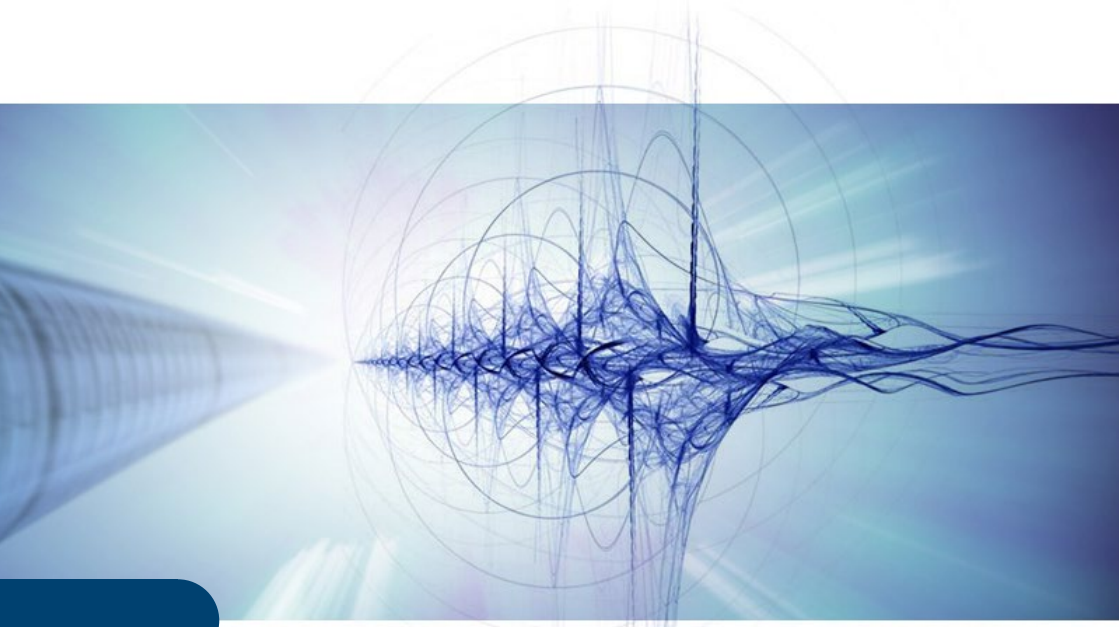
UV BOOK

PRODUCT OVERVIEW



uv-technik
meyer gmbh

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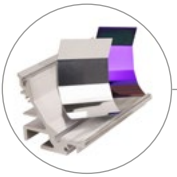
competence in uv



UV lamps, units and equipment

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uv-technik
meyer gmbh

Company Profile

The Beginnings ...

In 1986, Karl-Heinz Meyer and Michael Miseré met for the first time. Both of them were young engineers, and they shared a common vision: They wanted to offer industrial services and establish their reputation as specialists in tailor made UV lamp systems and associated equipment. Their greatest passion has always been to develop individual solutions to all sorts of UV-related problems. Therefore, they founded uv-technik, the company that has been putting their vision into practice for 30 years now. As one of the first UV component suppliers, they have been developing and supporting this technology from the very beginnings.

Revolutionary technical developments, top quality, trendsetting innovation as well as professional consulting competence in addressing our customers' UV issues – these are the strengths that are manifested in all of our products. Almost as many as 100 engineers, technicians and other personnel, located in Ortenberg, (in Germany) and Luton (Great Britain), make visions come true every day. We set the standards that have made us market leader in the field of UV components.

Remarkable strengths make companies market leaders. Our strengths: customer-oriented solutions for new plants and systems that can be specifically integrated with existing production processes, also as retrofits.

uv-technik meyer gmbh operates in all fields with great quality consciousness and in a yield-oriented way. Return has priority over turnover. With all of our personnel acting in an entrepreneurial way, we increase the value of our company and, at the same time, we secure our independence in the long term.

The history

1986

Karl-Heinz Meyer and Michael Miseré establish the company uv-technik. Their mission statement is: „acting as a strategic partner for industrial clients and as a system supplier of tailor-made UV lamps and components“.

1991

Takeover of a lamp-manufacturing company near Ilmenau (Germany). Since 1997, this company has been operating under the name of uv-technik speziallampen gmbh.

1995

Network development in cooperation with uv-technik‘s technology partner. The first and most successful electronic ballast for UV medium-pressure lamps, with continuously variable power control and pulse operation, is manufactured.

1997

Founding of uv-technik meyer gmbh with the new general management of Karl-Heinz Meyer and Axel Steuernagel, and the founding of uv-technik Speziallampen GmbH.

2003

Karl-Heinz Meyer and Keith Lane establish uv-technik international ltd in the U.K.
This Luton-based company is founded to further extend their international business activities. The new company infrarot speziallampen gmbh is established as a subsidiary of uv-technik speziallampen gmbh.

