. The control panel of multi-lamp systems is provided with a touch panel that displays and monitors equipment parameters.

- User-friendly interface
- Remote control and monitoring is suited for SCADA
- The chemical cleaning system can only be activated through the control panel; this avoids the spontaneous start of the chemical cleaning process when UV lamps are still on and prevents operator's error
- Dose pacing by means of external control signal is an optional feature
- Power efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N MST	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N MST	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N MST	10	6,3	8	5	5,8	3,6	140	G 2"
DUV-1A250-N MST	20	13	17	11	12,2	7,7	230	G 2"
DUV-1A350-N MST	30	19	27	17	19	12	330	G 2"
DUV-1A500-N MST	50	32	44	28	28	18	440	DN 100
DUV-1A700-N MST	70	44	61	39	39	24	540	DN 100
DUV-2A500-N MST	100	63	82	52	51	32	1 100	DN 100
DUV-2A700-N MST	-	-	115	72	71	45	1 300	DN 100
DUV-3A500-N MST	175	110	143	90	83	52	1 600	DN 150
DUV-4A500-N MST	260	165	210	130	116	73	2 000	DN 200
DUV-5A500-N MST	-	-	268	170	147	92	2 500	DN 200
DUV-5A500-NE MST	360	225	-	-	-	-	2 500	DN 250
DUV-6A500-N MST	-	-	315	200	172	108	2 900	DN 200
DUV-6A500-NE MST	420	265	-	-	-	-	2 900	DN 250
DUV-7A500-N MST	-	-	384	240	207	130	3 400	DN 200

## DUV-N ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 70 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-48-N ADV	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N ADV	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N ADV	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N ADV	20	13	17	11	12,2	7,7	340	G 2"
DUV-1A350-N ADV	30	19	27	17	19	12	400	G 2"
DUV-1A500-N ADV	50	32	44	28	28	18	550	DN 100
DUV-1A700-N ADV	70	44	61	39	39	24	730	DN 100

## DUV-N BASIC SERIES

The DUV-N BASIC is a group of compact single-lamp UV units with a capacity up to 20 m<sup>3</sup>/hr equipped with power-efficient and environmentally safe amalgam lamp with a nominal lamp life of 12,000 – 16,000 hours.

- The compact control panel indicates system failure and lamp elapsed time
- The compact UV reactors can handle an operational pressure up to 10 bar
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water after advanced treatment (membranes, reverse osmosis)		Ground water		Surface water			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-21-N BSC	2,1	1,3	2	1,3	1,4	0,9	24	G 1"
DUV-1-48-N BSC	3,2	2	3	1,9	2,2	1,4	52	G 1"
DUV-1-87-N BSC	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N BSC	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N BSC	20	13	17	11	12,2	7,7	340	G 2"

# 6

## SWIMMING POOLS AND RECREATIONAL WATER PARKS

UV technology is used in swimming pools and recreational water parks to increase disinfection efficiency, cut down the dosage of chlorine agent and significantly reduce the amount of free residual chlorine in pool basins. All this has a beneficial effect on organoleptic water properties and on the air quality in recreational areas. UV technology limits monochloramine formation.



## DESIGN ASPECTS

UV disinfection reduces the amount of free residual chlorine to the minimal value of 0,1–0,3 mg/l. However the correction of chlorination process should be performed by a specialist. A UV disinfection system is advisable to place before chlorine dosing system. When heat-exchange units are used it is reasonable to install a UV disinfection system before water heating process since the high temperature of treated water can reduce the disinfection efficiency.

The compact design and high electrical protection grade, allow the DUV-N series to fit easily in a wide variety of production processes. Remote control and monitoring provide easy integration of a UV unit in the overall manufacturing SCADA-system.

During UV installation air-pockets should be avoided (an air-vent or waterlock after UV system could be applied). Also make sure, the necessary service area is provided in order to access the UV equipment and stop valves for removal of UV lamps and quartz sleeves.

Where necessary, we can offer UV reactor housings manufactured of more corrosion-resistant steel qualities like: 316Ti, duplex, or super duplex.

According to the international standards for water disinfection in swimming pools and recreational water parks the recommended UV dose is up to 60 mJ/cm<sup>2</sup>.

### The Main Parameters for UV Equipment Selection

- **Maximum Design Flow Rate (Capacity).** It is essential to know the peak design hourly flow rate. The hourly flow rate should be set based on the capacity of a circulation pump.
- **UV Transmittance (UVT)** is used to define water transparency for UV spectrum (at a wavelength of 254 nm). The UV transmittance indicates how far UV light can penetrate through 1 cm water layer. It can be measured by special photometers or spectro-photometers. The UV transmittance depends on the amount of colloids and dissolved organic compounds in the water. To some extent the UV transmittance can be derived from the following water quality parameters: turbidity, color index, permanganate value. However The UV transmittance of water in swimming pools and recreational water parks usually are sufficiently high – 80-95%. If the UV transmittance of the water of your process fluctuates, the lowest value (worst case scenario) should be used for the UV system selection. With this disinfection design philosophy, safe water is assured in all cases.
- **UV Dose.** The required UV dose depends on the below factors: the bacterial load coming into the UV system and the type of microorganisms in water, microbiological outlet requirements for disinfected water and the level of suspended solids in the water. Depending on the local standards, the required minimum UV dose may be stipulated in governmental guidelines. Alternatively the required UV dose for specific project conditions is defined in a pre-project microbiological UV response study.  
The UV dose can vary during operation due to aging of UV lamps, fouling of quartz sleeves, fluctuation of the flow rate and water quality. For that reason the equipment should be designed to provide the minimum required dose when all unfavorable factors are present (peak design flow rate, minimum UV transmittance, maximum sleeve fouling at the end of the effective lamp life).

## DUV-N MASTER SERIES

The DUV-N MASTER Series is a group of professional UV units with a capacity up to 400 m<sup>3</sup>/hr. The UV units are equipped with a certified UV intensity monitoring system and chemical cleaning system. The control panel of multi-lamp systems is provided with a touch panel that displays and monitors equipment parameters.

- User-friendly interface
- Remote control and monitoring is suited for SCADA
- The chemical cleaning system can only be activated through the control panel; this avoids the spontaneous start of the chemical cleaning process when UV lamps are still on and prevents operator's error
- Dose pacing by means of external control signal is an optional feature
- Power efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hr
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water in swimming pools equipped with advanced treatment system		Water in swimming pools equipped with conventional filtration system		Water in swimming pool without filtration process			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-87-N MST	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N MST	10	6,3	8	5	5,8	3,6	140	G 2"
DUV-1A250-N MST	20	13	17	11	12,2	7,7	230	G 2"
DUV-1A350-N MST	30	19	27	17	19	12	330	G 2"
DUV-1A500-N MST	50	32	44	28	28	18	440	DN 100
DUV-1A700-N MST	70	44	61	39	39	24	540	DN 100
DUV-2A500-N MST	100	63	82	52	51	32	1 100	DN 100
DUV-2A700-N MST	-	-	115	72	71	45	1 300	DN 100
DUV-3A500-N MST	175	110	143	90	83	52	1 600	DN 150
DUV-4A500-N MST	260	165	210	130	116	73	2 000	DN 200
DUV-5A500-N MST	-	-	268	170	147	92	2 500	DN 200
DUV-5A500-NE MST	360	225	-	-	-	-	2 500	DN 250
DUV-6A500-N MST	-	-	315	200	172	108	2 900	DN 200
DUV-6A500-NE MST	420	265	-	-	-	-	2 900	DN 250
DUV-7A500-N MST	-	-	384	240	207	130	3 400	DN 200

## DUV-N ADVANCED SERIES

The DUV-N ADVANCED Series is a group of compact single-lamp UV units with a capacity up to 70 m<sup>3</sup>/hr. The UV units are equipped with a UV intensity monitoring system, remote control and optional chemical cleaning system.

- The UV units can be remotely switched ON/OFF with use of a dry contact signal
- The compact control panel displays the key operating parameters of the UV unit
- Power-efficient and environmentally safe amalgam lamps with a nominal lamp life of 12,000 – 16,000 hours
- The compact UV reactors can handle an operational pressure up to 10 bar and are equipped with easy-accessible drain fittings
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water in swimming pools equipped with advanced treatment system		Water in swimming pools equipped with conventional filtration system		Water in swimming pool without filtration process			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-87-N ADV	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N ADV	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N ADV	20	13	17	11	12,2	7,7	340	G 2"
DUV-1A350-N ADV	30	19	27	17	19	12	400	G 2"
DUV-1A500-N ADV	50	32	44	28	28	18	550	DN 100
DUV-1A700-N ADV	70	44	61	39	39	24	730	DN 100

## DUV-N BASIC SERIES

The DUV-N BASIC Series is a group of compact single-lamp UV units with a capacity up to 20 m<sup>3</sup>/hr equipped with power-efficient and environmentally safe amalgam lamp with a nominal lamp life of 12,000 – 16,000 hours.

- The compact control panel indicates system failure and lamp elapsed time
- The compact UV reactors can handle an operational pressure up to 10 bar
- The high temperature sensor is integrated into the automatic safety circuit



UV unit	Capacity, m <sup>3</sup> /hr						Power consumption, W	Connection
	Water in swimming pools equipped with advanced treatment system		Water in swimming pools equipped with conventional filtration system		Water in swimming pool without filtration process			
	UVT = 90%		UVT = 85%		UVT = 70%			
	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>	25 mJ/cm <sup>2</sup>	40 mJ/cm <sup>2</sup>		
DUV-1-87-N BSC	7,5	4,7	7	4,4	5,1	3,2	95	G 2"
DUV-1A120-N BSC	10	6,3	8	5	5,8	3,6	210	G 2"
DUV-1A250-N BSC	20	13	17	11	12,2	7,7	340	G 2"

## DRAWINGS AND ADDITIONAL INFORMATION

**1**

DUV-N MASTER SERIES

**2**

DUV-N ADVANCED SERIES

**3**

DUV-N BASIC SERIES

## How to select steel for different operational conditions

When selecting equipment, please consider the appropriate steel for the type of water.

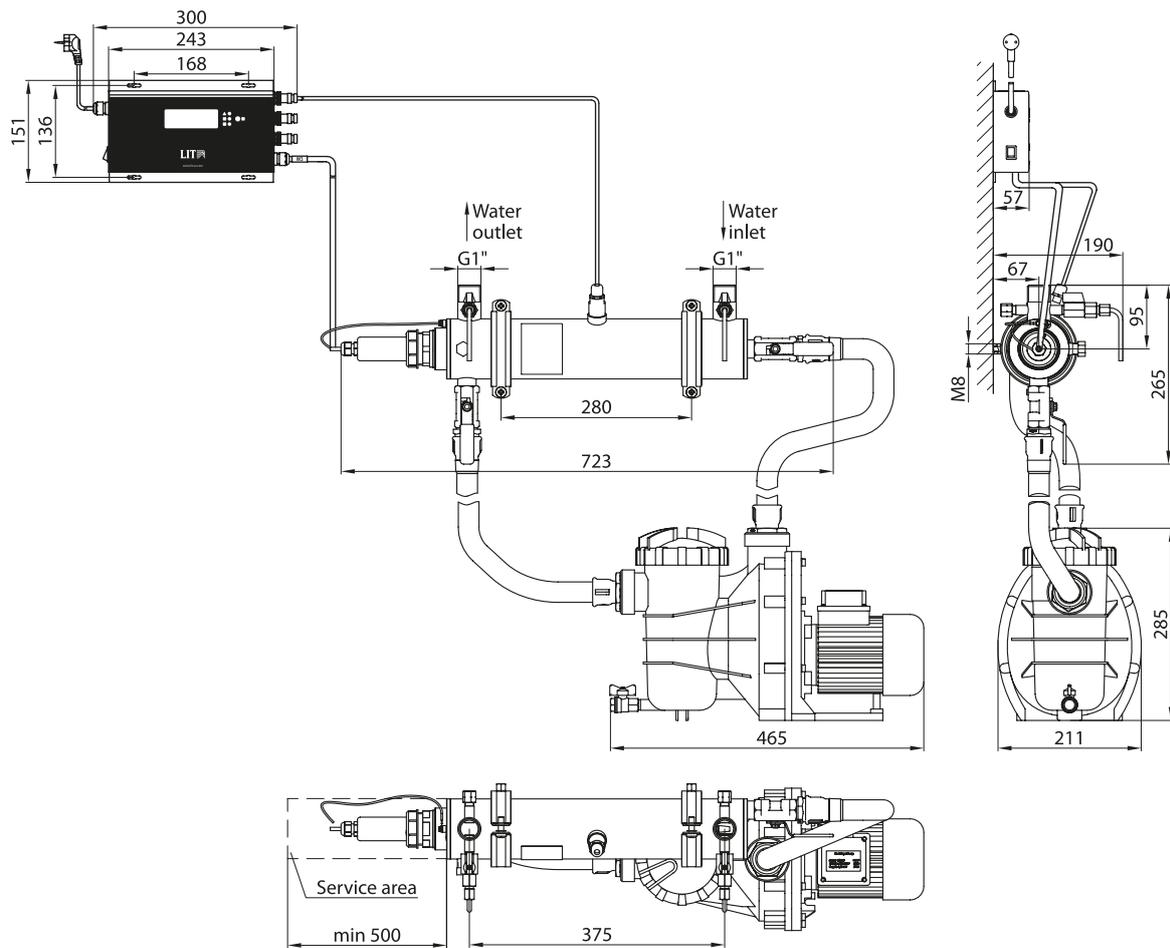
To select steel quality see the following table (the main parameter is chlorides level):

Water to be treated	Maximum chlorides, mg/l	EN steel	ASTM steel
Cold drinking water	200	1.4301	304
Cold process water		1.4306	304L
Hot drinking water	50	1.4307	304L
Cold drinking and process water with high chlorine ion concentration	500	1.4401	316
		1.4404	316L
		1.4435	316L
Sea water	5 000	1.4462 (duplex)	S32205
Sea water swimming pool			
Chlorinated wastewater			
Ballast water	10 000	1.4539	904L
Baths and swimming pools with concentrated sea water			
Ballast water			
		1.4547	S31254

### Note:

- 1% solution of NaCl corresponds to chlorides content of 6100 mg/l
- 1% solution of CaCl<sub>2</sub> corresponds to chlorides content of 6400 mg /l
- 1 mmole of chloride per 1 liter (1 mole/m<sup>3</sup>) corresponds to 36 mg/l
- 1 permille corresponds to 1 g of chlorides per liter

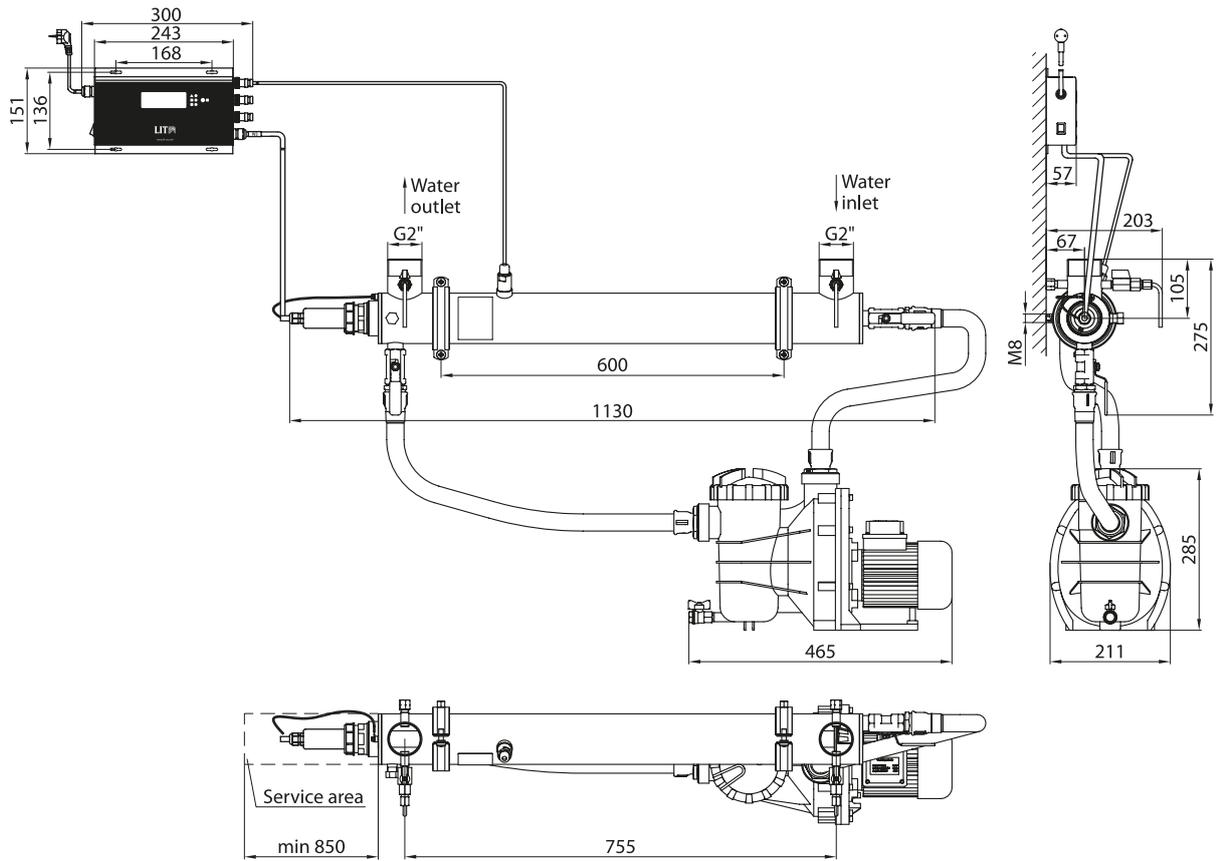
# DUV-1-48-N MST



## Components

Component	LIT Number
UV lamp	GHO436T5L
Quartz sleeve with sealing	LIT HP.235.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	L~220-1x55-2201-07 UV G55T8
UV sensor	IS-7
Chemical cleaning system	LIT HP.215.00.000

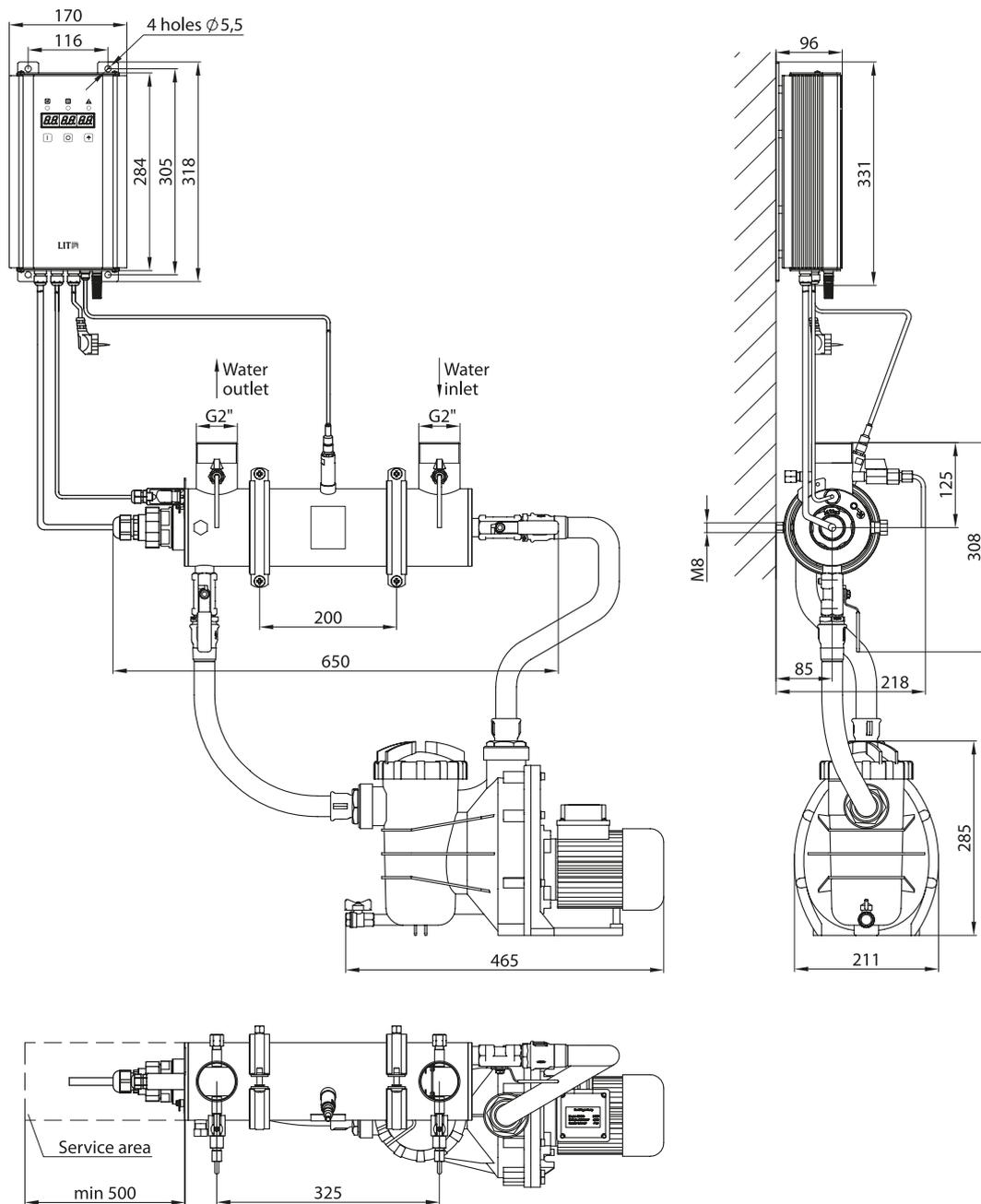
# DUV-1-87-N MST



## Components

Component	LIT Number
UV lamp	GHO36T5L
Quartz sleeve with sealing	LIT HP.276.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	L~220-1x75-2201-07 UV G75T8
UV sensor	IS-7
Chemical cleaning system	LIT HP.215.00.000

