

Ellwangen

Air-cooled UV module with shutter for UV medium pressure lamps

The UV modules type Ellwangen with snap shutter were specially developed for rough industrial UV applications. The construction is extremely robust and low-maintenance. The reflectors have clamped cost-effective reflector sheets which can be replaced easily by the customer. The reflector geometry produces a broad radiation characteristic that ensures that the irradiated substrate receives a high UV dose. If required, the focussing characteristic of the reflector profiles can be preset, allowing to adjust the focus depending on the distance to the substrate.



The UV lamp is cooled exclusively by air via one or more exhaust air connections. The optional exhaust air control set can be used to adjust the cooling air volume. The maximum possible lamp output is 240 W/cm, depending on the length.

Typical applications can be found in the following areas:

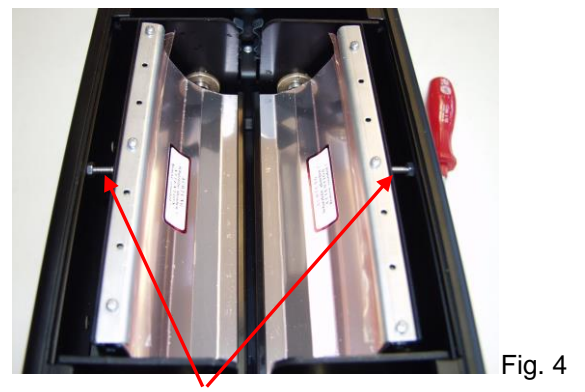
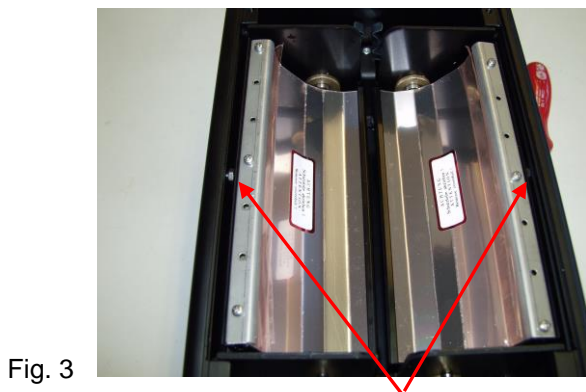
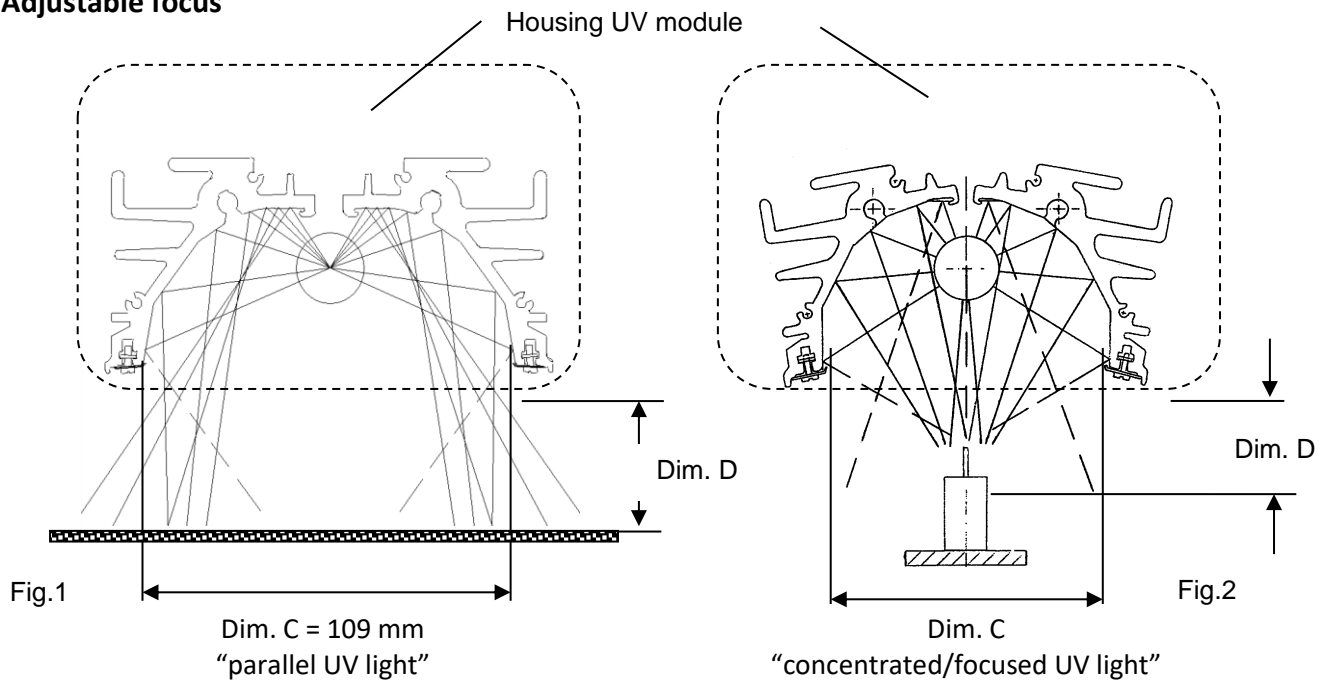
- UV printing/coating
- wood industry
- industrial UV coating