2007

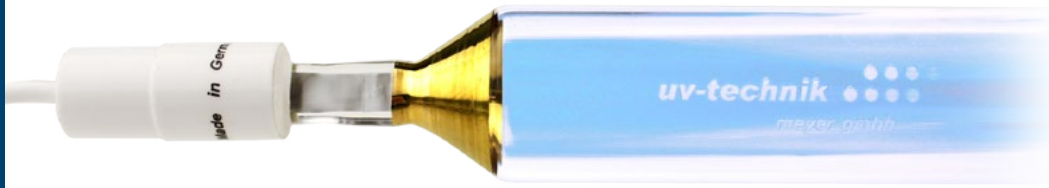
Expansion of the manufacture of electronic ballasts for UV low-pressure lamps by takeover and establishment of uv-electronic gmbh in Durchhausen, Germany.

2008

Strategic expansion of the product range by taking over uv-systec and its range of UVC sterilisation systems for surface disinfection. Introduction of the brand uv-fresh ®.

2012

Establishment of UV-Technik LLC, St. Petersburg (Florida) as a subsidiary with the local Managing Director Arpad Kolbe.



Doping and quartz types in UV medium pressure lamps

UVH lamps

Medium pressure UV lamps are mainly installed where uv-reactive paints or coatings are used. Photo initiators within the substances are exposed to UV radiation thus creating a reaction between the ink and the lacquer called polymerization. In addition to paints and coatings, industrial UV radiation is used in many other fields, e.g. in materials testing, photochemistry and also for disinfection of material surfaces, air and water.

In the following areas UVH lamps are mainly applied:

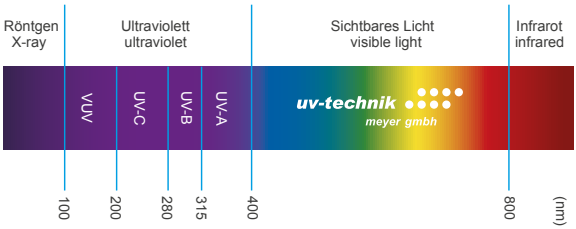
- Graphic arts industry
- Wood industry
- Electrical Industry

The main advantages of the UV processes are:

- The materials are free of solvents and therefore environmentally friendly
- The timing of the cure can be freely defined
- The uv cure is instantaneous, therefore high production speeds can be achieved

UV medium pressure lamps can be manufactured with lengths between 40 mm and 2800 mm and are available for capacities up to 60 kW.

The following pages give a brief overview of the common market of medium-pressure UV lamps, its doping and models. Please contact us if you have special requirements for your application. In almost all cases, we can offer a solution.



The range of the UV radiation according to DIN 5031-7 is defined as follows:

UV-C	= 100 to 200 nm (vacuum-UV)
	= 200 to 280 nm (far UV)
UV-B	= 280 to 315 nm
UV-A	= 315 to 400 nm (in DIN only defined to 380 nm, in practice often down to 400 nm)
UV-VIS	= 400 to 450 nm (395 to 445 nm are; defined in DIN)
Light (VIS)	= 380 to 780 nm (in practice often between 400 to 780 nm)

A UV lamp is composed of:

- The quartz glass tube
- The seal with melted in electrodes on both sides (the so-called sealing)
- The caps with connections

Examples of electrodes.

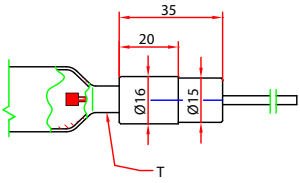
The electrodes have a diameter of a few millimeters. They have a length range from a few millimeters up to about 10 mm. The choice of the optimal electrode mainly depends on the emitter current.

UV medium pressure lamps on both ends must be terminated with mostly ceramic caps. These are available in different designs. If desired, the cable length can be custom defined. The same applies for the connection.

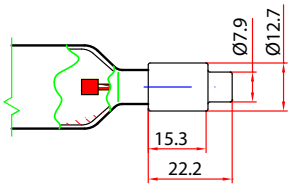
Caps

UVH lamps

Please contact us
if you require a different cap type



ABV 14



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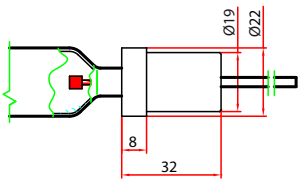

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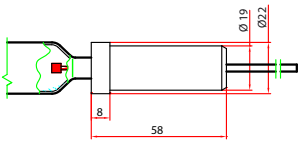

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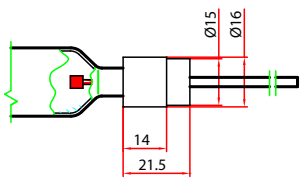
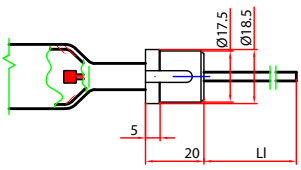
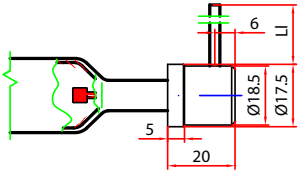