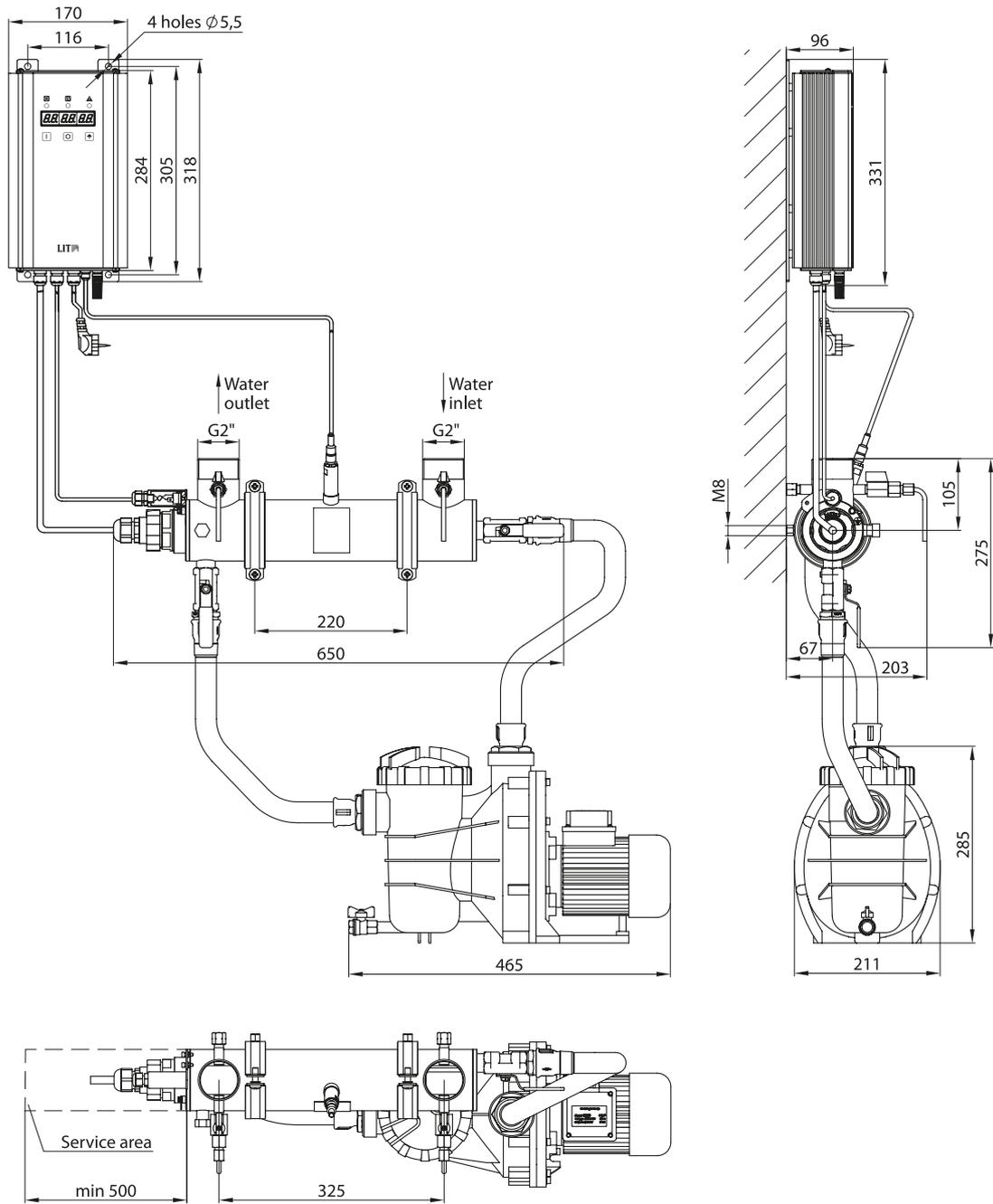
# DUV-1A120-N MST



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

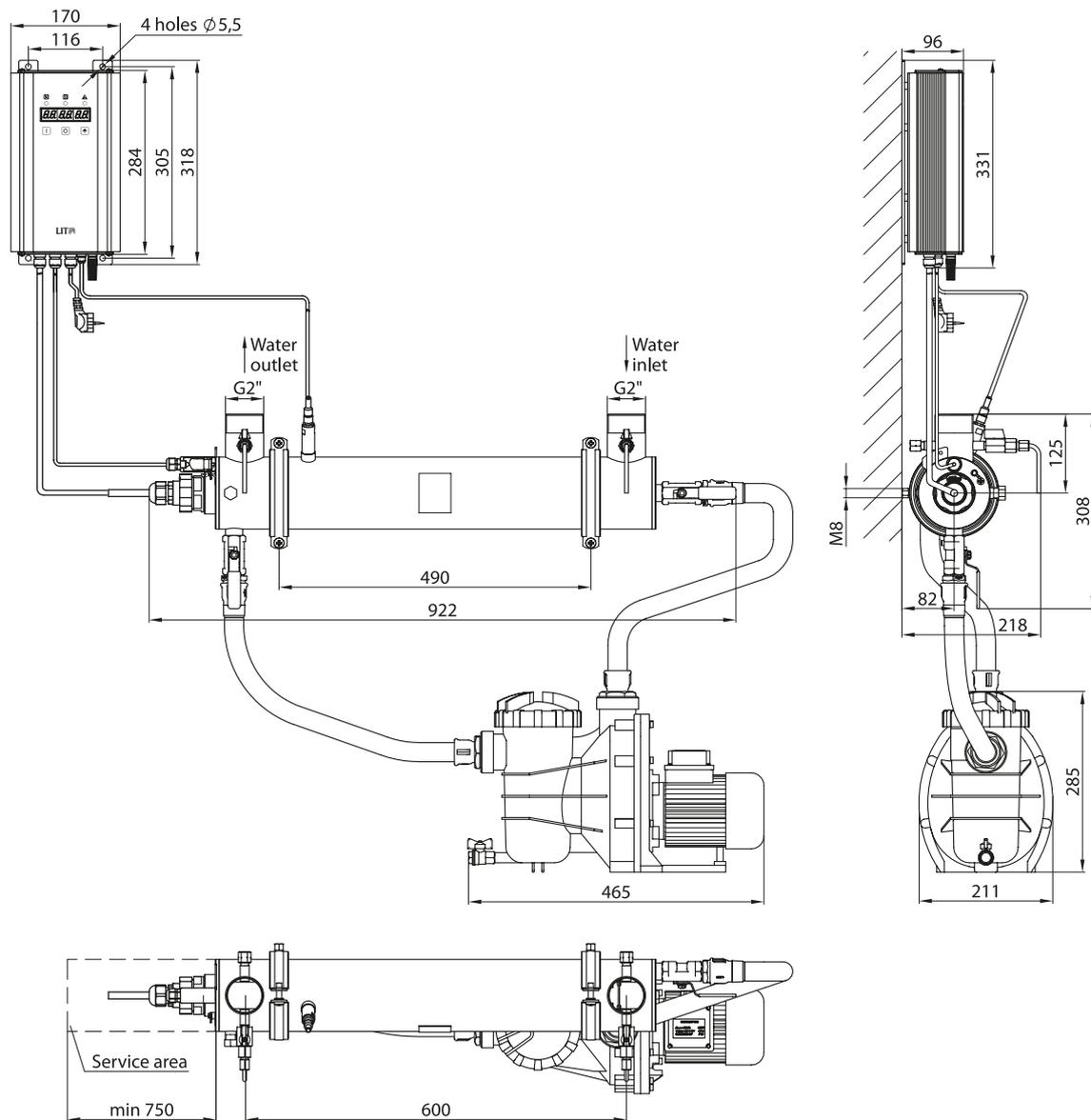
# DUV-1A120-NK MST



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

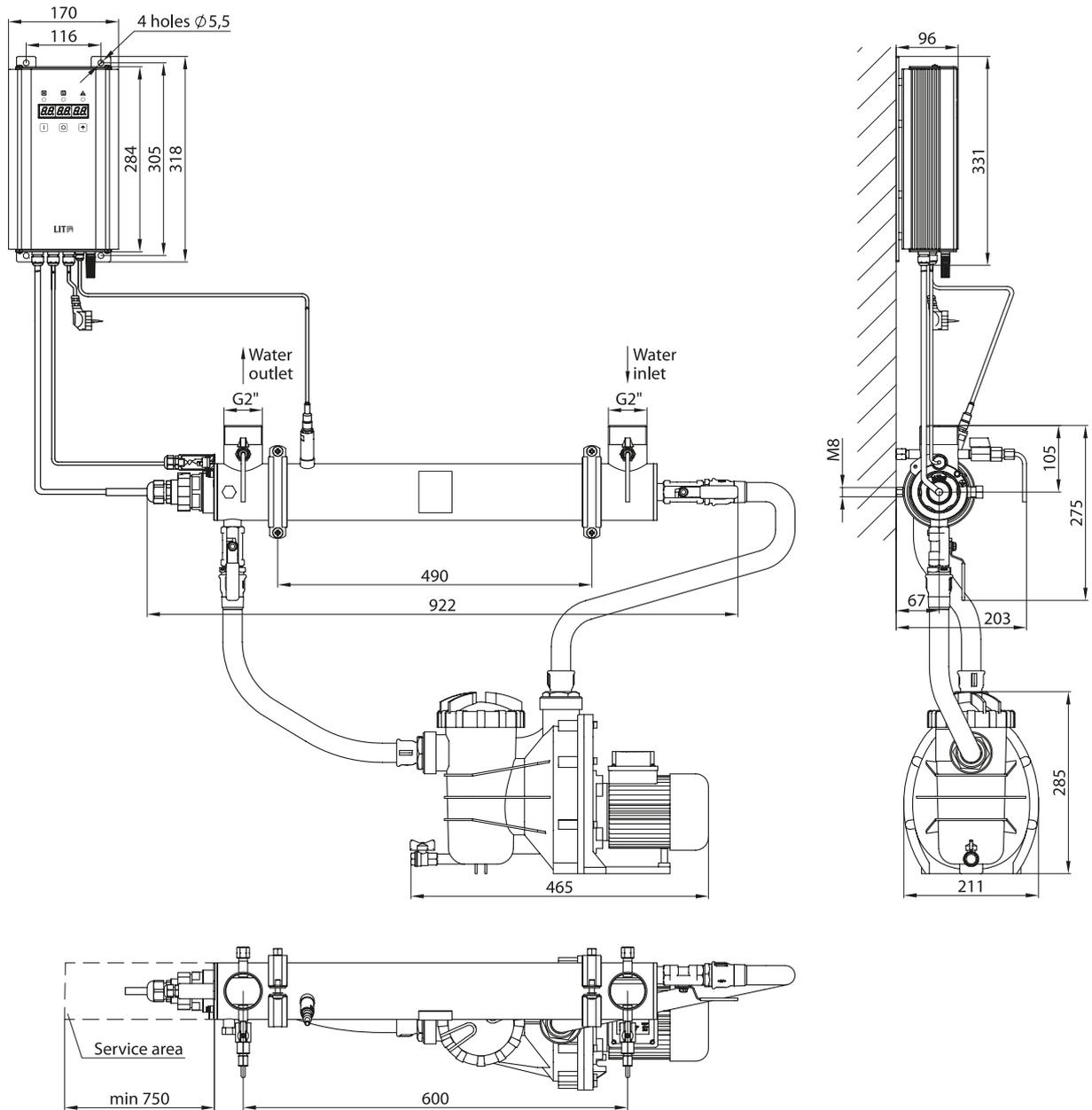
# DUV-1A250-N MST



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

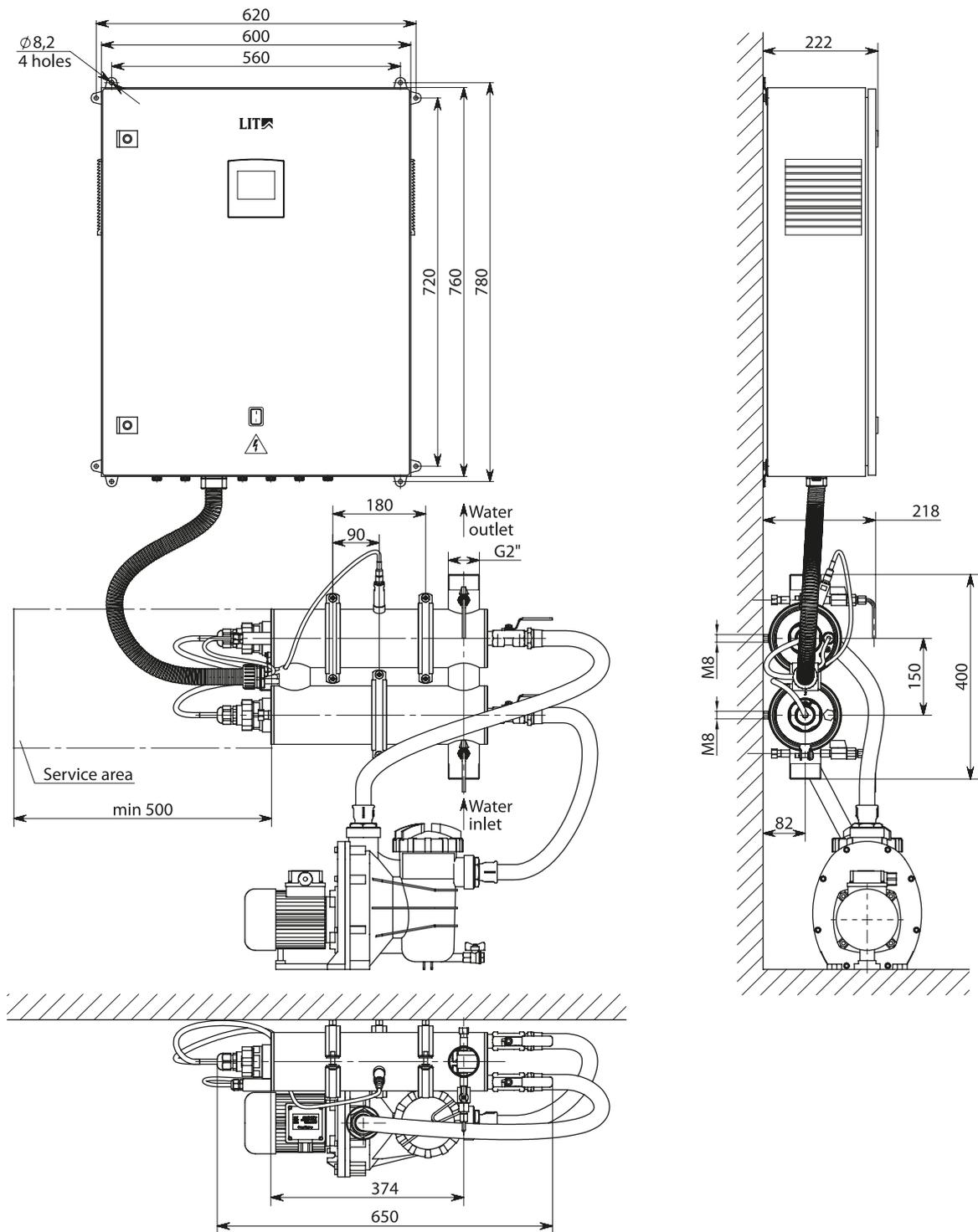
# DUV-1A250-NK MST



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

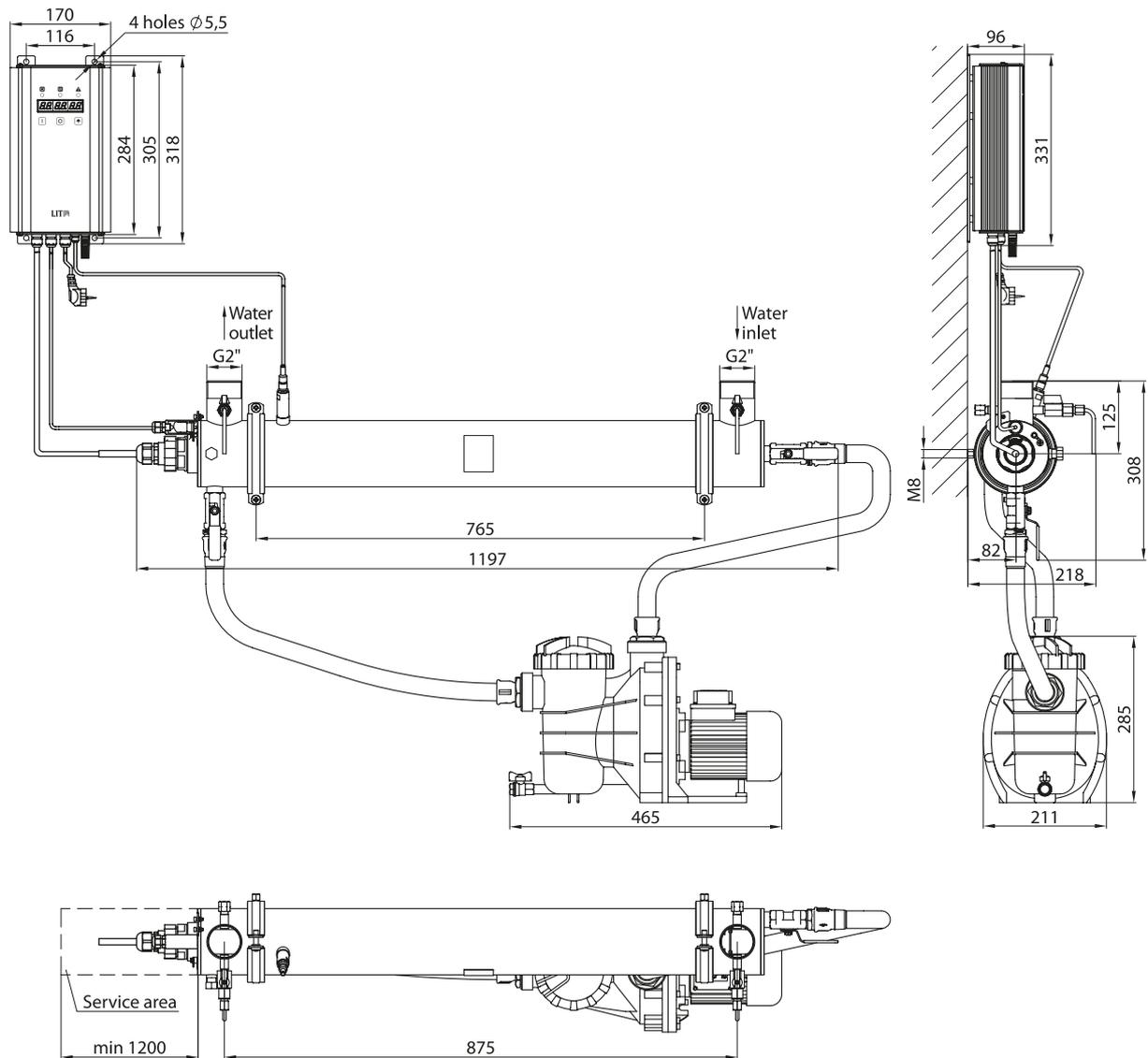
# DUV-2A120D-N MST



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

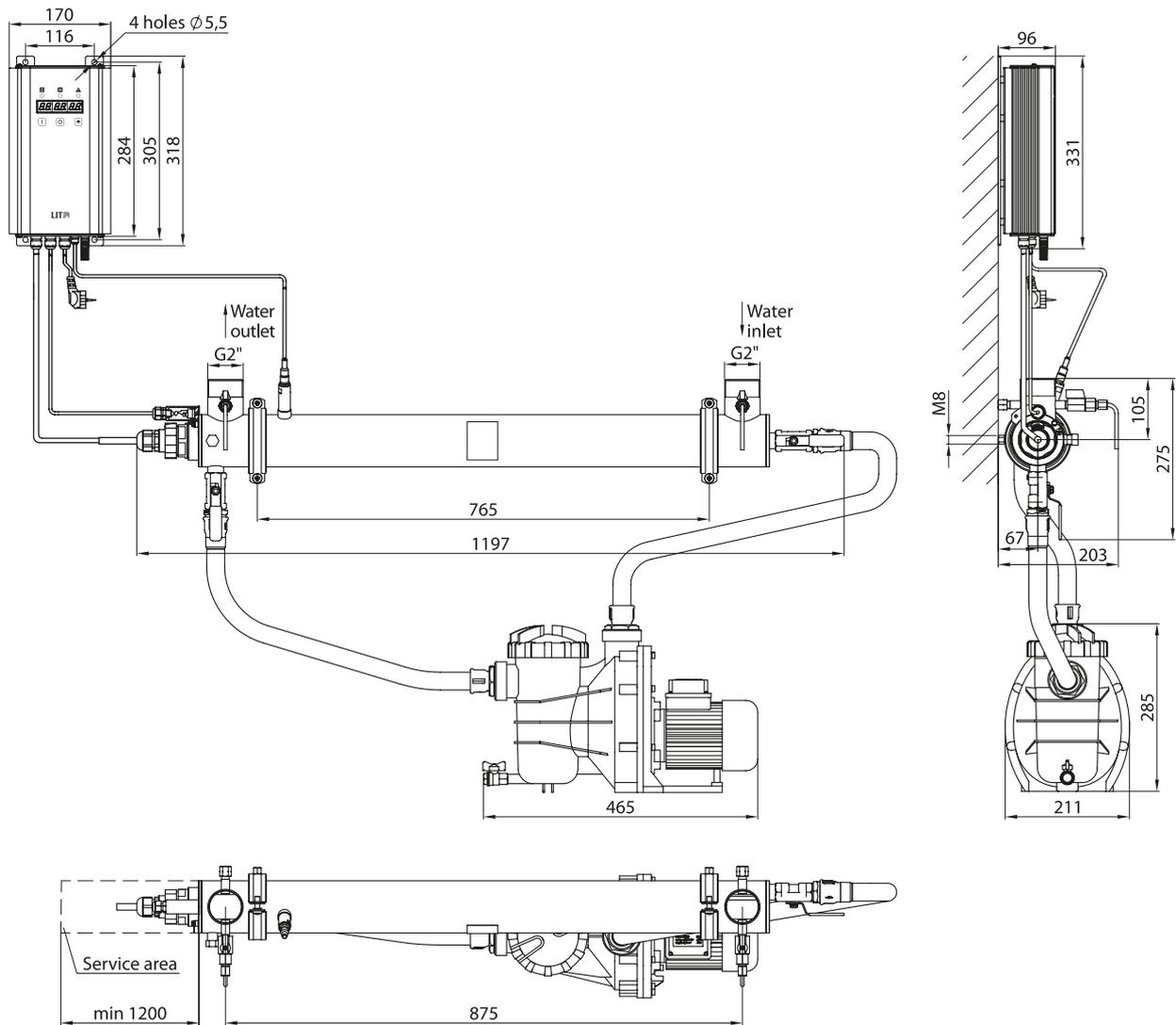
# DUV-1A350-N MST



## Components

Component	LIT Number
UV lamp	DB 350HO
Quartz sleeve with sealing	LIT HP.284.00.000-17
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