Features UV module Ellwangen:

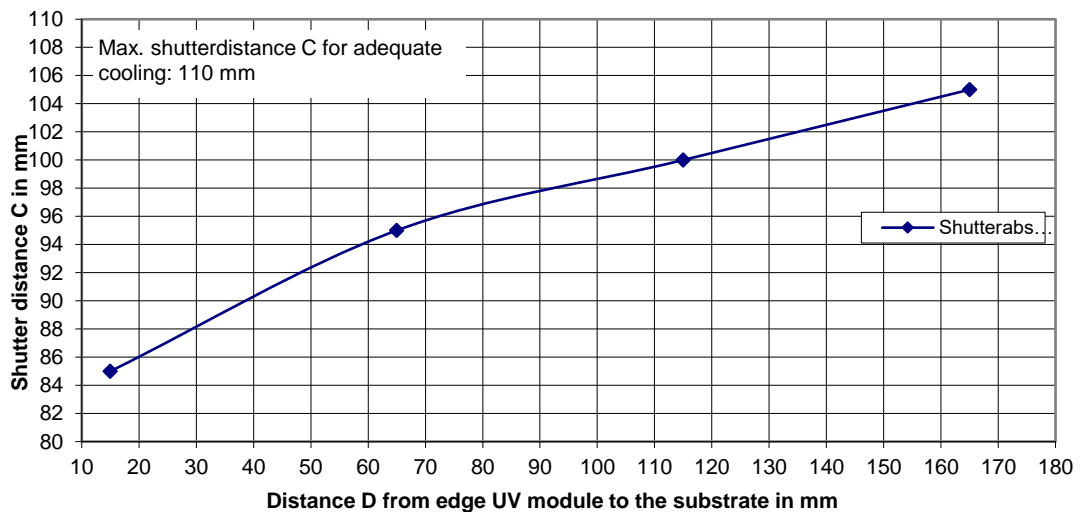
- robust snap shutter with actuator
- monitoring of the shutter position (open/close)
- built in temperature switch
- adjustable focusing
- available for arc lengths between 10 and 145 cm

Technical data				
Arc lengths	100 – 600 mm	720 – 850 mm	1100 mm	1250 – 1450 cm
Specific lamp power	max. 240 W/cm	max. 200 W/cm	max. 160 W/cm	max. 120 W/cm
Lamp diameter	Ø 28,5 mm	Ø 28,5 mm	Ø 26,5 mm	Ø 22,5 mm
Standard lengths	100 to 600 mm in 50 mm steps and 720, 850, 1100, 1250, 1450 mm			
Dimensions	width: 184 mm, height: 108 mm (with air connection: approx. 160 mm)			
Cooling	exhaust air; fan: on behalf of the customer			
Exhaust air connection	DN 100 or 125 or 140; number and diameter of air connections depending on arc length and specific power			
Shutter control	built-in 5/2-way valve DC 24V			
Electrical connection	output signals: <ul style="list-style-type: none"> • shutter open/closed • temperature switch (AC 250V, 6A; DC 30V, 5A) 			
Shutter actuator	snap shutter, pneumatic 6...8 bar compressed air acc. to ISO 8573-1:2010			
Ambient temperature	5 - 35 °C			
Options	<ul style="list-style-type: none"> • HiPro high voltage connector (bulk head mounting) • exhaust air temperature sensor PT 100 • quartz glass holder/frame • mounted UV inline sensor • mounted axial fans instead of air connections • elliptic reflectors with exchangeable reflector sheets • electric shutter actuator 			
Further options	<ul style="list-style-type: none"> • separate air control set 			
Protection class	IP20			

Adjustable focus



**Shutter distance C depending on distance D between uv module and substrate
UV module type Ellwangen**



General

UV medium-pressure lamps should have a quartz glass temperature of between 700 and 900°C during operation, which is achieved by forced air cooling, which also ensures that any ozone that eventually is produced is exhausted.

UV modules are used to accommodate UV medium-pressure lamps and reflect a large proportion of the otherwise unused uv light onto the substrate. The adjustable reflector characteristics (focusing or wide distribution) allow the units to be used universally and adjusted to all applications. In conjunction with the correct amount of cooling air, it also enables cooling tailored to the needs of the uv lamp.