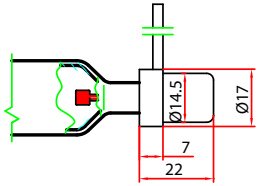
ABV 26



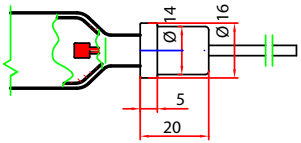
ABV 41 a



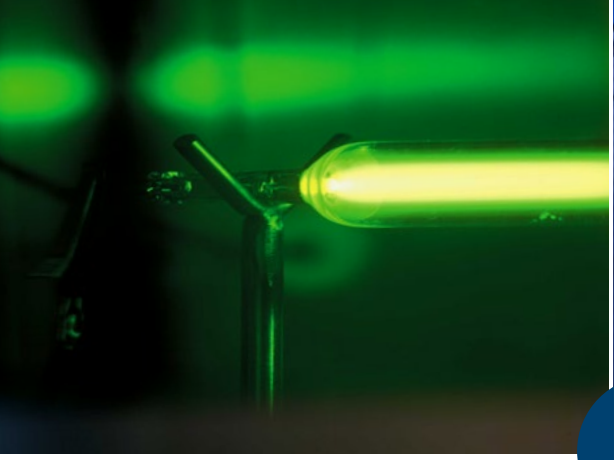
ABV 41 h

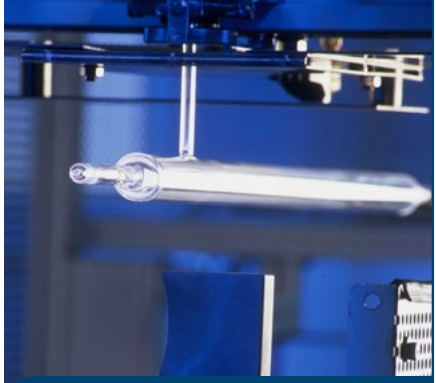


UVT 13



UVT 17





Ballasts for operating UVH lamps

A ballast that ensures the operation of the lamp at the desired power is required for using a UVH lamp. Combinations of chokes and a starter can be used for lamps operating at a power of up to 5 kW. In the power range of 5 kW up to approximately 8 kW, combinations of an autotransformer and chokes are used while leakage-field transformers are preferred from a power level of 8 kW upwards. The currently most powerful lamp provides 60 kW. Ballasts can be designed for single-level or for multi-level operation. Continuously variable variants are also available without any problems in all power ranges. Alternatively, continuously variable electronic ballasts can be used in the power ranges from 600 W to 40 kW and with a lamp length of up to 300 cm, in special cases also somewhat longer.

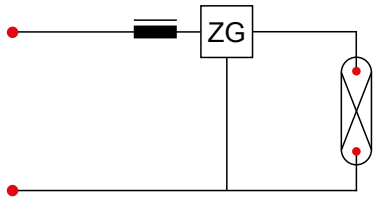


Fig. I
Choke and igintion unit,
up to about 5kW

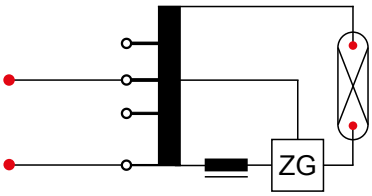


Fig. II
Auto transformer and chokes,
up to about 8kW

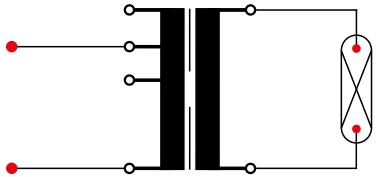


Fig. III
Leakage Transformer, over about 8kW

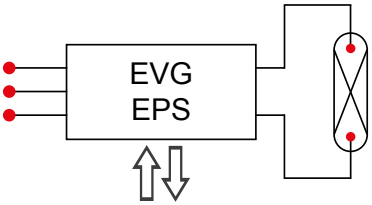
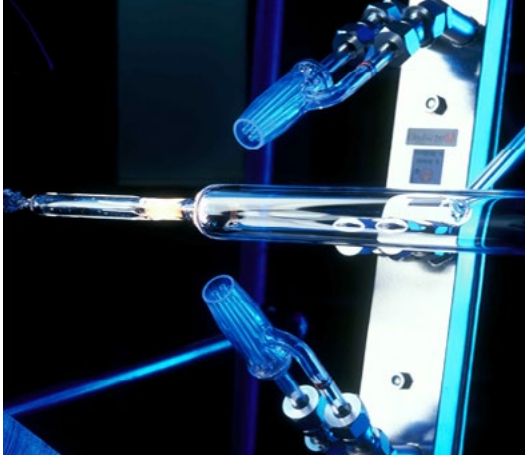


Fig. IV
Electronic Power Supplies (EPS)

With conventional ballasts, stand-by operation at 35 - 40% of the maximum power output is possible if it is required by the respective process. If electronic ballasts are used, significantly lower standby power levels down to approx. 10% can be realised. Operation in stand-by mode almost always requires a reduction of the lamp cooling.



Warranty Conditions

UVH lamps

UVH lamps supplied by uv-technik meyer gmbh are covered by a warranty that depends on the type, power and spectrum of the lamp. The warranty period applies for lamps that are not contaminated by dirt on the outside and are efficiently cooled.