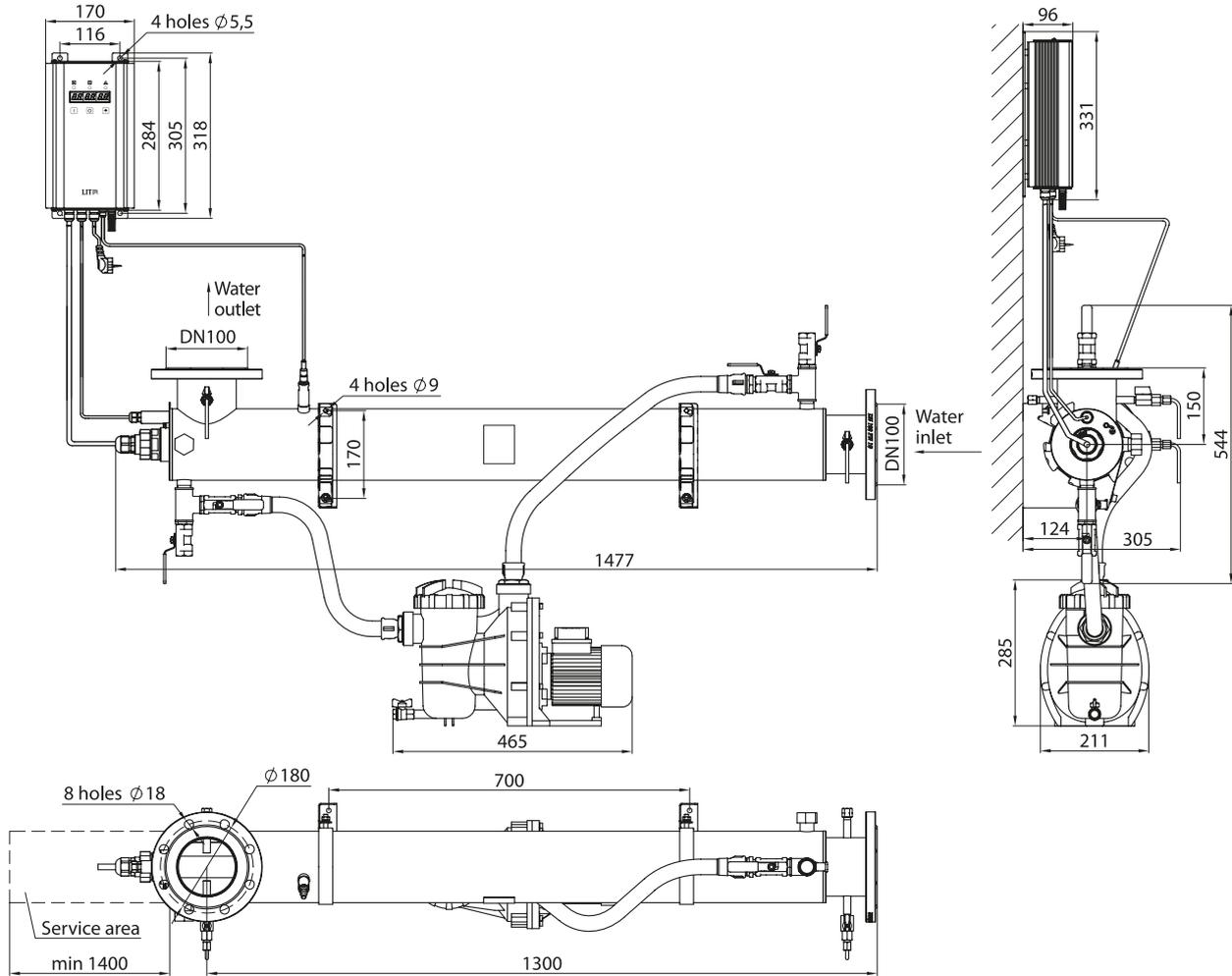
# DUV-1A350-NK MST



## Components

Component	LIT Number
UV lamp	DB 350HO
Quartz sleeve with sealing	LIT HP.284.00.000-17
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

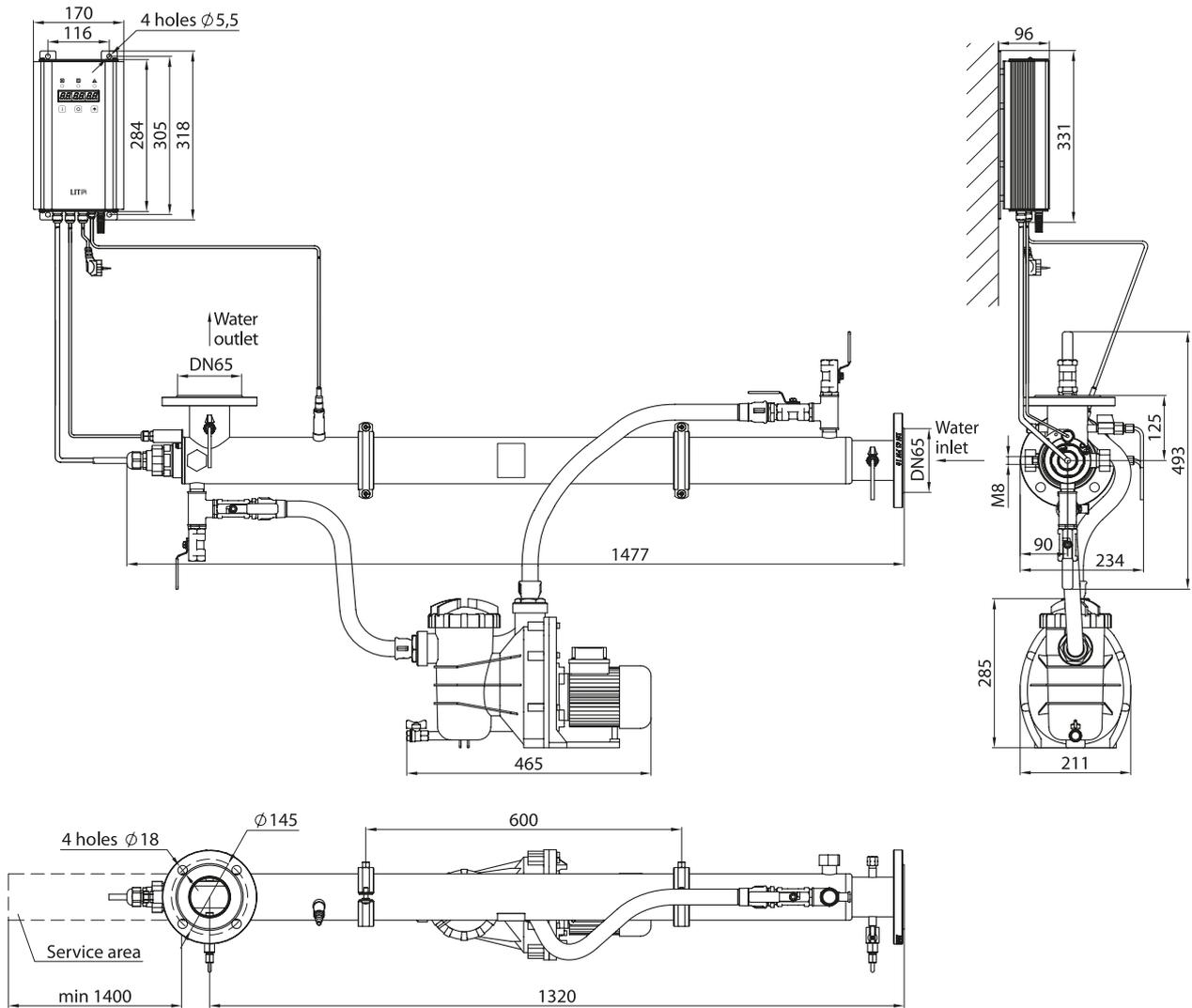
# DUV-1A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

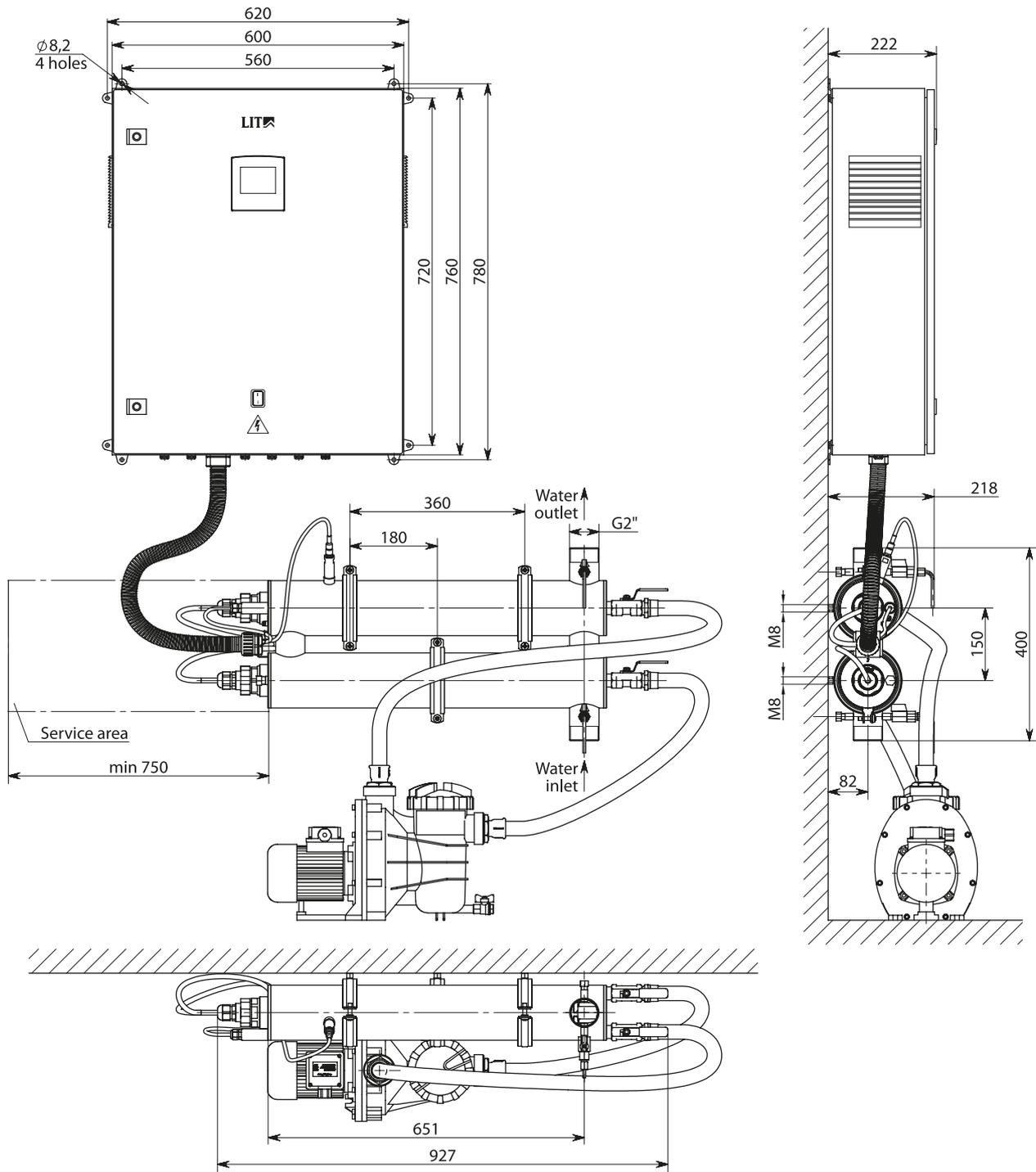
# DUV-1A500-NK MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

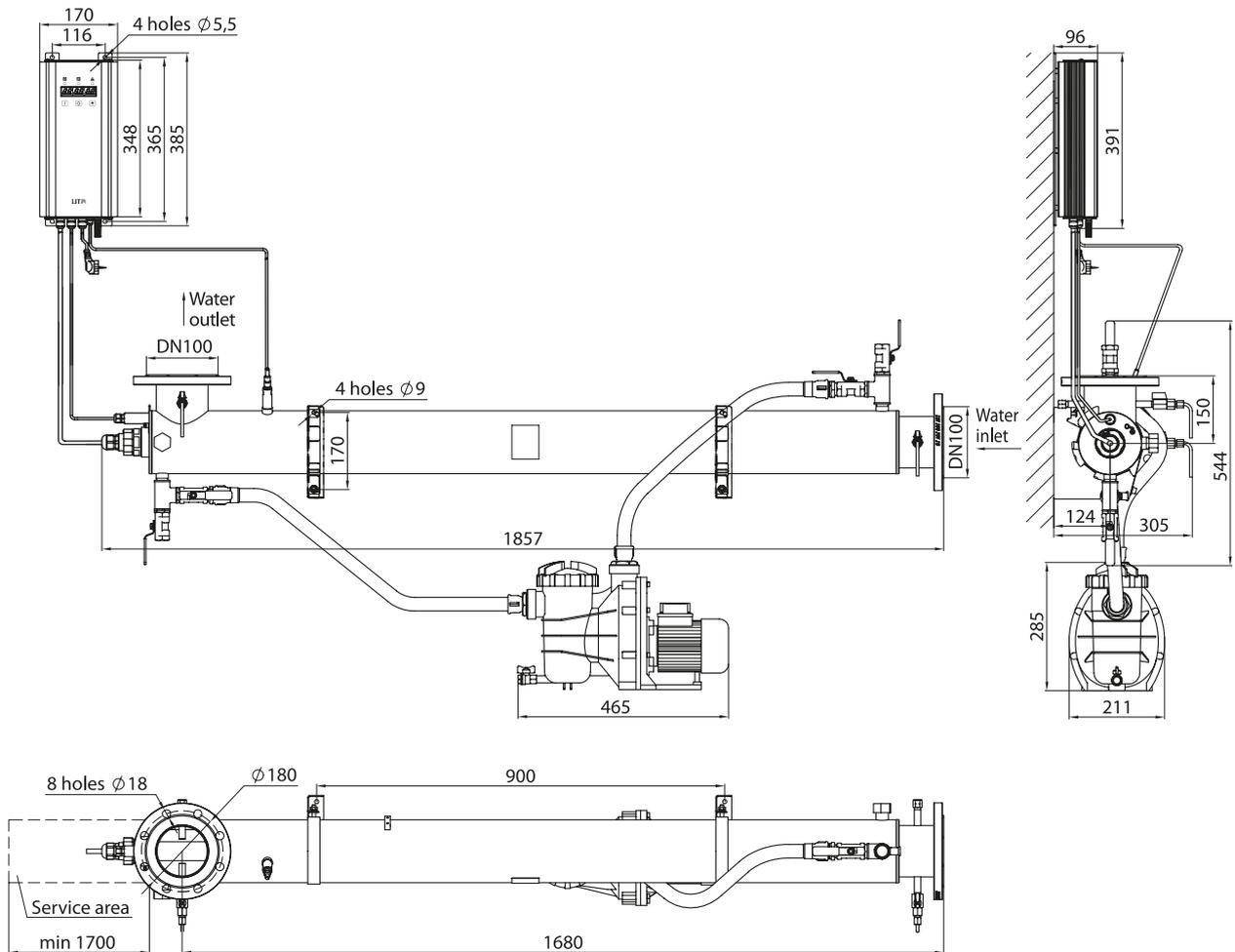
# DUV-2A250D-N MST



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

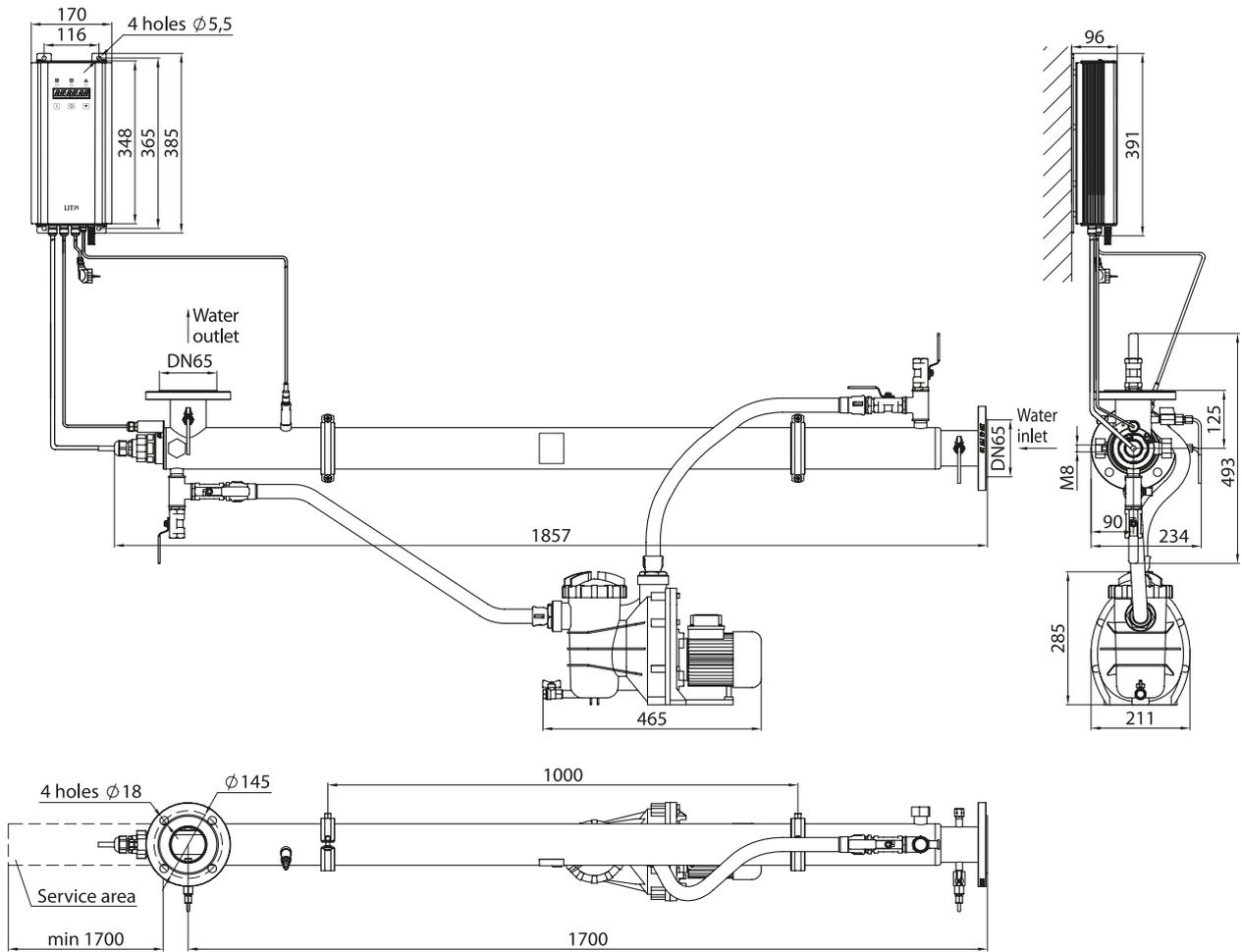
# DUV-1A700-N MST



## Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT HP.284.00.000-02
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

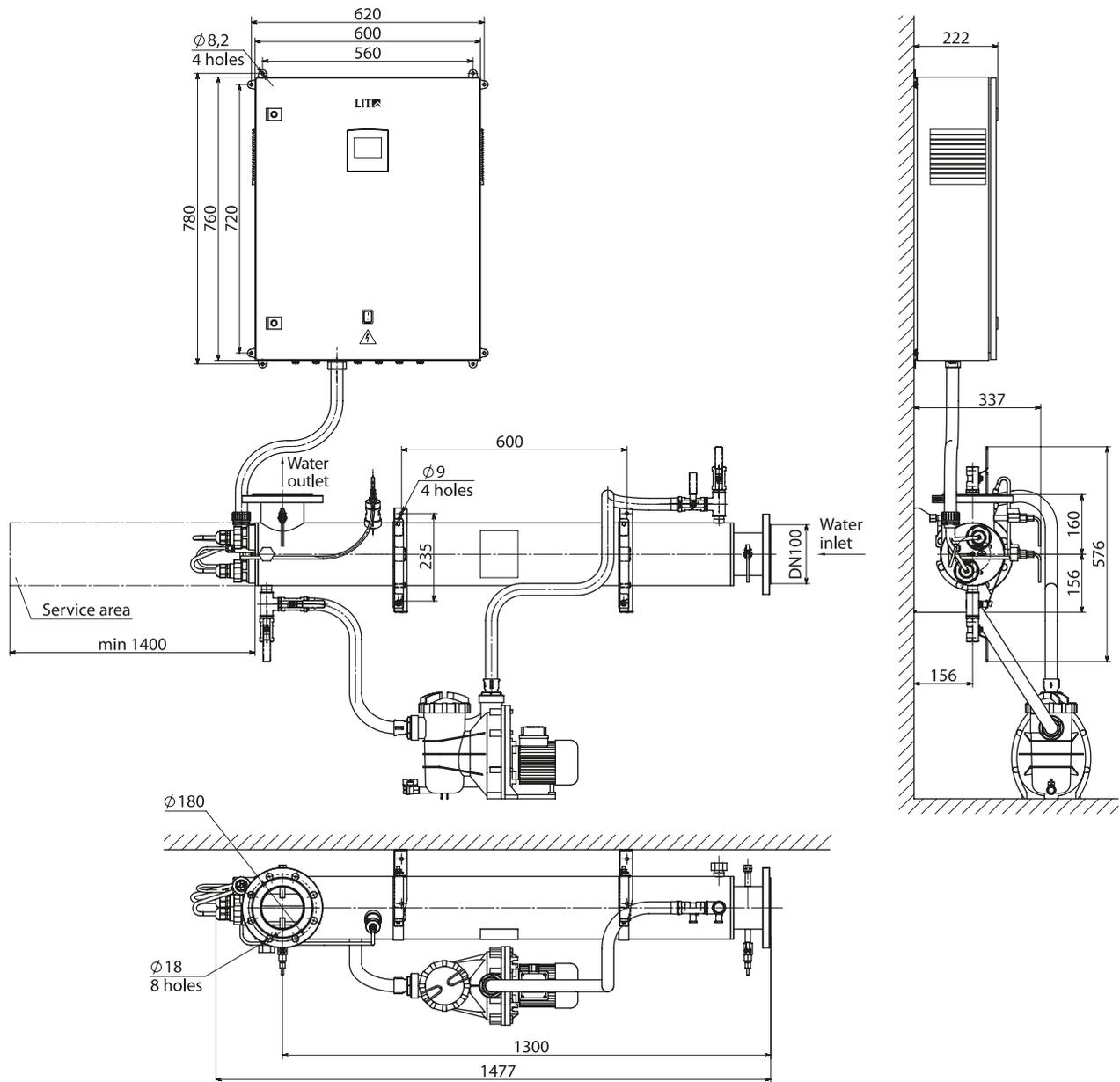
# DUV-1A700-NK MST



## Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT HP.284.00.000-02
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

