Köln

Air-cooled UV module with fixed reflector for UV medium pressure lamps

The UV modules type Köln 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 Köln:

- fixed reflector
- built in PT100 exhaust air temperature sensor and temperature switch
- adjustable focusing
- available for arc lengths between 10 and 240 cm

Technical data				
Arc lengths **Specific lamp power** **Lamp diameter**	100 – 600 mm max. 240 W/cm ∅ 28,5 mm	1900 mm max. 200 W/cm ∅ 28,5 mm (special design)	2400 mm max. 160 W/cm ∅ 26,5 mm (special design)	
Standard lengths	100 to 600 mm in 50 mm steps and 720, 850, 1100, 1250, 1450 mm			
Dimensions	width: 176 mm, heigth: 92 mm (with air connection: approx. 136 mm)			
Cooling	exhaust air; fan: on behalf of the customer			
Exhaust air connection	DN 100 or 125 or 140; number and diamter of air connections depending on arc length and specific power			
Electrical connection	output signals: • temperature switch (AC 250V, 6A; DC 30V, 5A) • PT100 temperature sensor (exhaust air)			
Ambient temperature	5 - 35 °C			
Mounting	horizontal, sideways or downwards			
Options	• HiPro high voltage connector (bulk head mounting) • quartz glass holder/frame • mounted UV inline sensor • mounted axial fans instead of air connections • elliptic reflectors with exchangeable reflector sheets			
Further options	• separate air control set			
Protection class	IP20			

Adjustable focus

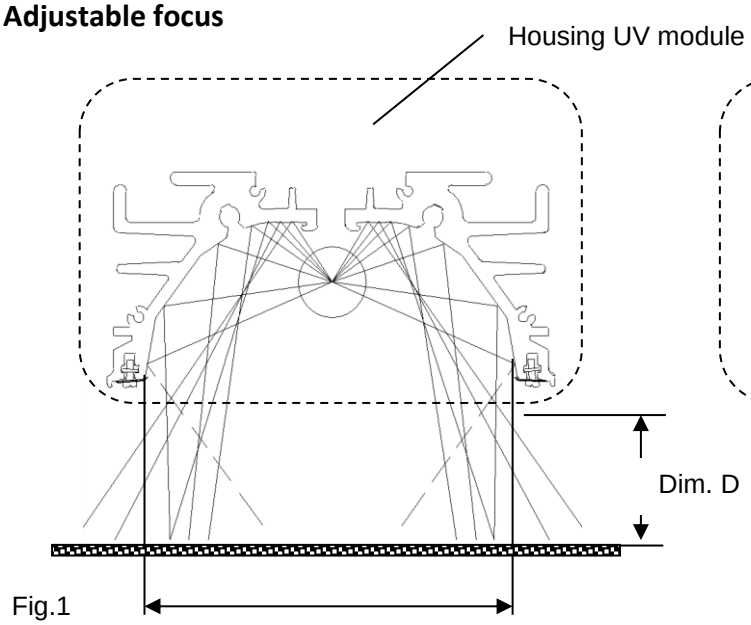


Fig.1

Dim. C = 109 mm
"parallel UV light"

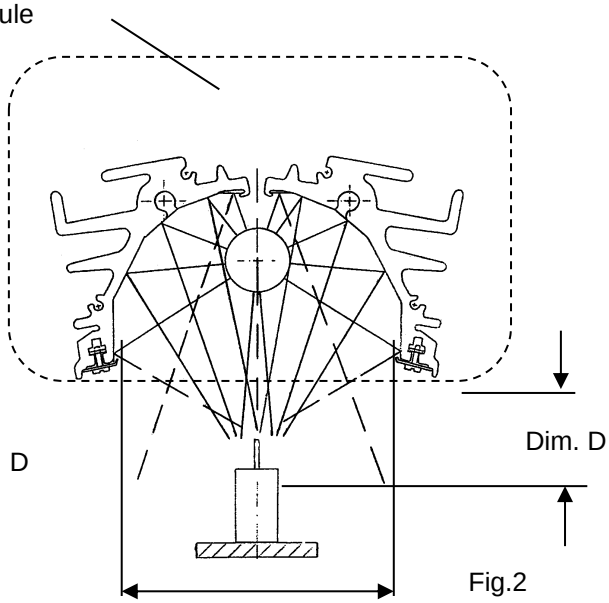


Fig.2

Dim. C
"concentrated/focused UV light"