The warranty period takes into account a decrease in radiation of 25% in the respective UV range compared to the new condition. For iron-doped lamps, the 25-hour value is defined as the new condition. A turn-on frequency of maximum 3 times within 8 hours of operation applies for all lamps. Any further turning on/turning off reduces the service life by half an hour.

In all cases, a pro-rata method is applied, i.e. if a complaint is made about a lamp, the past duration of use will be taken into account. Example: A lamp is covered by a 1,500 hours‘ warranty and fails after 1,000 hours of operation. One third of the value will be refunded, or an equivalent replacement will be provided (see table).
There is no claim for compensation for deformed lamps, as this cause of failure is related to the device (e.g. insufficient lamp cooling, lamp operated at excessive power). Nor will a replacement be provided if a lamp in new condition breaks (breakage during transport, improper handling during installation).

uv-technik meyer gmbh accepts no liability in the case of injury or damage due to improper use of the lamp. Replacement or credit is only provided for the lamp itself. All further claims are excluded, unless otherwise stipulated by law.

The warranty periods mentioned above (table) apply for a period of 2 years after date of delivery.

UV lamp	**Spectrum / labeling**				
	Mercury (Hg) (no labels)	**Iron (F)**	**Gallium (G)**	**Low-ozone (Y)**	**Ozone-free (Z)**
UVH up to 160 W/cm	1500	750	1000	1500	1000
UVH up to 240 W/cm	1000	750	1000	1000	1000
UVH more than 240 W/cm	1000	750	750	750	750
Quick-start lamps	500				

Other lamps, particularly with special spectra, are available on request.

The energy balance for most types of UVH lamps is as follows (approximate values):

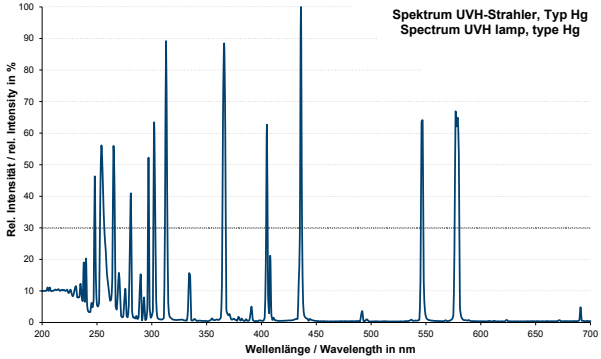
- 30 % UV radiation
- 15 % visible light
- 55 % infrared (heat)

Depending on the filling of the lamp, whether only mercury or also with iron or gallium or other additives, the radiation peaks shift to different wavelengths. Due to this, the proportions of UV-A, UV-B and UV-C change relative to one another. The three most commonly used UVH lamp types emit the mercury, iron and gallium spectrum.

Spectrum of a mercury lamp (UVH standard)

Energy distribution (approximate values):

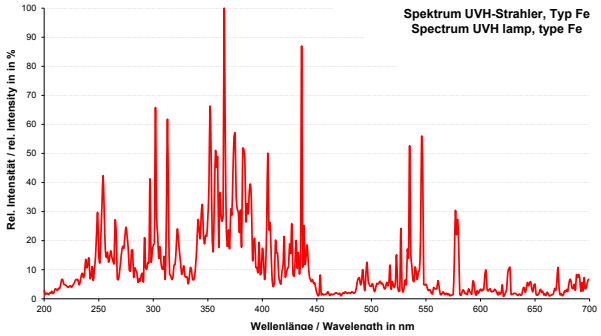
- 15 % UV-C
- 8 % UV-B
- 7 % UV-A
- 5 % UV-VIS
- 15 % VIS



Spectrum of an iron-doped lamp (UVH type F)

Energy distribution (approximate values):

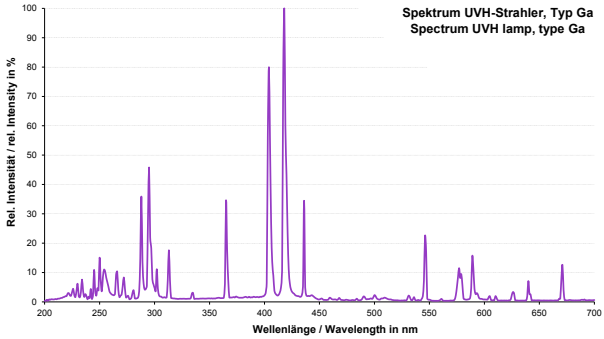
- 7 % UV-C
- 5 % UV-B
- 17 % UV-A
- 6 % UV-VIS
- 16 % VIS