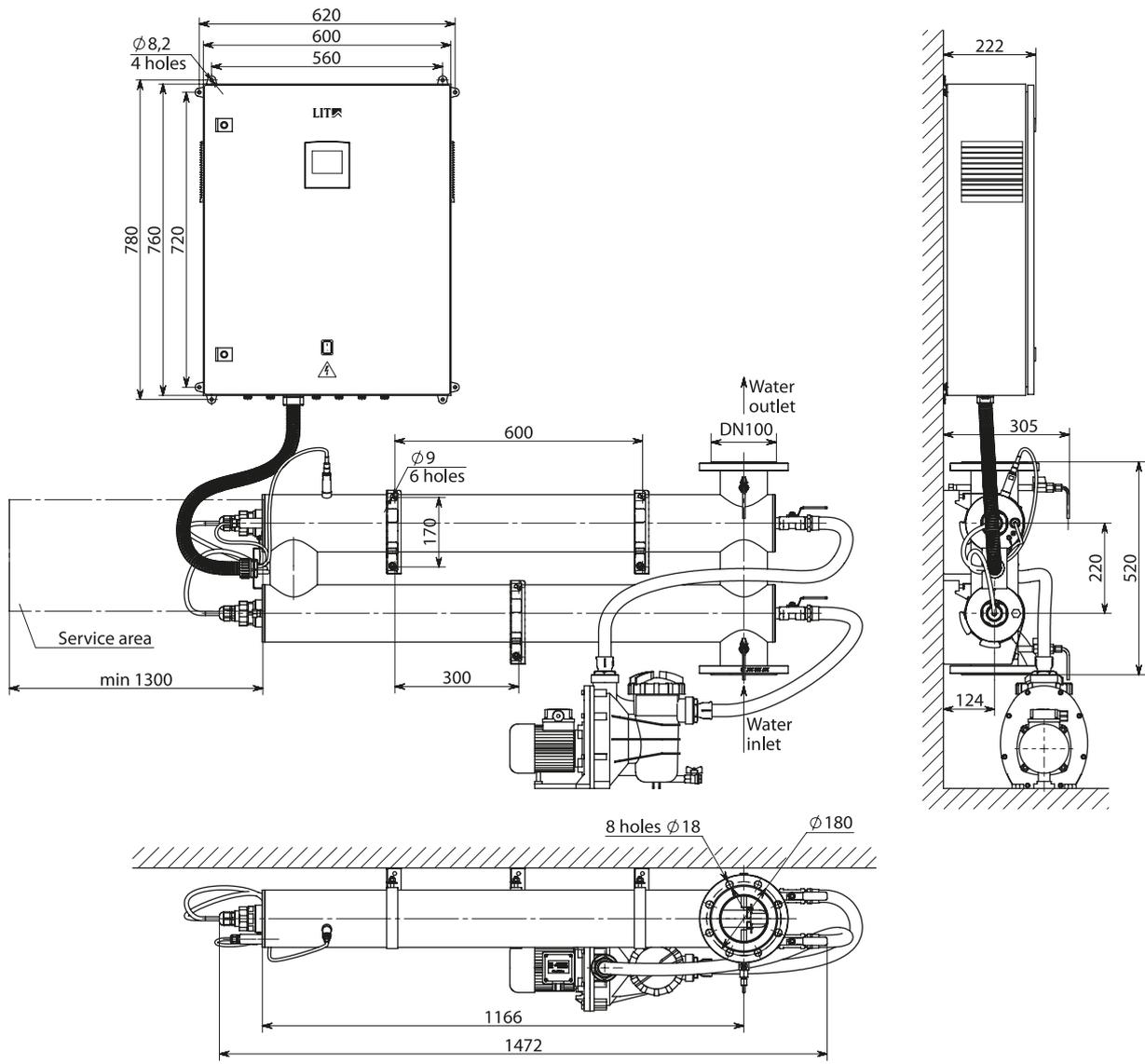
# DUV-2A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

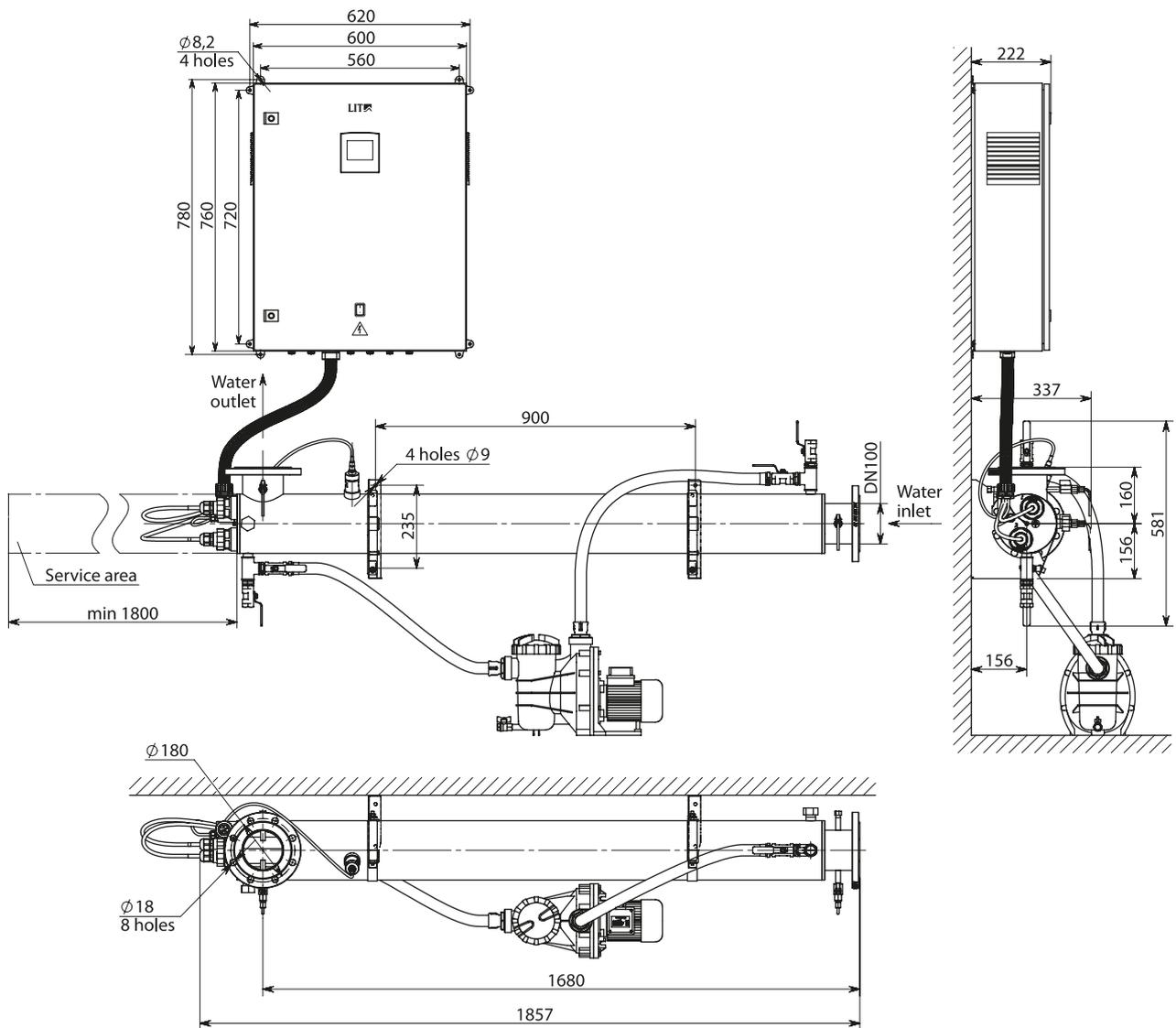
# DUV-2A500D-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-5
Chemical cleaning system	LIT HP.215.00.000

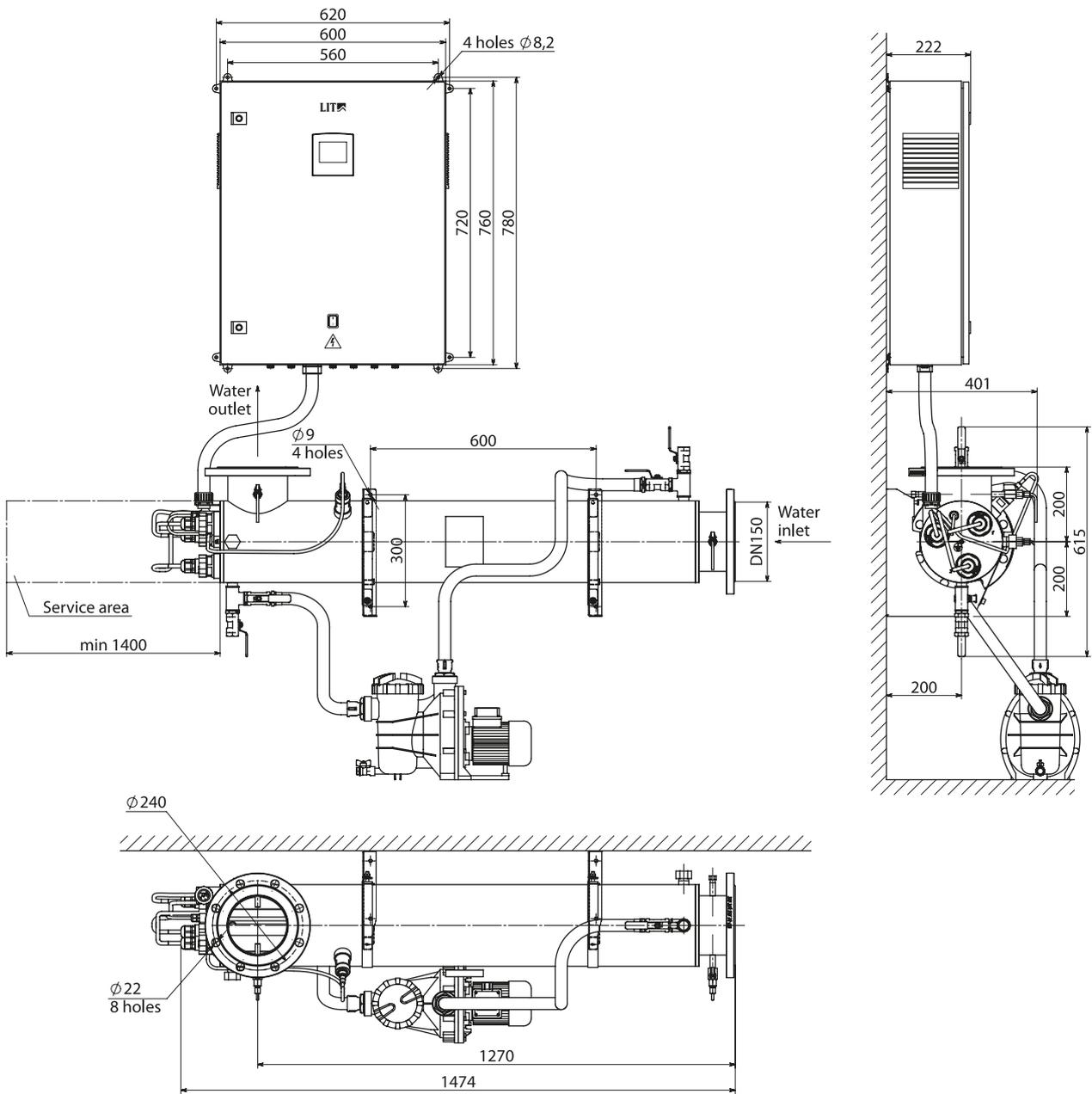
# DUV-2A700-N MST



## Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT HP.284.00.000-02
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

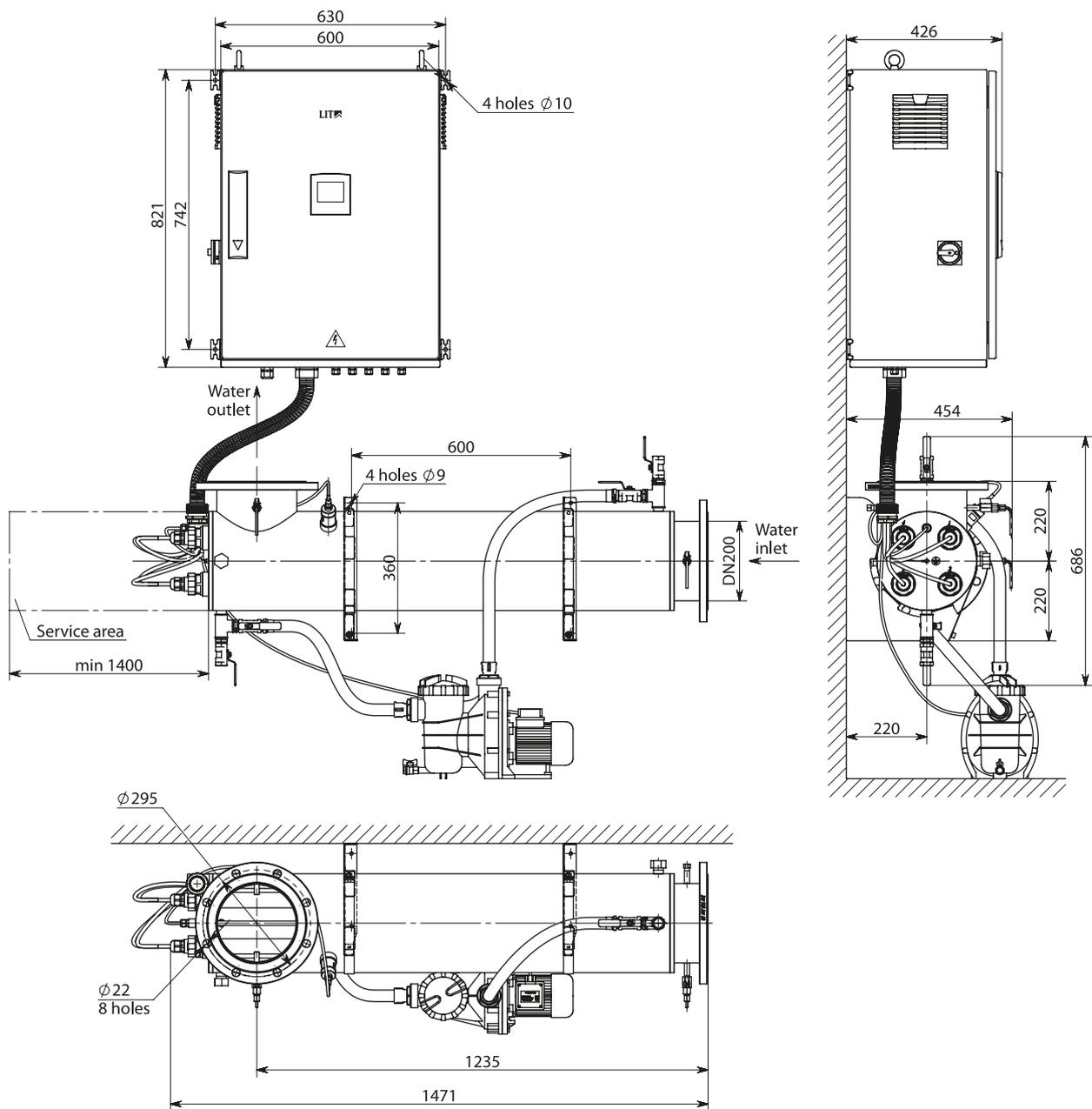
# DUV-3A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

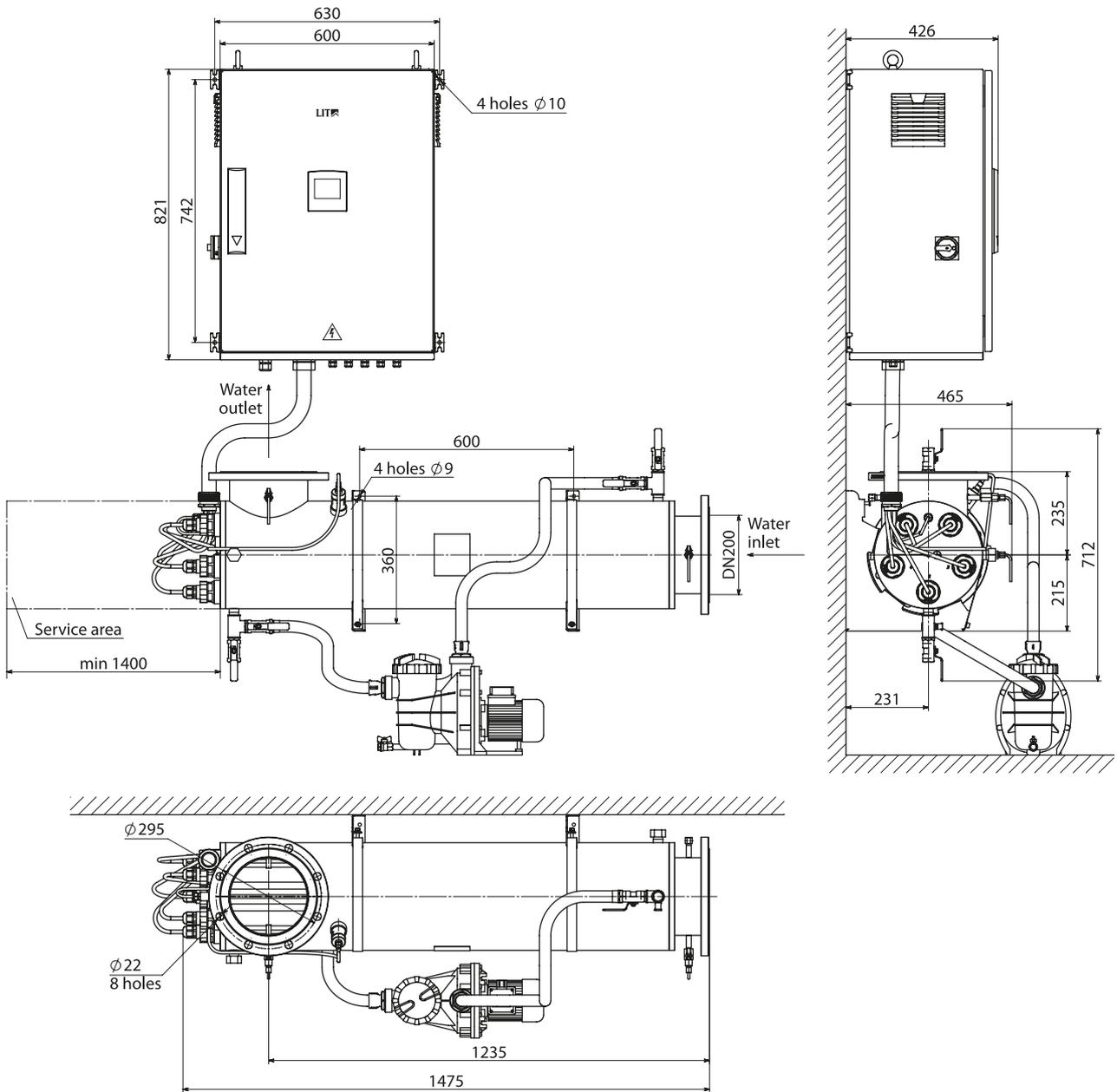
# DUV-4A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

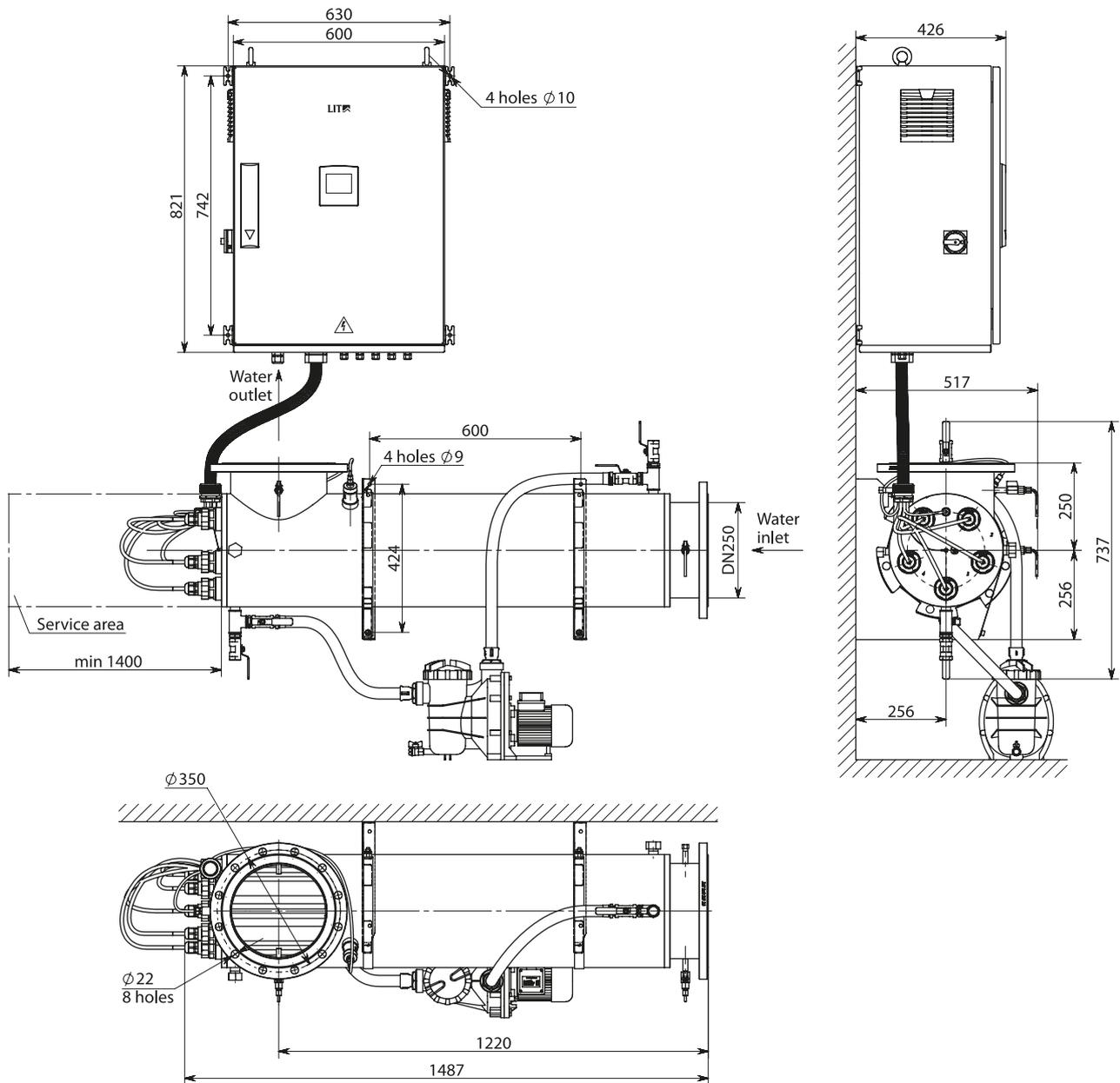
# DUV-5A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