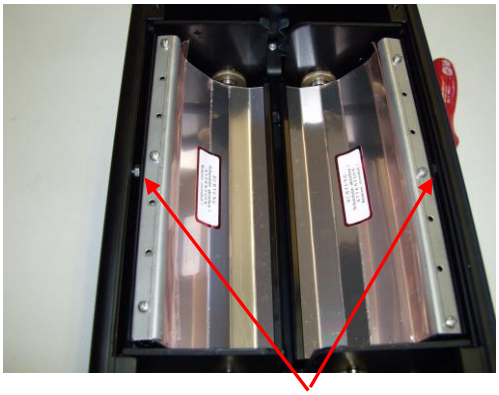


Fig. 3

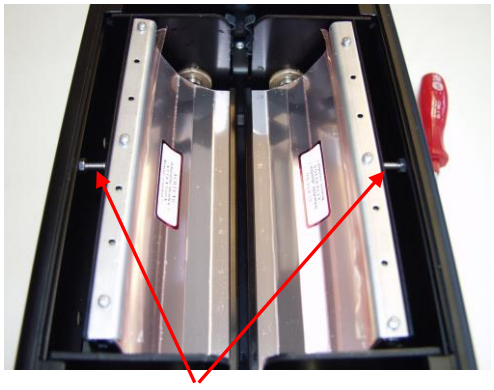
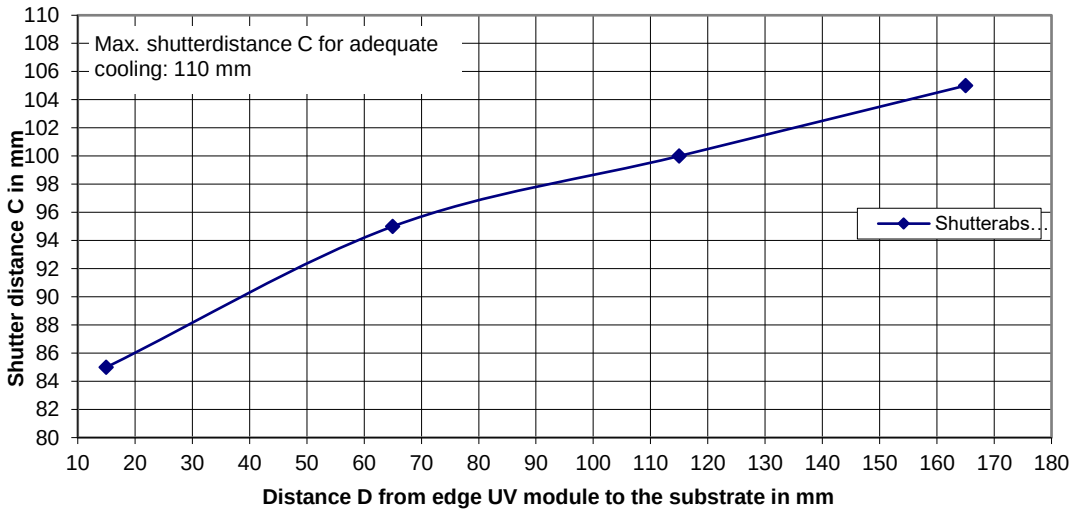


Fig. 4

Shutter distance C
depending on distance D between uv module and substrate



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!

Installation

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.

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 m³/h	kW * 35 m³/h	kW * 50 m³/h	kW * 70 m³/h	kW * 95 m³/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 m^3/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.

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.