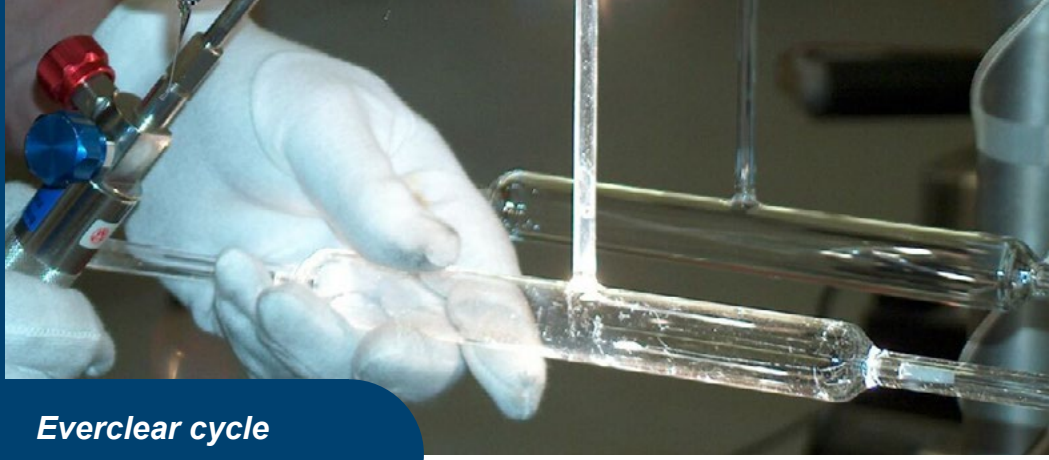


Spectrum of a gallium-doped lamp (UVH type G)

Energy distribution (approximate values):

- 7 % UV-C
- 8 % UV-B
- 5 % UV-A
- 17 % UV-VIS
- 24 % VIS





Everclear cycle

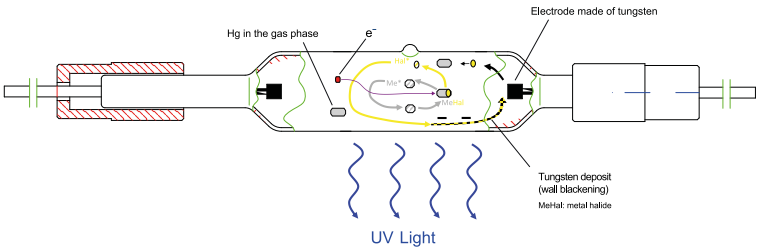
UVH lamps

As mentioned above medium pressure UV lamps are gas discharge lamps. In operation the plasma is in the quartz glass tube, which generates the desired spectrum. The plasma has a temperature of approximately 5,000 to 7,000 K. This is made possible by the fact that a high current goes through the electrodes. Due to the small dimensions of the electrodes the current density is very high at their tips. Combined with the small dimensions this means that the electrodes are heavily loaded. After several hours of operation often the inner surface of the quartz glass tube begins to blacken in the electrode area. This is denoted as the so-called blackening-effect and can be significantly reduced by the addition of halogen.

By filling the lamp additionally with halogen, a cycle process is initiated which works as described: Tungsten, which is sputtered from the electrode deposits on the quartz glass tube (coldest place) and combines with the halogen. This combination breaks apart again near the electrode, depositing tungsten on it. Through this the depositing of tungsten on the quartz glass tube is prevented. A precondition for the optimal functioning of the halogen cycle is a sufficient high temperature of the quartz glass tube.

For this reason, we recommend that the tube wall temperature of a UV medium pressure lamp should be 700 - 900 °C.

Everclear cycle



General information about ozone and how to manage it

UVH lamps

How to handle ozone – practical advice

Because of the different types of uv curing stations / uv dryers and the fact that each system uses different exhaust air volumes, no general statement can be made regarding the quantity of ozone produced. The ozone levels should be measured at each work station or exhaust duct. The most typical method is to use a Draeger handheld gas sampler (e.g. test tube 0,05/b, measuring range 0,05…0,7 ppm). A defined amount of air is pumped through the test equipment. The colour change in the test tube gives the ozone concentration.

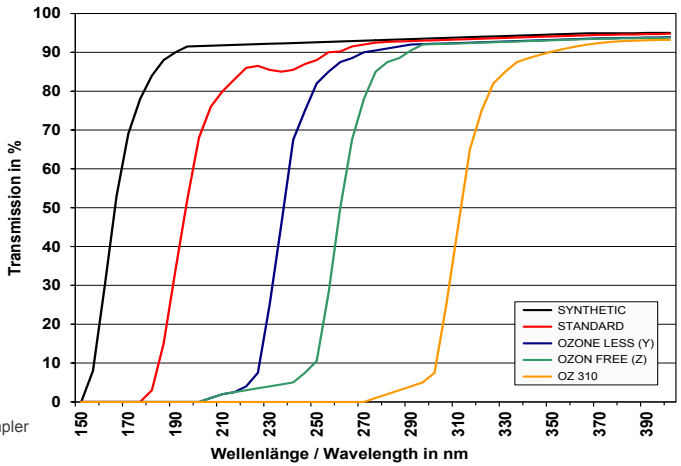
These test tubes can be sourced from uv-technik meyer gmbh. The air pump can be hired from us for a small fee. Please contact us for more information.