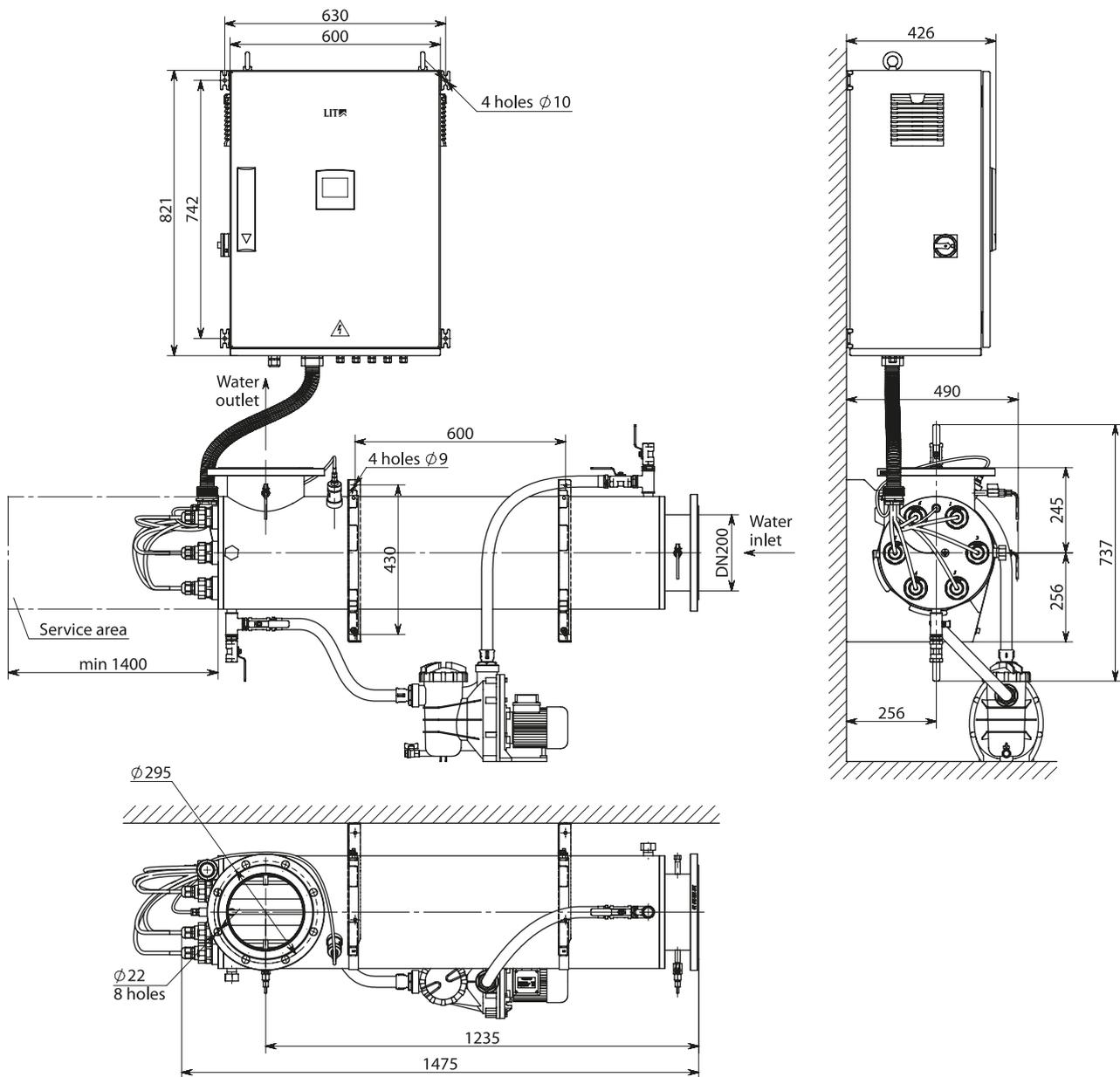
# DUV-5A500-NE MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

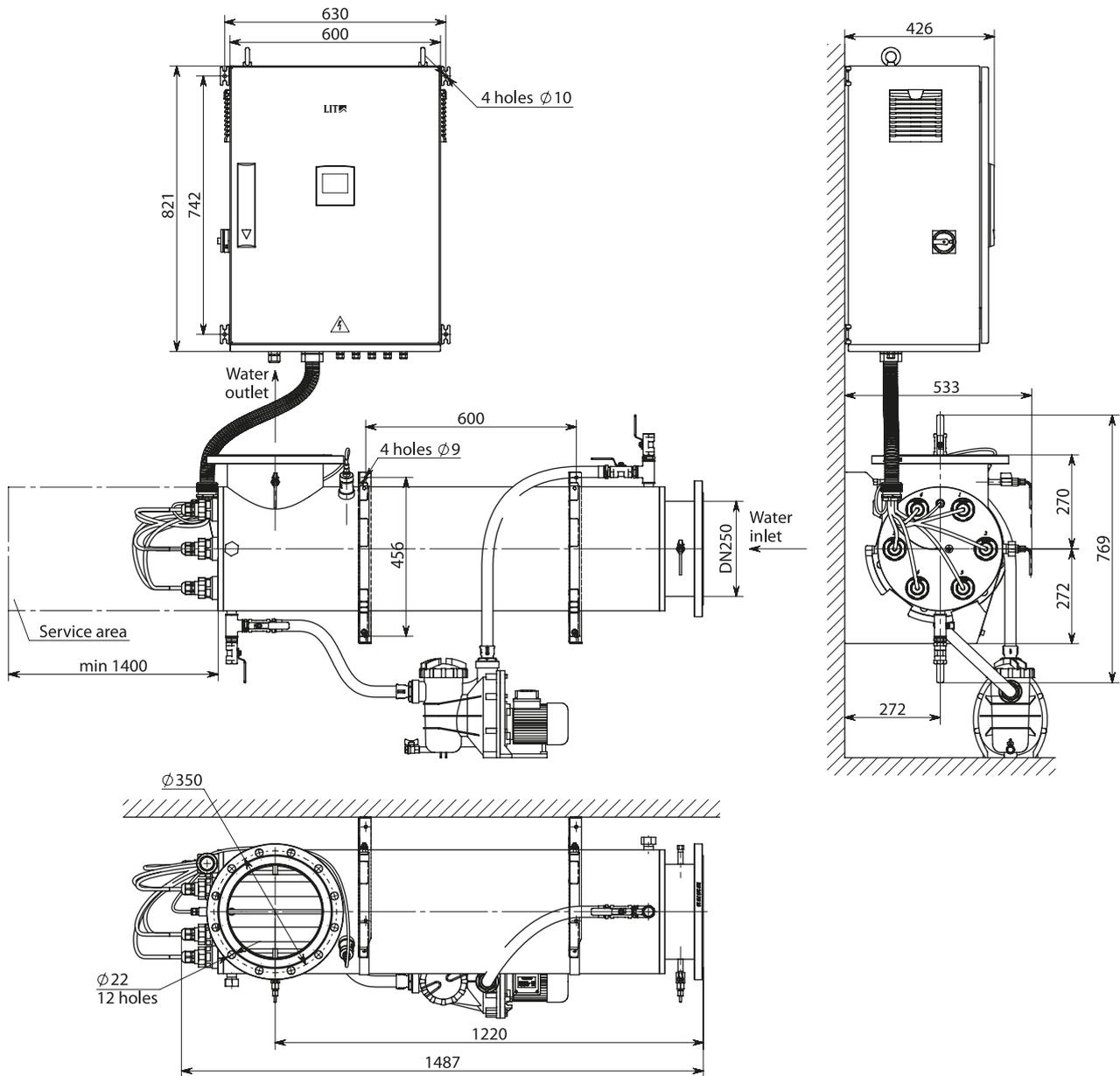
# DUV-6A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

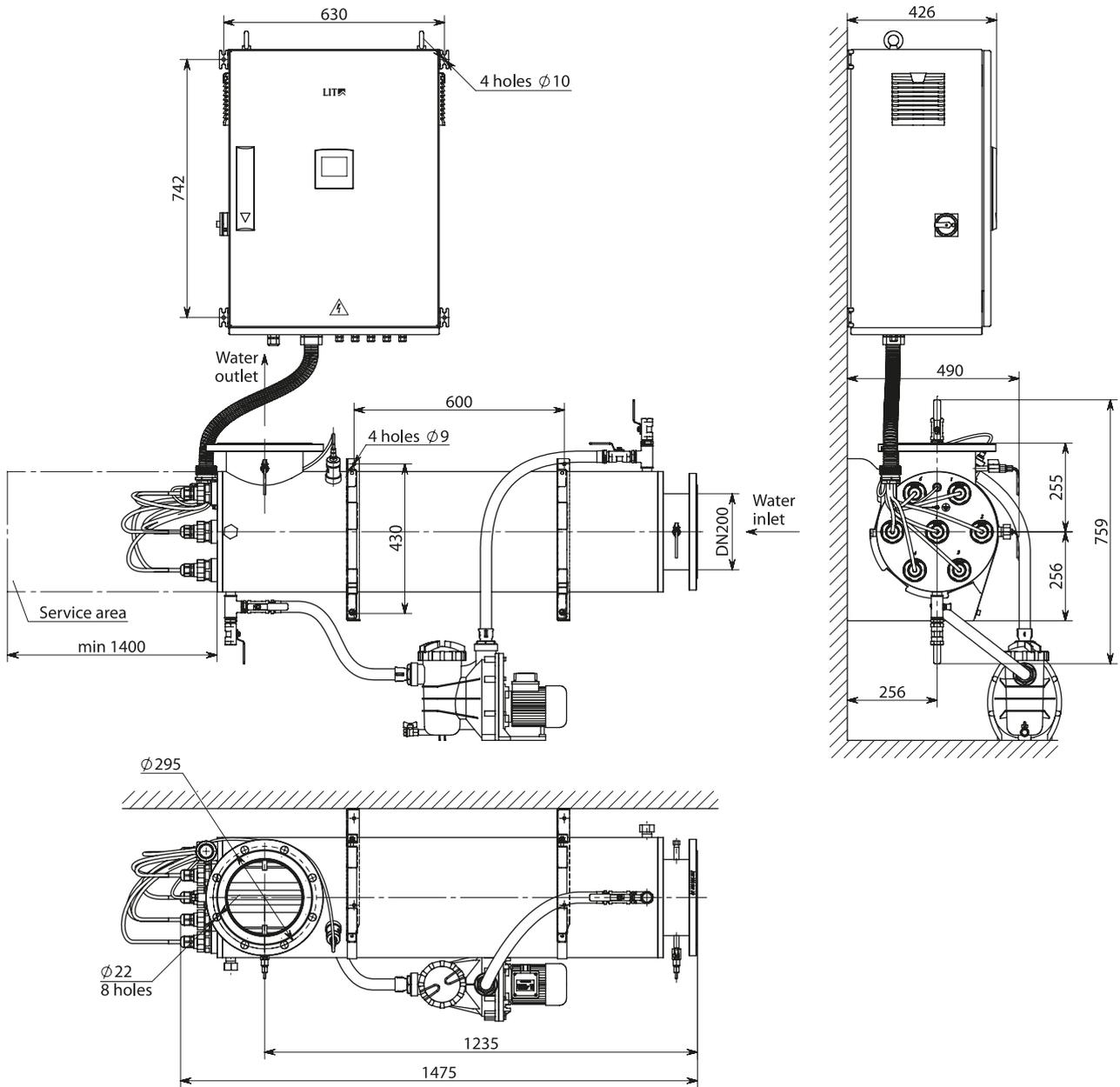
# DUV-6A500-NE MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

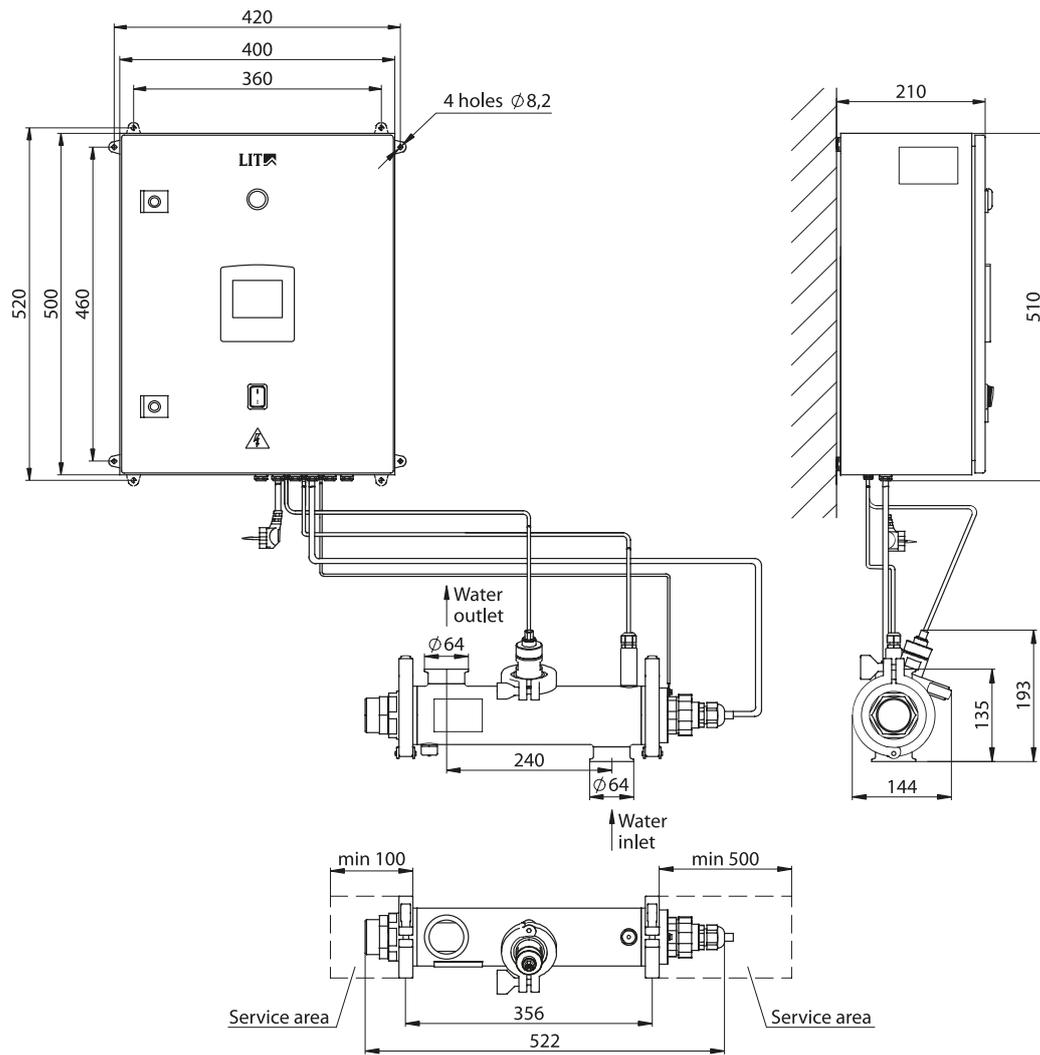
# DUV-7A500-N MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~3x380-6x500-2222-52
UV sensor	IS-4
Chemical cleaning system	LIT HP.215.00.000

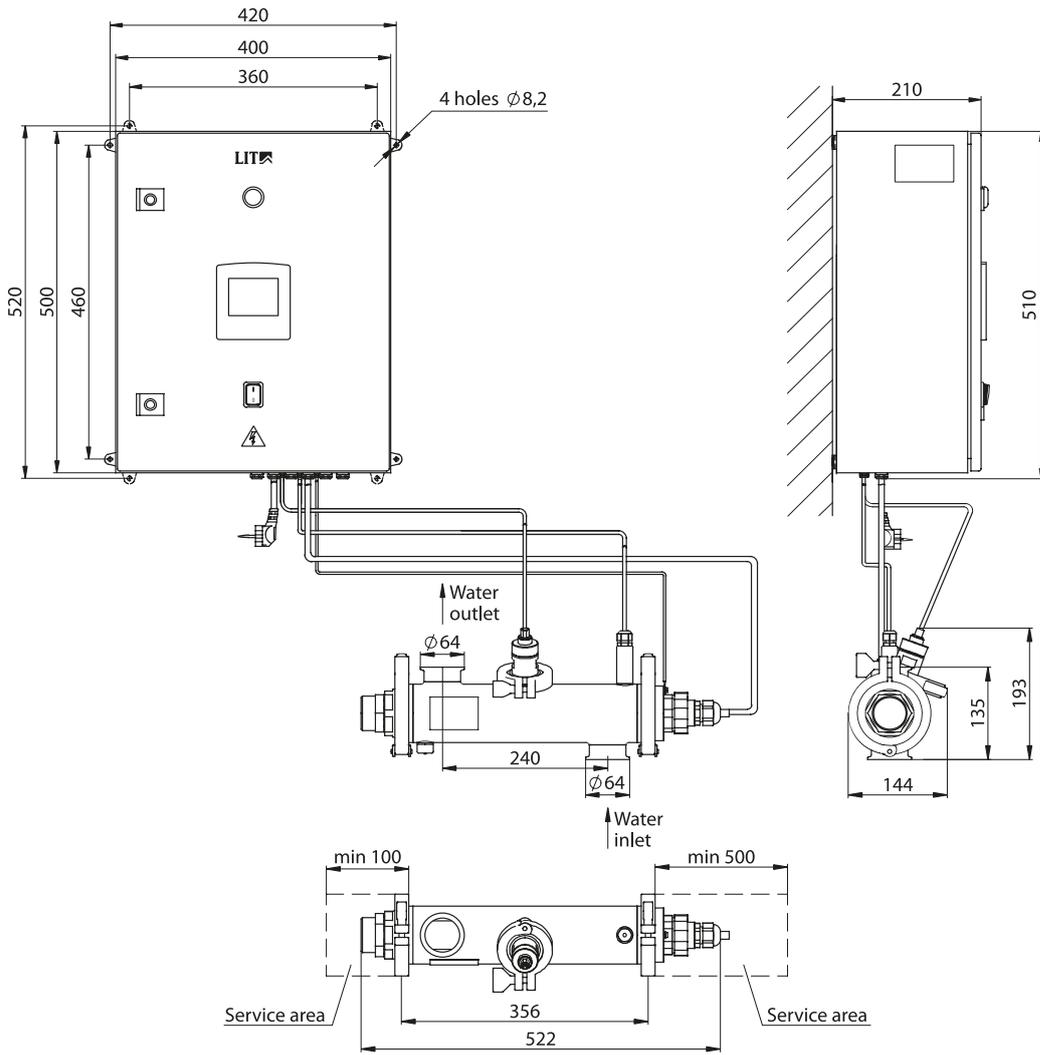
# DUV-1A50-N PH MST



## Components

Component	LIT Number
UV lamp	DB 50HO
Quartz sleeve with sealing	LIT 1528.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4

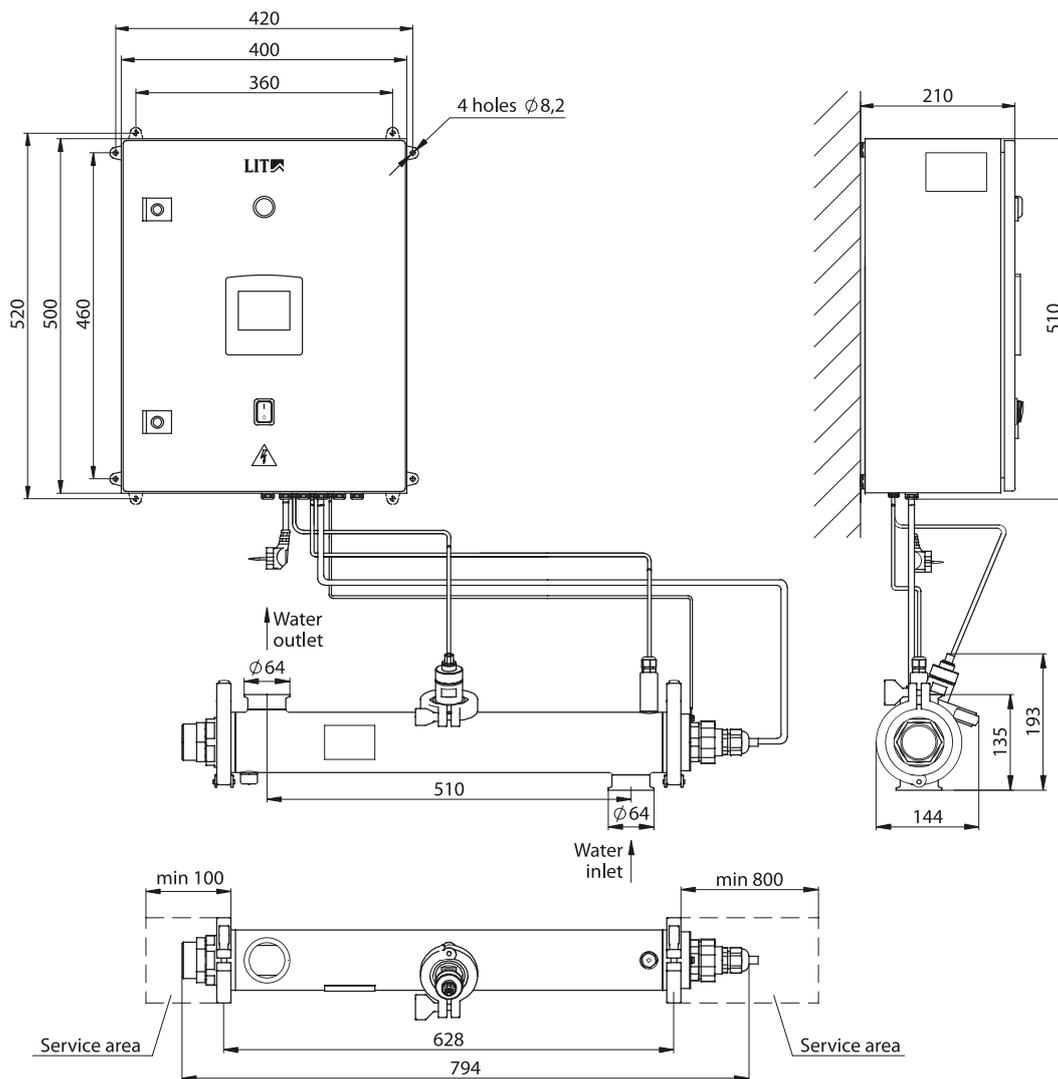
# DUV-1A120-N PH MST



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT 1436.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4