The UV modules are made of corrosion-resistant materials. All essential parts are made of aluminium and stainless steel.

Precautions

UV radiation emitted by uv lamps in operation is dangerous for skin and eyes and has kept off the operating personnel during operation by shielding.

Never look directly with unprotected eyes in an uv lamp and in reflected radiation!

During operation, the quartz tube of the lamp has a temperature of approx. 700 to 900 °C, therefore the lamp has to be cooled off before working on it or the uv module in case of e.g. service. Despite sufficient cooling, the uv module itself can reach temperatures clearly more than 50 °C at some places.

Because of the high temperature of the lamp, the use in explosion proof zones is not possible! If, for example, in combination dryers solvent-containing colours, lacquers etc. and uv curing materials are used alternately, ensure BEFORE switching on the uv lamp, that the solvent containing air in the dryer is sufficiently rarefied / eliminated!

UV modules with closed shutter do not block all UV light, a residual leakage radiation will still be emitted. This has taken into account, when humans should work in the area of this residual radiation.

Installation and shutter actuator

uv modules are designed for mounting in a larger housing provided by the customer (e.g. dryer unit), which guarantees a sufficient protection against touching (hot) and especially against uv light.

The fastening of the unit may be done in various ways, e.g. to lie on rails (do NOT cover the gills or the air inlet slits at the long sides between outer wall and reflector), or by holders (screws) at the reverse side or the face sides of the unit. If fastened by the rear side drill holes in the inside wings of the edge profile but not in the reverse side coversheet for more stability.

Care have to be taken to the end stops (open and closed shutter) and to the speed of the shutter. The shutter actuator has to close/open the shutter smoothly, not hard! Otherwise early damaging of shutter mechanism will occur.

Cooling

The necessary amount of cooling air depends on the power of the lamp. The air should be sucked off at the reverse side of the unit. In special cases it could be necessary to blow the air from the reverse side over the lamp to the front of the unit, but it is more difficult to find the right amount of air in this case, because of jet effects and partial cooling of the lamp.

Guiding values for the amount of exhausted cooling air are shown in the following table. These values have to be multiplied with the power of lamp in kW.

lamp power	40 to 60 W/cm	70 to 90 W/cm	100 to 130 W/cm	140 to 180W/cm	200 to 240 W/cm
air volume	kW * 25 m ³ /h	kW * 35 m ³ /h	kW * 50 m ³ /h	kW * 70 m ³ /h	kW * 95 m ³ /h

About 70 to 100% air volume have to be added to the calculated values for the cooling of the surrounding customer provided housing and machinery.

Example:	electrical lamp power 6 kW at 120 W/cm	
	necessary amount of cooling air for the reflector unit:	approx. 300 m ³ /h
	additional amount of cooling air for the housing:	approx. 270 m ³ /h
	total amount of air	about 600 m³/h

General experience has shown, that an exhaust temperature of approx. 60 °C measured near the air outlet at the dryer means a sufficient cooling. A lower temperature of <40°C often indicates a too strong cooling, but must not. A sure indication could be made by the lamp voltage. It have to be near the nominal value according to the lamp data (U_{lamp} should be more than 75-80% of nominal lamp voltage).

In stand-by operation with reduced power, the air volume has to be reduced in order not to cool down the uv lamp too much. A too strong cooling could be indicated by a sinking lamp voltage lower than about 80% of the nominal lamp voltage. The air reduction is to be established in a test, since it also depends on practical conditions of use. The air may be reduced by means of e.g. a motor-operated throttle valve or by a steplessly controlled fan or other.

Please note that the amount of cooling air differs significantly between open and closed shutter. For open shutters, the cooling air volume can be calculated according to the above formula, for closed shutters it can be significantly higher. But take care that the uv lamp isn't overcooled. It may even be possible to use the full-load volume. Ultimately, only an adjustment during installation/start-up will help to obtain accurate values.

ATTENTION: When the shutter is closed, the lamp power must be reduced to max. 60 W/cm!

Because of the ozone, the exhaust air must be discharged via the roof. Due to the relatively high temperature of the exhaust air, the ozone decomposes quite quickly.

Electrical connection

Electrical connection has to be worked out with suitable cables, the cable cross-section and the insulation have to correspond to the operation current, temperature of cable and ignition voltage. Depending on the version of the UV module, the cables are connected to terminal strips and/or to ceramic supports (high voltage) or optionally via a high voltage connector (HiPro). Since inside the unit the temperature can reach up approx. 120°C, the connected wires have to be chosen accordingly. They have to be protected against uv light and ozone inside the unit for example by protective or insulation tubes made of PTFE or soaked glass fiber.

For the same reason, the screws joint for cables and protective tubes outside the unit have to be made of metal.