Our ozone-free lamps (Glass type Z) have a built-in filter which filters out wavelengths below 235 nm (at room temperature) which results in no production of ozone. Because there is a part of the UVC wavelength missing this could result in insufficient curing. But this will depend on the chemistry of the substrate.

As an alternative, ozone-less lamps (Glass type Y) can be used, which filter out radiation below 215nm. This produces ozone only if the temperature is low and during the initial start up. The curing results must be checked carefully as they depend on the chemistry of the substrate.

Source: Draeger Gas Pump sampler

Transmission curves of different quartz glass types:



Why use Electronic Power Supplies

EPS

Advantages for the user:

• Step less control of lamp power and because of this optimised adaptation to the curing process e. g. at variable machine speeds. Results are: lower heat of the irradiated substrate and the surrounding machine, energy saving and the possibility of “balancing out” lamp ageing.

• The requested or adjusted lamp power is continously monitored and controlled and therefore independent of mains voltage variations or other influences. • Instant switching of lamp power from 100 % to 10-15% during gaps in production flow. This means, depending on application, significant energy saving and reduced heat without compromising cure.

Advantages for the machine producer (OEM):

• One power supply for a range different lamps and powers: For lamp powers between 300 to 40,000 watts there are only seven different EPS-types necessary. Without changing the power supply, a range of lamps within in the respective power and arc length range can easily be connected to the EPS, only the minimum and maximum limits of the lamp and the respective EPS need to match.

• EPS are in most cases smaller and lighter than conventional power supplies.

• There is less time needed for installation and wiring. • Perfect for export, since they can be used worldwide on 376 to 509 V supplies at 50 and 60Hz without changing the power supply (3 phase units).

• Possibility of installing the power supply directly into the machine, so that the switch cabinet becomes unnecessary or it becomes significantly smaller.

• Balanced load of the 3 phases
(for 3-phase units).

• High warm up current for short warm up phase, but NO higher current to the mains.

• No Neutral line necessary (3-phase units)

• No additional ignition is necessary
(except TEP 20-S)

• Distance between power supply and lamp up to 15 m and more (FSU).

**The possibility of
rapid pulsation of lamp power**

• Especially with interrupted processes, e.g. curing on single objects such as synthetic bottles, credit cards, CD‘s/DVD’s and so on, a rapid pulsation of lamp power is an ideal solution. When an object is located under the lamp, the lamp can be operated at full power. During the short break before the curing of the next object the power can be decreased to a minimum. The average power consumption for a lamp and EPS is the mean of minimum and maximum peaks with respect to

the pulse duration. The overall heat generation and energy consumption correspond to this mean, but the UV-power during the “curing moment” will be at its maximum or peak power level. The rise time from minimum to maximum power is approx. 2 - 3 ms (eUV/BLP) respectively approx. 20 ms (TEP/FSU).

Operation with rectangular current:

• Operation of a uv-lamp with a rectangular current avoids the short “dark breaks” which occur in the arc using standard power supplies at 50 or 60 Hz with a sinousoidal waveform. So when running at high speed there is no loss of curing, e.g. for high speed printing, lacquering or coating of fibre optics etc.

• Also when substrates are monitored by cameras, interference is avoided.

Reliability:

• EPS´s have been in use world-wide since 1996. The experiences and the suggestions for improvement from our customers have continually influenced the current product range. All types of EPS are short circuit proof, earth faultproof as well as no-load safe and have proved themselves as extremely reliable during use.

Regulations:

• All electronic power supplies have the CE sign.
• EMC according to EN 55011, group I, class A (industrial areas). The EPS´s correspond to EN 50178 and other European and worldwide standards (IEC).

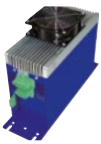
User benefits – YOUR benefits:

- Simple installation
- Phase-failure monitoring
- mains compensation
- adjusts for voltage fluctuations
- Infinitely variable and instant UV power control
- Wide mains voltage range
- Automatic stabilisation of the preselected UV power
- No off-times due to phase cut-off
- Smaller and more lightweight compared to traditional ballasts
- Little space required
- EMC-safe according to EN 55011, group I, class A; CE mark of conformity

For further information about individual ballasts, please refer to our product data sheets.
If you are interested in expert advice, please do not hesitate to contact us.
Our engineers and technicians are available to you at any time for a personal consulting session.