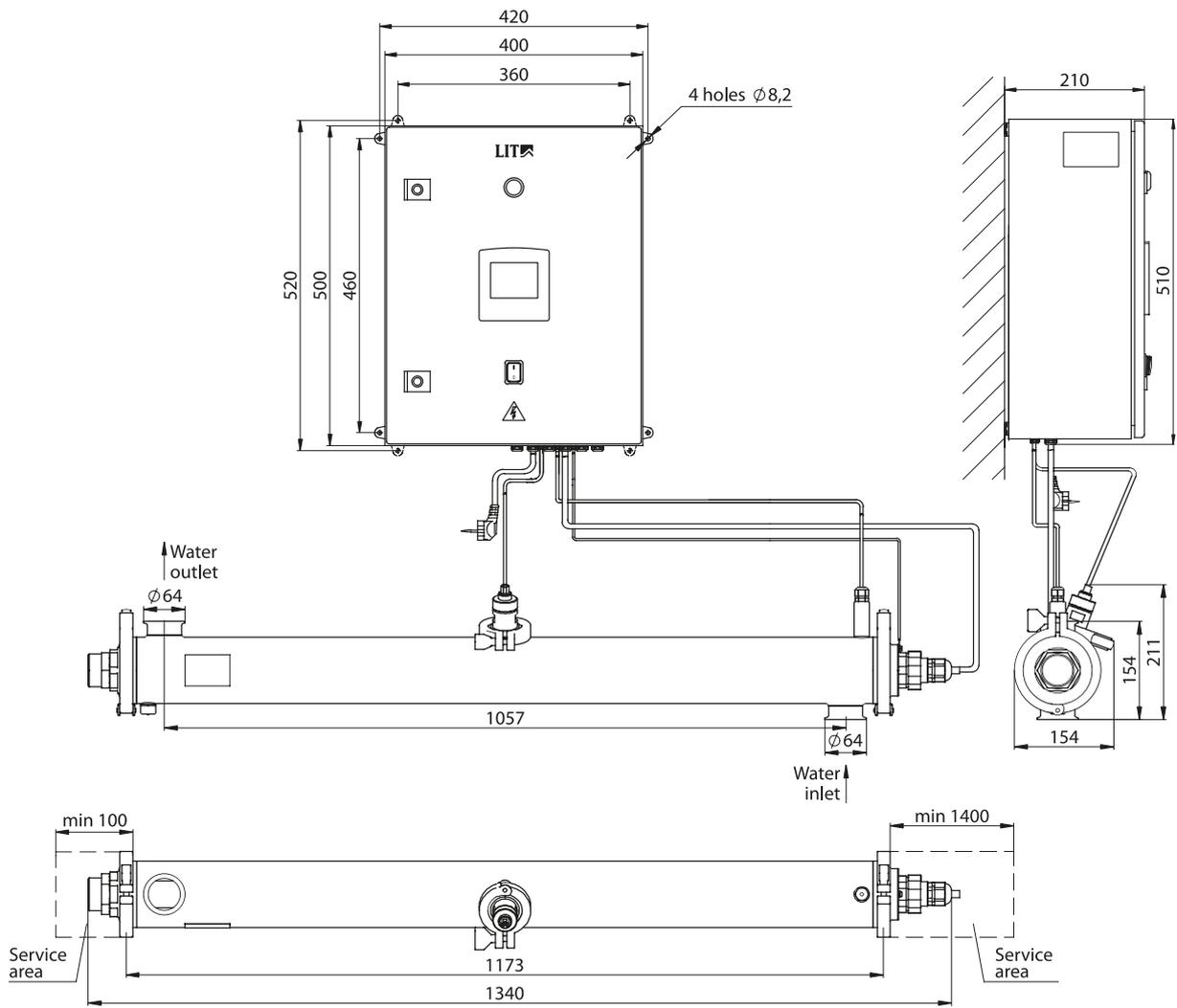
# DUV-1A250-N PH MST



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT 1437.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4

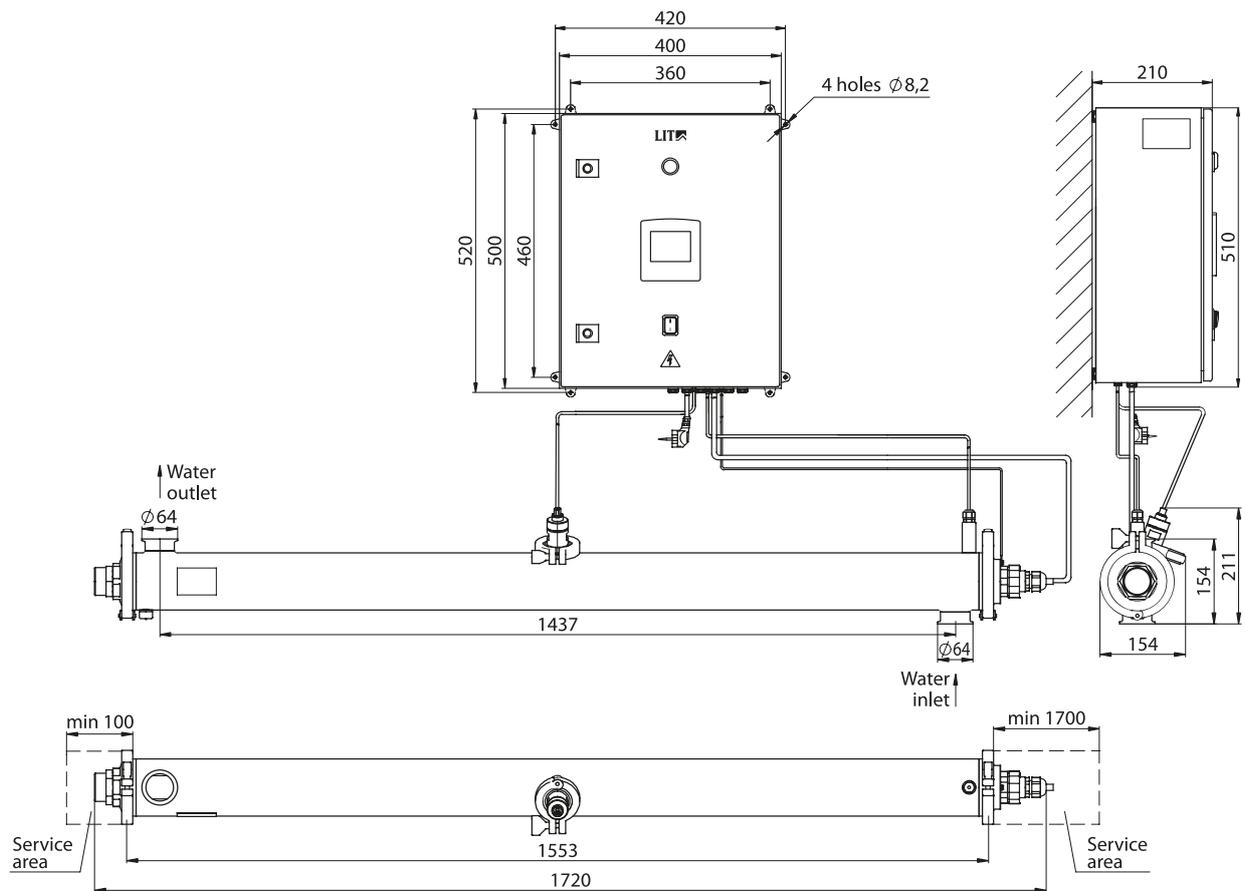
# DUV-1A500-N PH MST



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT 1438.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4

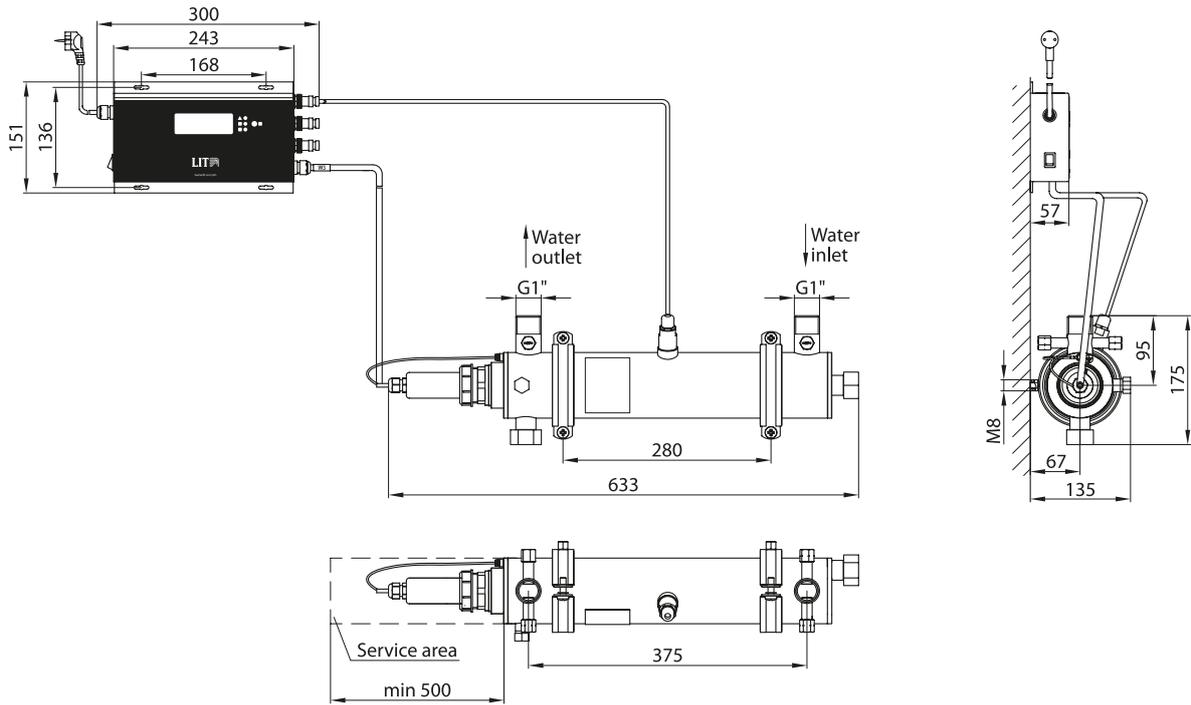
# DUV-1A700-N PH MST



## Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT 1439.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x500-2222-161
UV sensor	IS-4

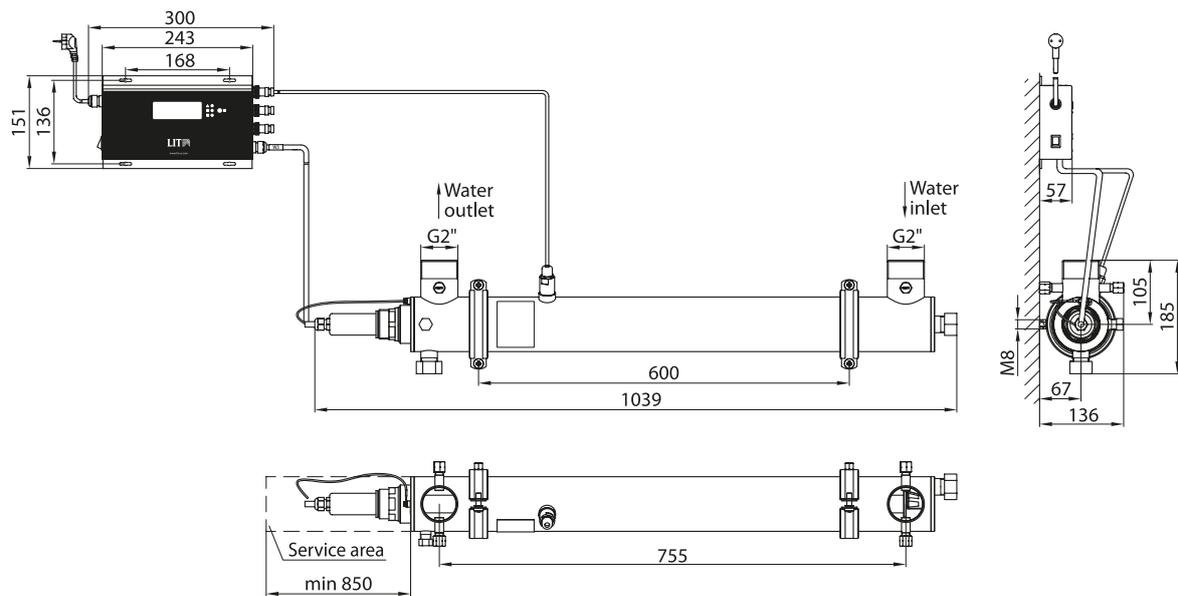
# DUV-1-48-N ADV



## Components

Component	LIT Number
UV lamp	GHO436T5L
Quartz sleeve with sealing	LIT HP.235.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	L~220-1x55-2201-07 UV G55T8
UV sensor	IS-7
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

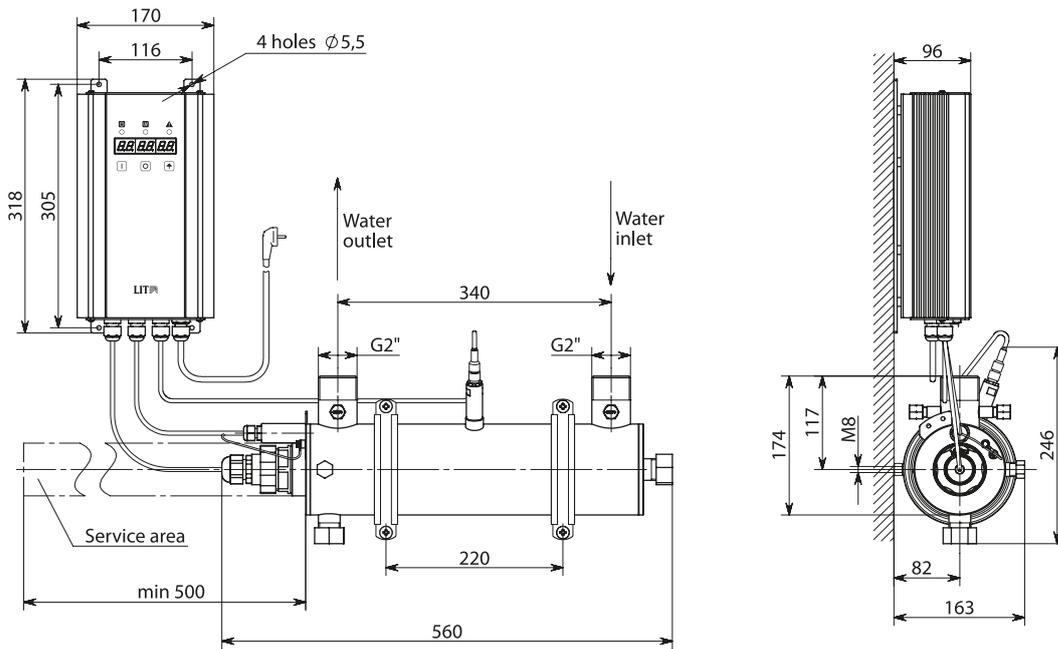
## DUV-1-87-N ADV



### Components

Component	LIT Number
UV lamp	GHO36T5L
Quartz sleeve with sealing	LIT HP.276.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	L~220-1x75-2201-07 UV G75T8
UV sensor	IS-7
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

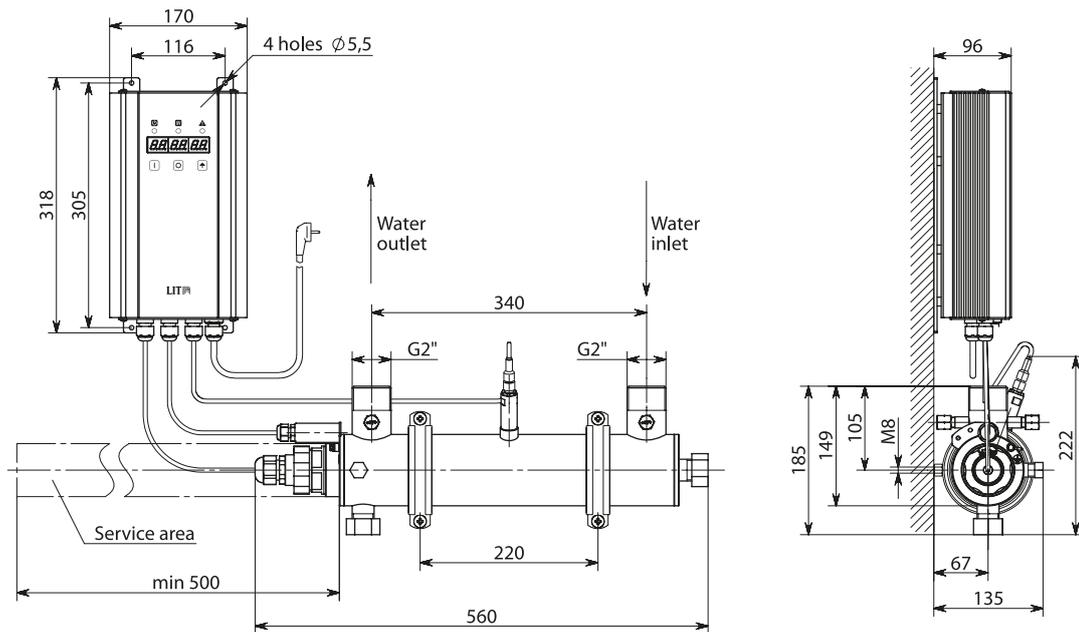
# DUV-1A120-N ADV



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

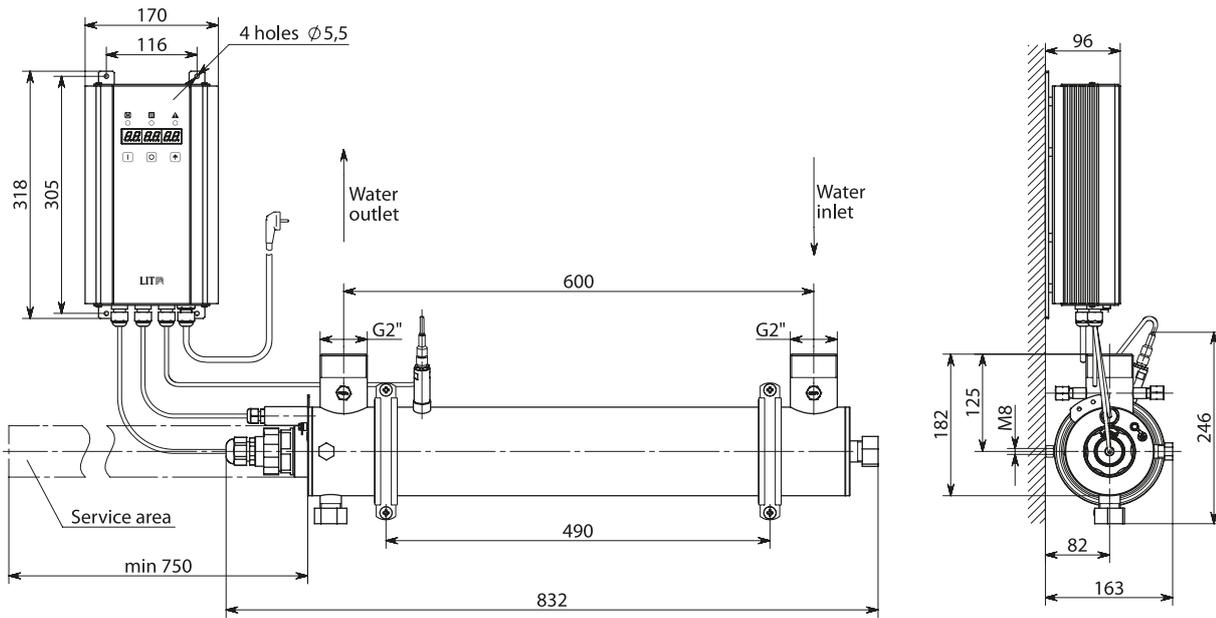
## DUV-1A120-NK ADV



### Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

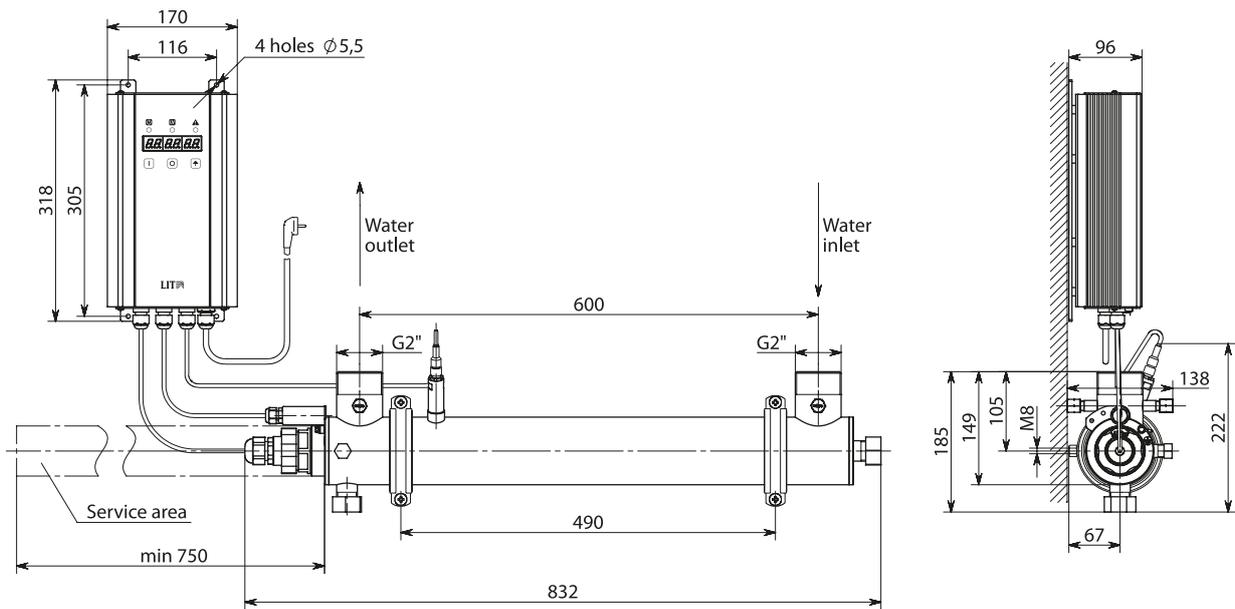
# DUV-1A250-N ADV



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

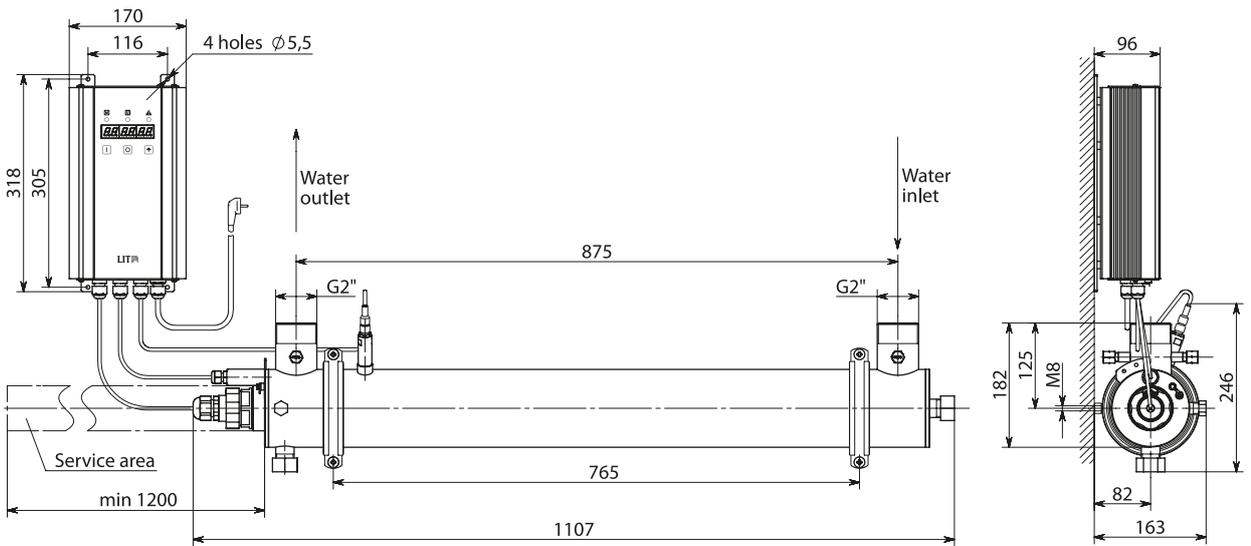
## DUV-1A250-NK ADV



### Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

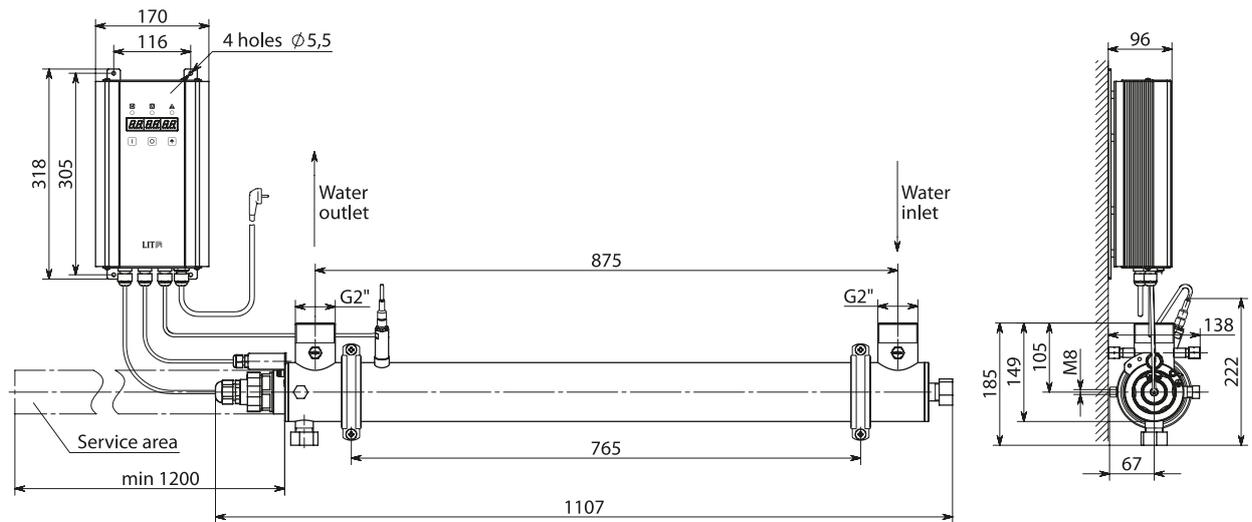
# DUV-1A350-N ADV



## Components

Component	LIT Number
UV lamp	DB 350HO
Quartz sleeve with sealing	LIT HP.284.00.000-17
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

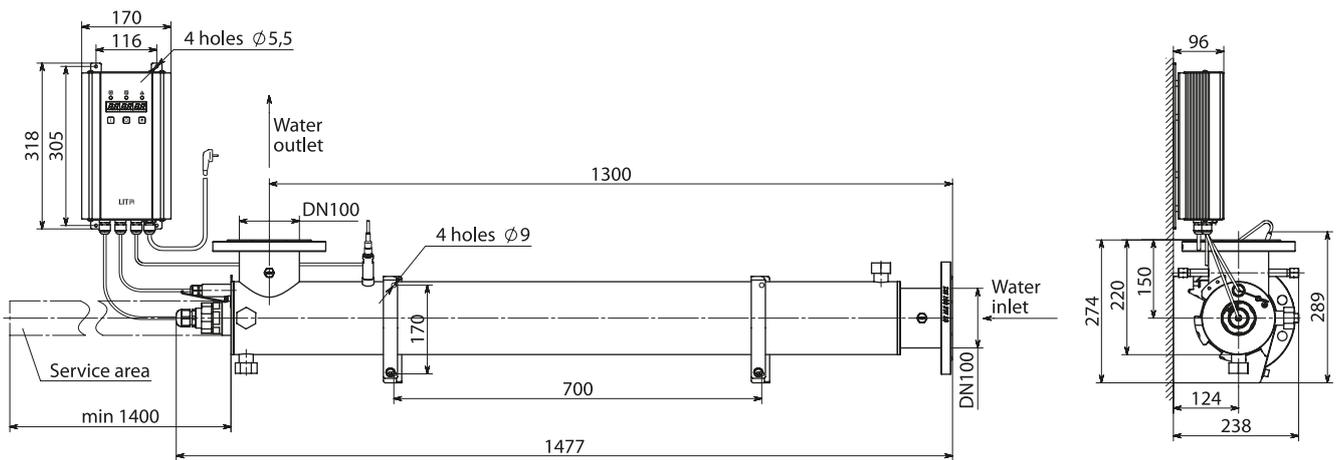
# DUV-1A350-NK ADV



## Components

Component	LIT Number
UV lamp	DB 350HO
Quartz sleeve with sealing	LIT HP.284.00.000-17
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

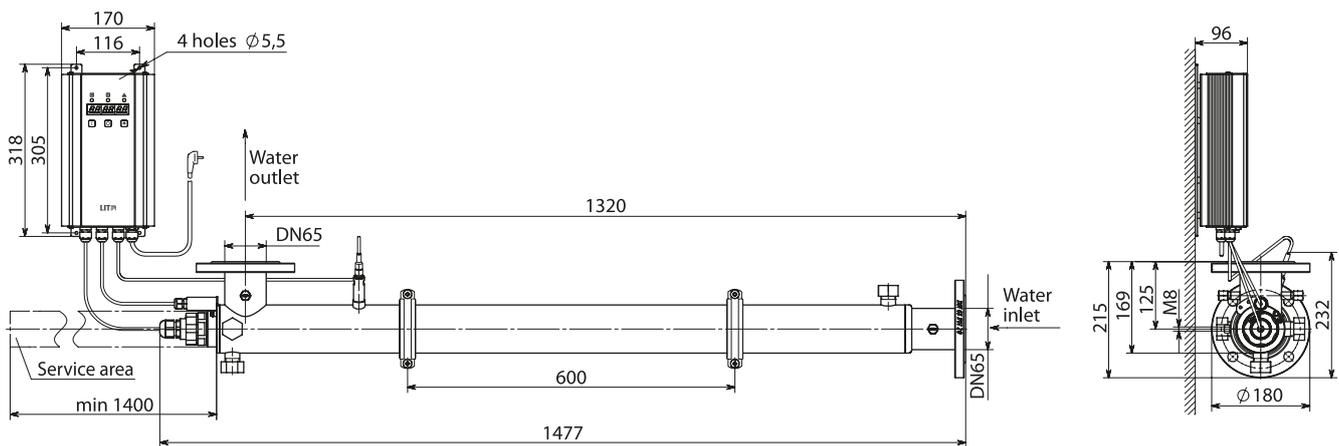
# DUV-1A500-N ADV



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

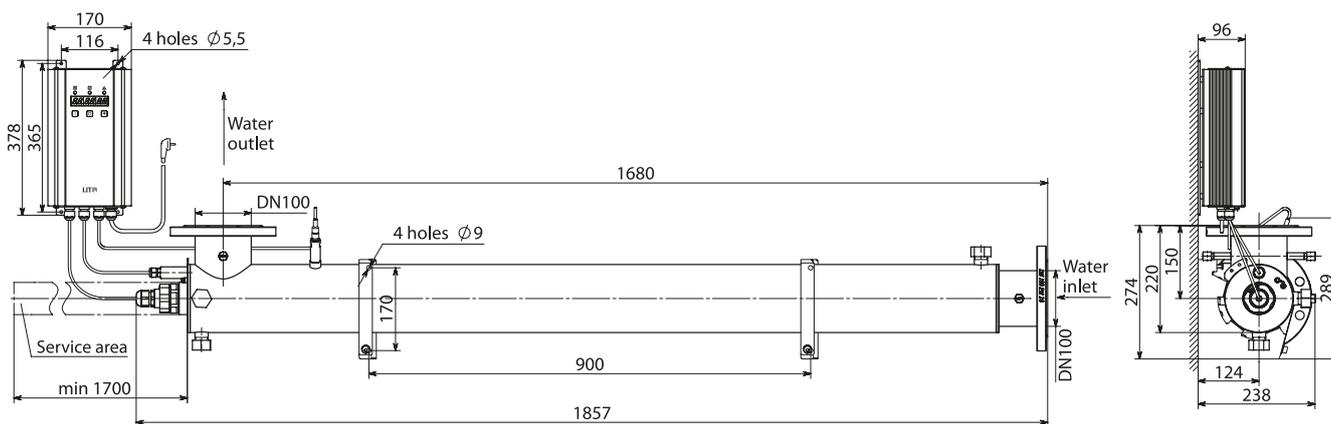
# DUV-1A500-NK ADV



## Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT HP.284.00.000
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x500-3303-200UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

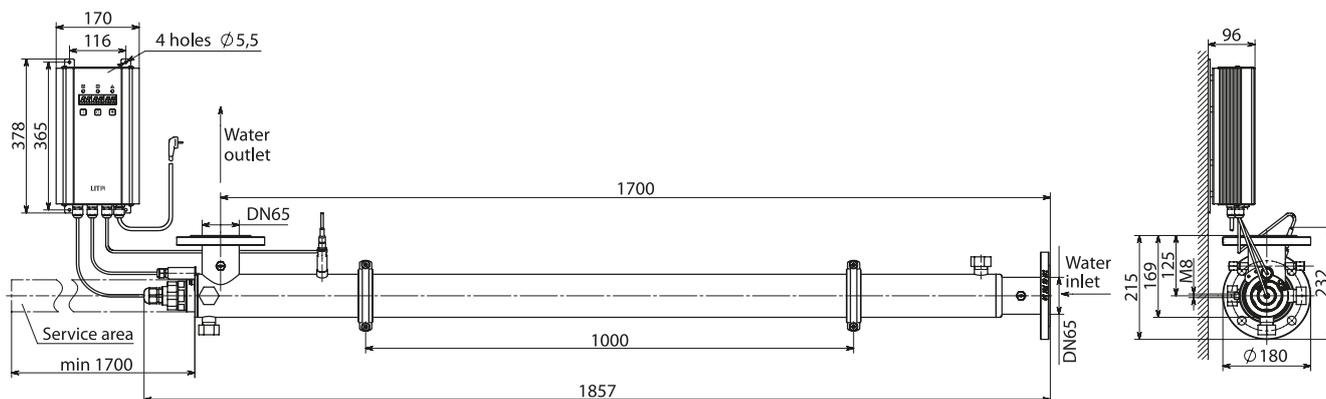
## DUV-1A700-N ADV



### Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT HP.284.00.000-02
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x700-3303-201UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

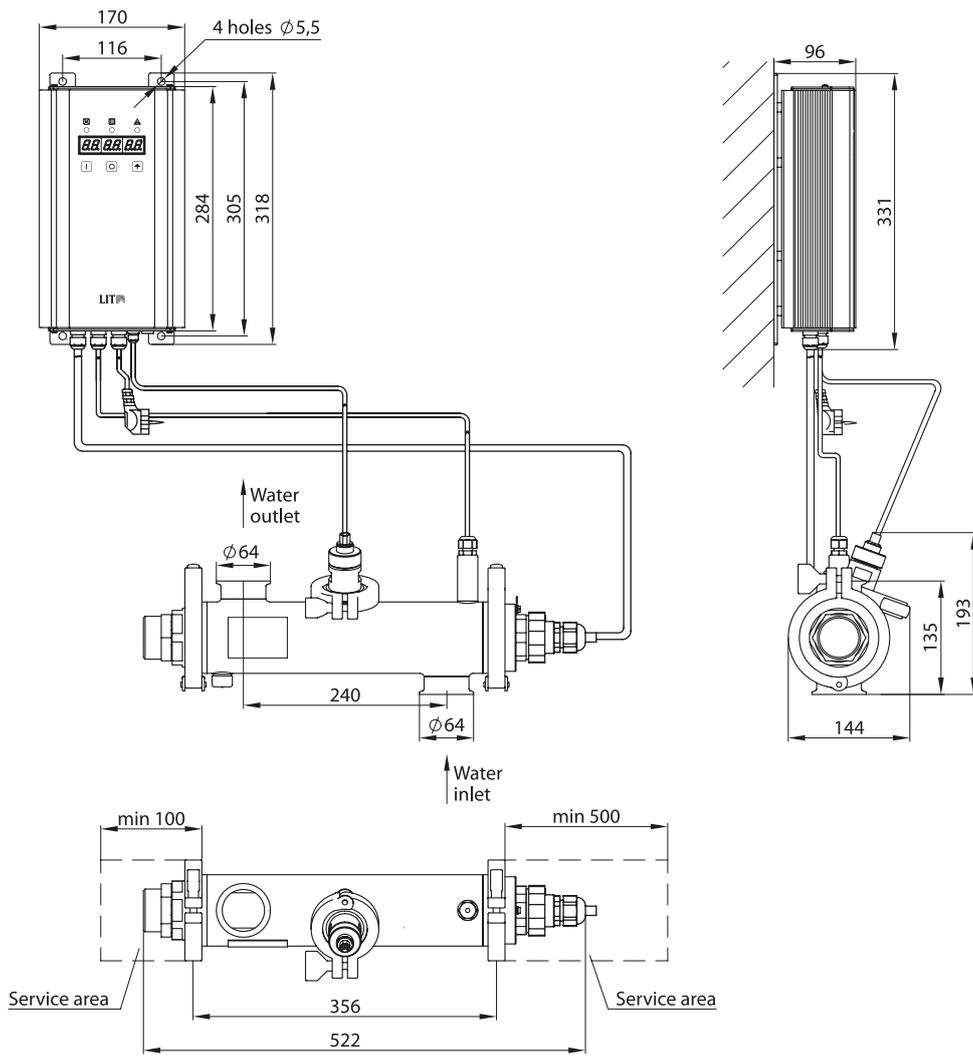
## DUV-1A700-NK ADV



### Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT HP.284.00.000-02
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x700-3303-201UV
UV sensor	IS-5
Chemical cleaning system (out of LIT scope of supply)	LIT HP.293.00.000

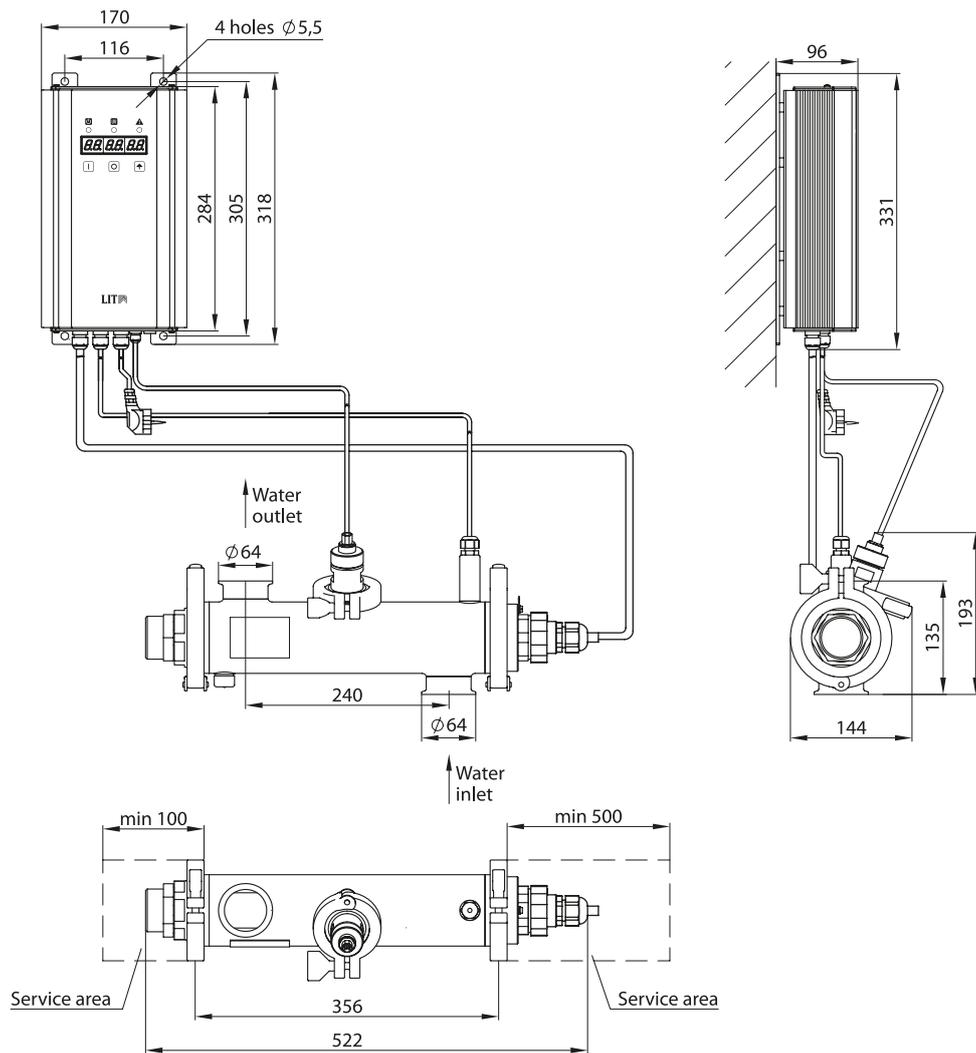
# DUV-1A50-N PH ADV



## Components

Component	LIT Number
UV lamp	DB 50HO
Quartz sleeve with sealing	LIT 1528.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-4

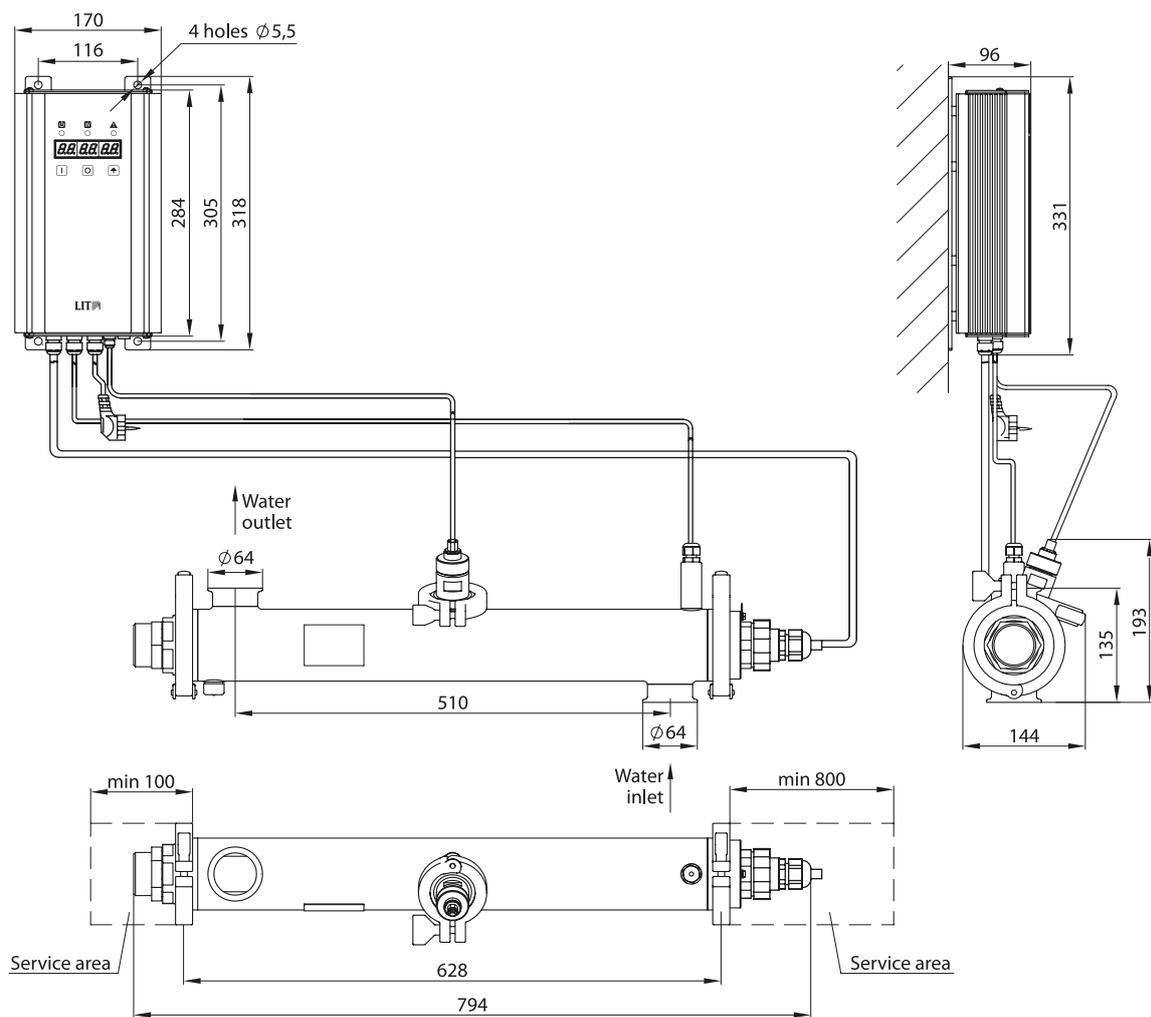
# DUV-1A120-N PH ADV



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT 1436.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-4