Overview Electronic Power Supplies for UV lamps

EPS

Max. Power			Art. No.	
620 W	Type Power Mains Lamp Voltage Lamp current Lamp arc length	**HLP 6.2-240** (open frame) 186 to 305 V, stepless 180 to 305 V, 1-phase +N +PE; 50 and 60 Hz nominal 100 to 200 V max. 6,2 A ~ 3 to 25 cm (1,2” to 10”), Hg lamps	A003904	
2.000 W 2.000 W	Type Type Power Mains Lamp voltage Lamp current Igniter Lamp arc length	**TEP 20-S** (to be used in cabinets etc.) **TEP 20-T** (to be used as desktop version) 300 to 2.000 W, stepless 196 to 249 V, 1-phase + neutral or 2-phase; 50 and 60 Hz nominal 100 to 300 V ~ 1.5 to 13 A TEP 20-S: external; TEP 20-T: internal ~ 5 to 45 cm (2” to 17”), Hg lamps ~ 5 to 40 cm (2” to 15”), doped lamps	TEP 20-S TEP 20-T	 
6.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**eb 60** eb 60: ~ 600 to 6.000 W, stepless 376 to 509 V, 3-phases + PE; 50 and 60 Hz nominal 100 to 450 V eb 60: ~ 1,5 to 15 A ~ 15 to 70 cm (6” to 27”), Hg lamps ~ 15 to 60 cm (6” to 24”), doped lamps	A003250	
6.000 W 7.500 W	Type Type Power Mains Lamp Voltage Lamp current Lamp arc length	**BLP 59-S** **BLP 75** BLP 59-S: ~ 600 to 6.000 W, stepless BLP 75: ~ 750 to 7.500 W, stepless 376 to 509 V, 3-phases + PE; 50 and 60 Hz nominal 100 to 450 V BLP 59-S: ~ 1,5 to 15 A; BLP 75: ~ 1,8 to 18 A ~ 15 to 70 cm (6” to 27”), Hg lamps ~ 15 to 60 cm (6” to 24”), doped lamps	BLP 59-S BLP 75	

Max. Power			Art. No.	
2.500 W	Type	**eUV 25-500 C0 / eUV 25-500 C1**	A005332 / A005346	
9.000 W	Type	**eUV 90-500 C0 / eUV 90-500 C1**	A00336 / A005350	
10.000 W	Type	**eUV 100-500 C0 / eUV 100-500 C1**	A005337 / A005351	
11.000 W	Type	**eUV 110-500 C0 / eUV 110-500 C1**	A005338 / A005352	
12.000 W	Type	**eUV 120-500 C0 / eUV 120-500 C1**	A005339 / A005353	
	Power	eUV 25: ~ 250 to 2.500 W, stepless eUV 90: ~ 900 to 9.000 W, stepless eUV 100: ~ 1.000 to 10.000 W, stepless eUV 110: ~ 1.100 to 11.000 W, stepless eUV 120: ~ 1.200 to 12.000 W, stepless		
	Mains	360 to 528 V, 3-phases + PE, 50 and 60 Hz		
	Lamp voltage	100 to 450 V		
	Lamp current	eUV 25-500: ~ 2,0 to 22,0 A eUV 90-500: ~ 2,0 to 22,0 A eUV 100-500: ~ 2,0 to 25,0 A eUV 110-500: ~ 2,0 to 27,5 A eUV 120-500: ~ 2,0 to 28,5 A		
	Lamp arc length	~ 15 to 60 cm (6“ to 24“) or 5 to 60 cm (2“ to 24“), eUV 25-500 C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs		
10.000 W	Type	**eUV 100-1000 C0**	A005660	
	Type	**eUV 100-1100 C0**	A006523	
	Type	**eUV 100-1200 C0**	A006524	
	Type	**eUV 100-1300 C0**	A006525	
	Power	1.000 to 10.000 W, stepless		
	Mains	360 to 528 V, 3-phases + PE, 50 and 60 Hz		
	Lamp Voltage	eUV 100-1000: 500 to 900 V eUV 100-1100: 500 to 1.000 V eUV 100-1200: 500 to 1.100 V eUV 100-1300: 500 to 1.200 V		
	Lamp current	eUV 100-1000: ~ 2,0 to 14,3 A eUV 100-1100: ~ 2,0 to 12,8 A eUV 100-1200: ~ 2,0 to 11,7 A eUV 100-1300: ~ 2,0 to 10,7 A		
	Lamp arc length	~ 40 to 125 cm (16“ to 49“) or 40 to 145 cm (16“ to 57“), eUV 100-1200 or 40 to 150 cm (16“ to 59“), eUV 100-1300 C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs		