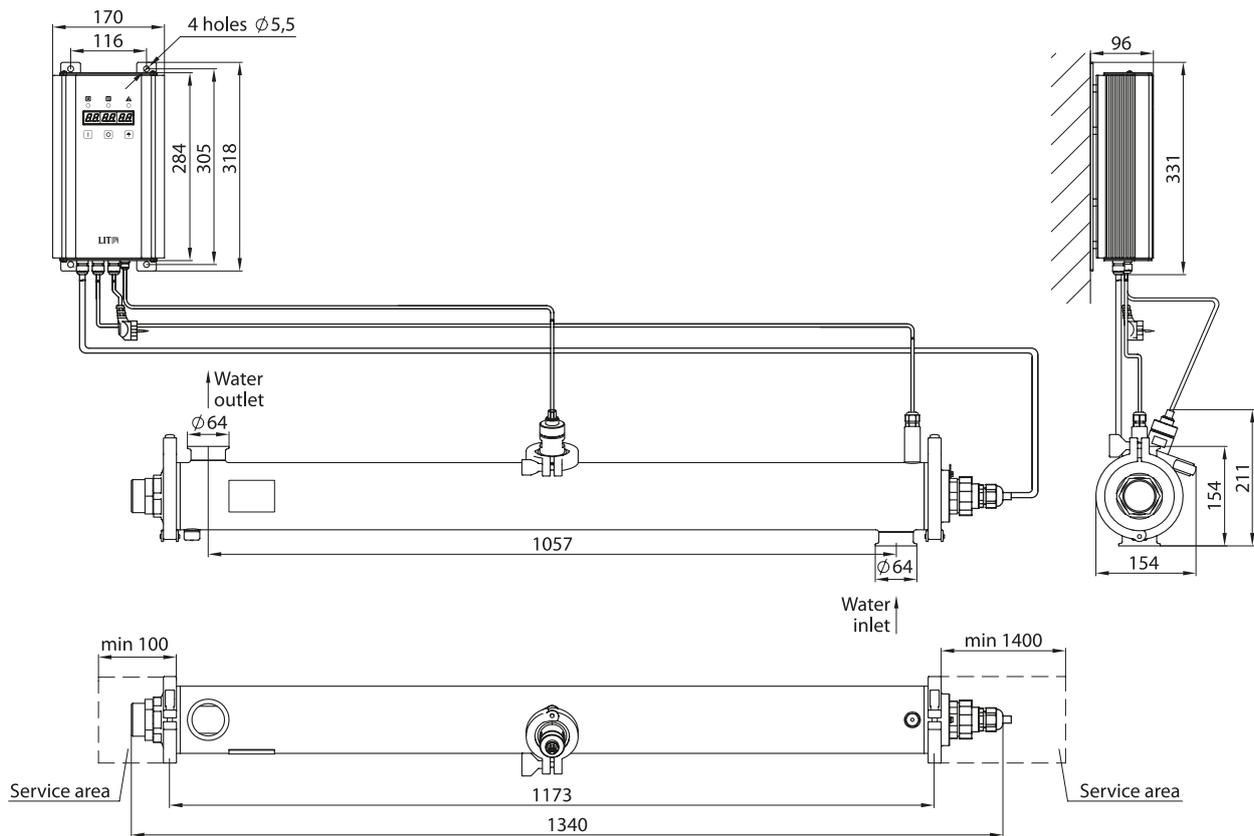
# DUV-1A250-N PH ADV



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT 1437.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-4

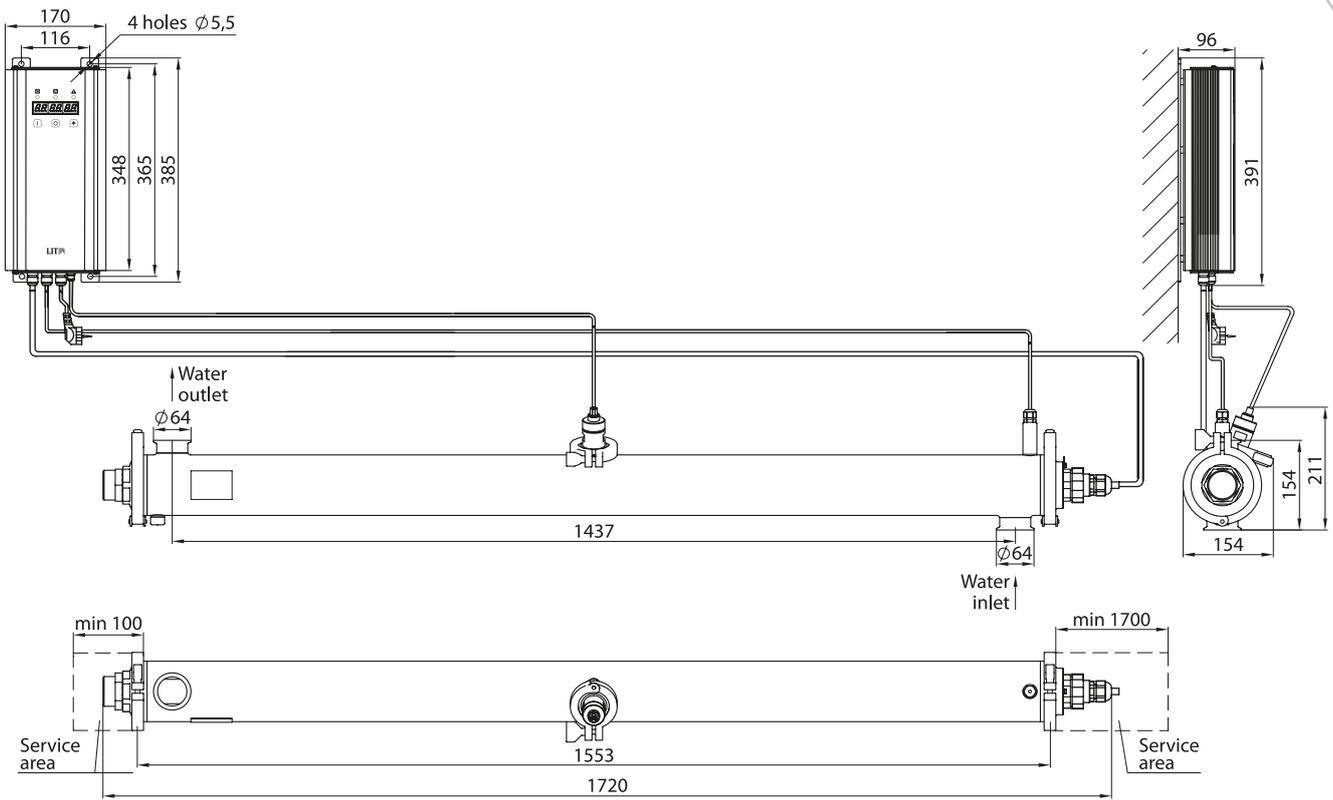
## DUV-1A500-N PH ADV



### Components

Component	LIT Number
UV lamp	DB 500HO
Quartz sleeve with sealing	LIT 1438.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-4

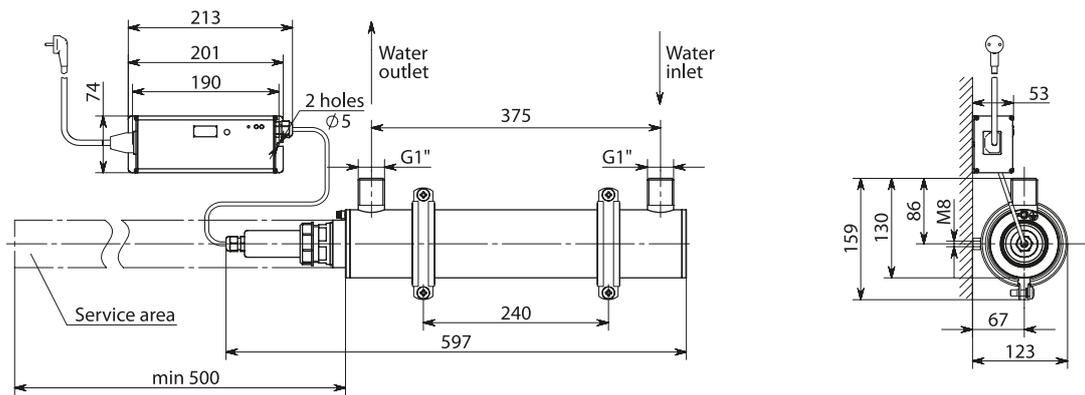
# DUV-1A700-N PH ADV



## Components

Component	LIT Number
UV lamp	DB 700HO
Quartz sleeve with sealing	LIT 1439.01.03.000
Sealing ring set for lamp unit	LIT HP.296.00.000
Electronic ballast	L~220-1x250-3303-200UV
UV sensor	IS-4

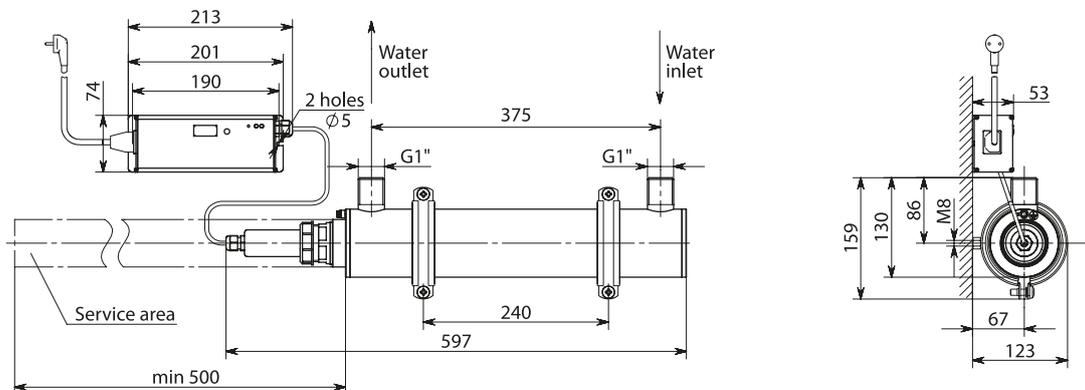
## DUV-1-21-N BSC



### Components

Component	LIT Number
UV lamp	GPH436T5L
Quartz sleeve with sealing	LIT HP.235.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	LIT 1578.02.00.000

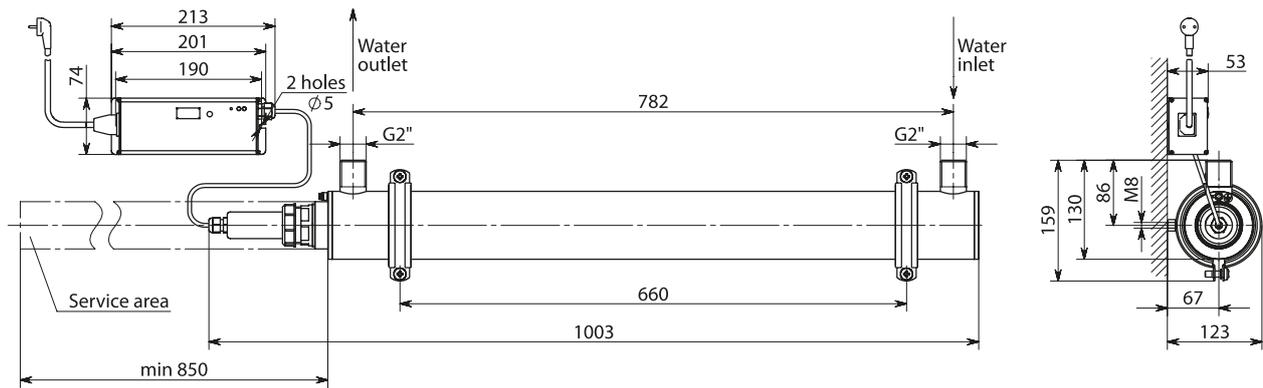
## DUV-1-48-N BSC



### Components

Component	LIT Number
UV lamp	GHO436T5L
Quartz sleeve with sealing	LIT HP.235.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	LIT 1579.02.00.000

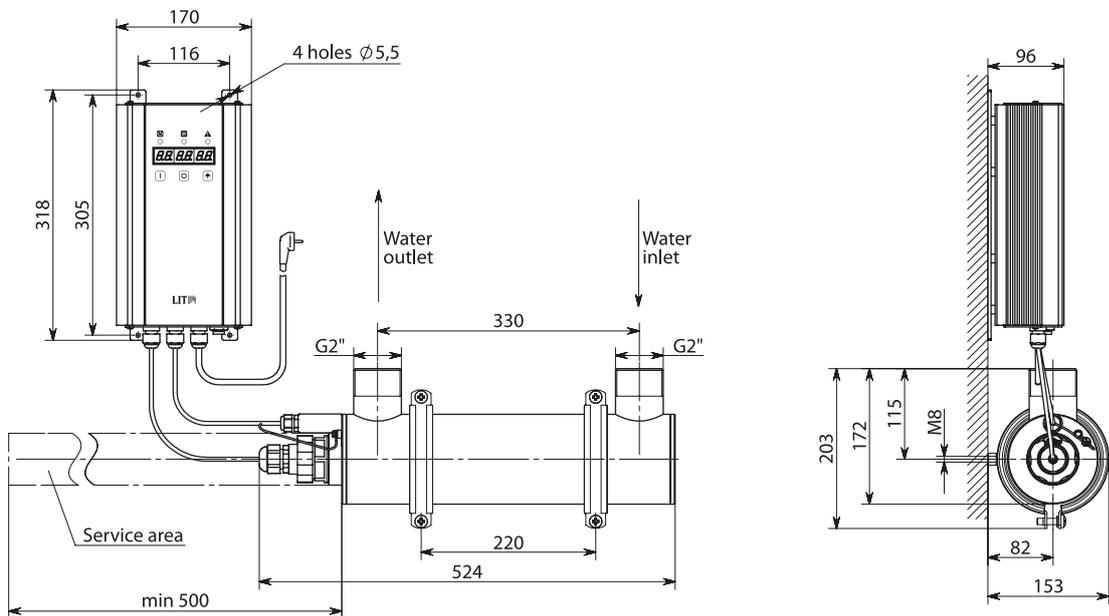
# DUV-1-87-N BSC



## Components

Component	LIT Number
UV lamp	GHO36T5L
Quartz sleeve with sealing	LIT HP.276.01.000
Sealing ring set for lamp unit	LIT HP.295.00.000
Electronic ballast	LIT 1580.02.00.000

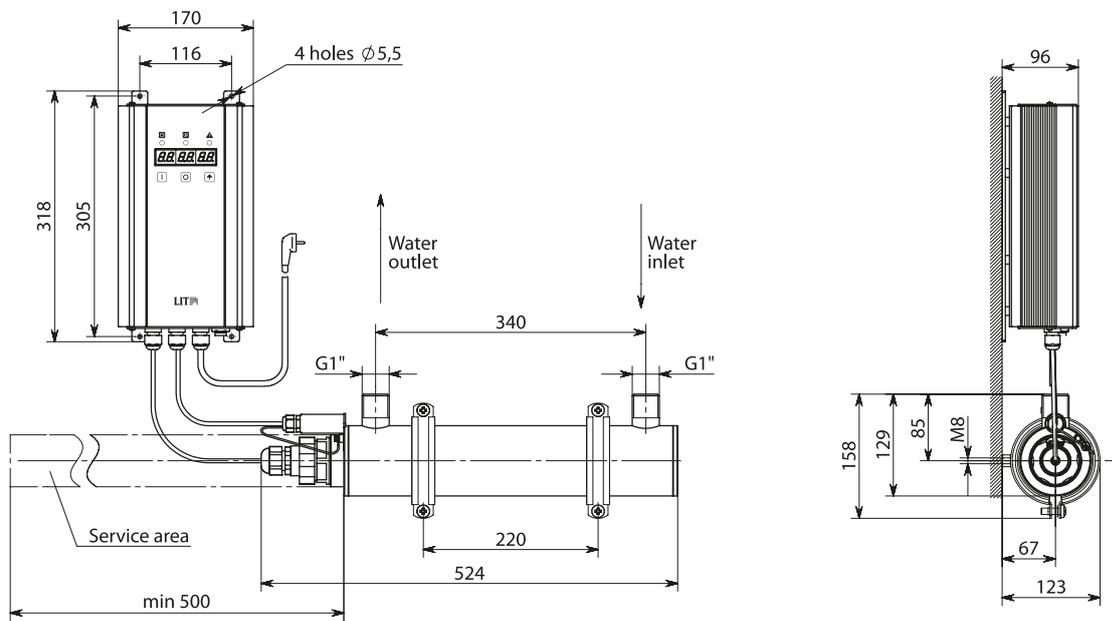
# DUV-1A120-N BSC



## Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200

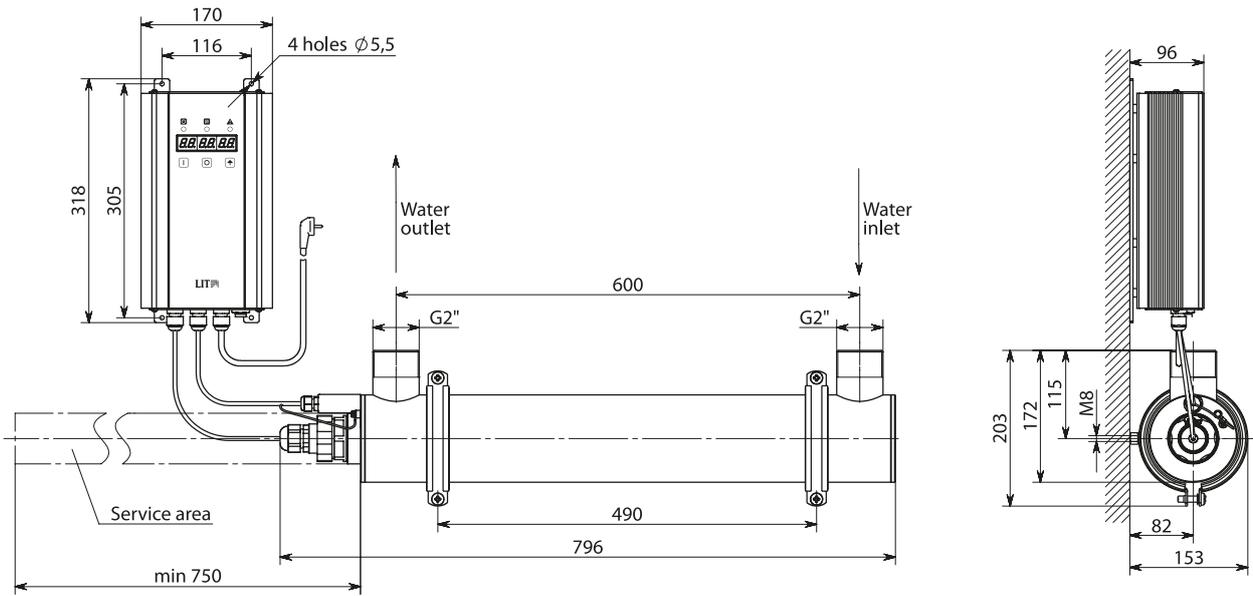
## DUV-1A120-NK BSC



### Components

Component	LIT Number
UV lamp	DB 120HO
Quartz sleeve with sealing	LIT HP.284.00.000-05
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200

# DUV-1A250-N BSC



## Components

Component	LIT Number
UV lamp	DB 250HO
Quartz sleeve with sealing	LIT HP.284.00.000-04
Sealing ring set for lamp unit	LIT HP.294.00.000
Electronic ballast	L~220-1x250-3303-200

**LIT UV Elektro**

Erfurt, Germany  
Tel.: +49 3643 48999 0  
Email: [germany@lit-uv.com](mailto:germany@lit-uv.com)

**LIT UV Europe**

Eindhoven, the Netherlands  
Tel.: +31 402 240 730  
Email: [info@lit-uv.com](mailto:info@lit-uv.com)

**LIT Moscow**

Moscow, Russia  
Tel.: +7 495 733 9526  
Email: [lit@lit-uv.com](mailto:lit@lit-uv.com)

**LIT Duna**

Budapest, Hungary  
Tel.: +36 1 239 5268  
Email: [hungary@lit-uv.com](mailto:hungary@lit-uv.com)

**LIT Bulgaria**

Sofia, Bulgaria  
Tel.: +359 887 036 330  
Email: [bulgaria@lit-uv.com](mailto:bulgaria@lit-uv.com)

**LIT Baltics**

Riga, Latvia  
Tel.: +371 278 714 18  
Email: [baltics@lit-uv.com](mailto:baltics@lit-uv.com)

**LIT Poland**

Lodz, Poland  
Tel.: +48 603 304 366  
Email: [poland@lit-uv.com](mailto:poland@lit-uv.com)

**LIT Asia**

Beijing, China  
Tel.: +86 139 111 639 97  
Email: [asia@lit-uv.com](mailto:asia@lit-uv.com)

**LIT Turkey**

Istanbul, Turkey  
Tel.: +90 212 945 0 269  
Email: [turkey@lit-uv.com](mailto:turkey@lit-uv.com)