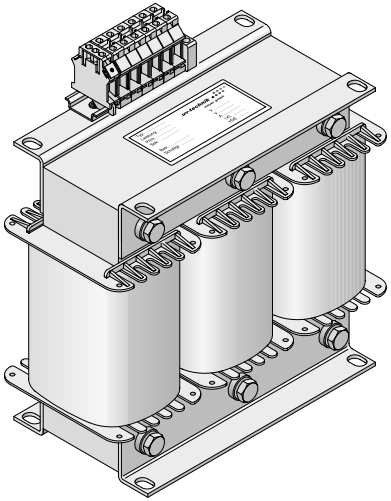
Max. Power			Art. No.	
12.000 W 18.000 W	Type Type Power Mains Lamp voltage Lamp current Lamp arc length	**eUV 120-1450 C0 / eUV 120-1450 C1** **eUV 180-2000 C0 / eUV 180-2000 C1** eUV 120-1450: ~ 1.200 to 12.000 W, stepless eUV 180-2000:~ 1.800 to 18.000 W, stepless 360 to 528 V, 3-phases + PE 50 and 60 Hz eUV 120-1450: 500 to 1.400 V eUV 180-2000: 500 to 1.900 V UV 120-1450: ~ 2,0 to 9,6 A eUV 180-2000: ~ 2,0 to 13,0 A eUV 120-1450: 40 to 175 cm (16“ to 69“) eUV 180-2000:~ 60 to 230 cm (24“ to 91“) C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A005341 / A005356 A005342 / A005357	
20.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**FSU 200** ~ 2.500 to 20.000 W, stepless 376 to 509 V, 3-phases + PE; 50 and 60 Hz nominal 800 to 900 V 3 to 25 A ~ 50 to 140 cm (20” to 55”), Hg lamps ~ 50 to 125 cm, doped lamps	FSU 200	
20.000 W	Type Type Type Power Mains Lamp Voltage Lamp current Lamp arc length	**eUV 200-1100 C0** **eUV 200-1600 C0** **eUV 200-2000 C0** 2.000 to 20.000 W, stepless 360 to 528 V, 3-phases + PE, 50 and 60 Hz eUV 200-1100: 500 to 1.000 V eUV 200-1600: 500 to 1.500 V eUV 200-2000: 500 to 1.900 V eUV 200-1100: ~ 2,0 to 24,8 A eUV 200-1600: ~ 2,0 to 16,5 A eUV 200-2000: ~ 2,0 to 13,0 A ~ 40 to 125 cm (16“ to 49“) or 40 to 200 cm (16“ to 79“), eUV 200-1600 or 60 to 250 cm (24“ to 89“), eUV 200-2000 C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A006540 A006541 A006542	

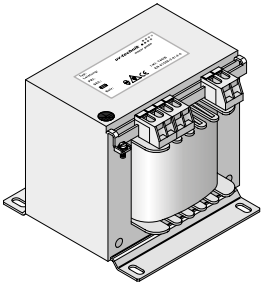
Max. Power			Art. No.	
24.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**eUV 240-2200 C0 / eUV 240-2200 C1** ~ 2.400 to 24.000 W, stepless 360 to 528 V, 3-phases + PE 50 and 60 Hz 500 to 2.100 V ~ 2.0 to 13 A ~ 80 to 270 cm (30“ to 106“) C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A005344 / A005365	
32.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**eUV 320-2700 C0 / eUV 320-2700 C1** ~ 3.200 to 32.000 W, stepless 360 to 528 V, 3-phases + PE 50 and 60 Hz 700 to 2.500 V ~ 2.0 to 16,2 A ~ 90 to 300 cm (35“ to 118“) C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A005343 / A005358	
34.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**FSU 341** ~ 4.500 to 34.000 W, stepless 376 to 509 V, 3-phases + PE; 50 and 60 Hz nominal 1.100 to 1.360 V ~ 3 to 26 A ~ 90 to 200 cm (35” to 80”), Hg lamps ~ 90 bis 190 cm (35” to 75”), doped lamps	A003011	
36.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**eUV 360-2700 C0 / eUV 360-2700 C1** ~ 3.600 to 36.000 W, stepless 376 to 509 V, 3-phases + PE, 50 and 60 Hz 700 to 2.500 V ~ 2.0 to 17,8 A ~ 90 to 300 cm (35“ to 118“) C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A005345 / A005359	
40.000 W	Type Power Mains Lamp voltage Lamp current Lamp arc length	**eUV 400-3300 C0 / eUV 400-3300 C1** ~ 4.000 to 40.000 W, stepless 360 to 528 V, 3-phases + PE, 50 and 60 Hz 700 to 3.100 V ~ 2.0 to 14,4 A ~ 90 to 400 cm (35“ to 157“) C0: analog input and analog/digital outputs C1: alternatively CANopen or analog/digital inputs/outputs	A006682 / A006683	

Electronic ballasts for different lamp voltages and interfaces not shown here are available on request.

Conventional ballasts

CB





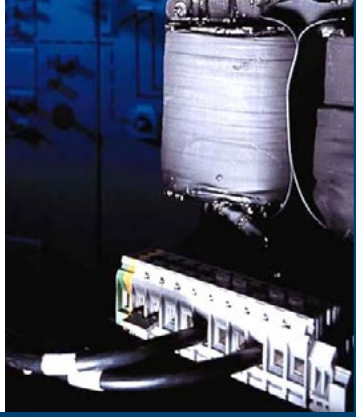
Due to the current-voltage characteristics of mercury lamps, a current-limiting ballast is required that is connected in series to the UV lamp. In UV applications, high-power mercury lamps with a power output of several kilowatts are currently exclusively operated on inductive or capacitive ballasts.

The simplest arrangement consists of a choke and a UV lamp connected in series. If different power outputs are required, a “stepped” circuit can be used. Several chokes are connected in parallel; the lamp current is increased by activating them one after the other.

Transductors enable dimming of up to approx. 50% of the rated power. With lamp arc voltages of more than 280 V, a sufficiently stable operation with a choke and 400 V mains is no longer possible. UV lamps with an arc voltage of 280 to 450 V are in practice mostly operated on a combination of autotransformer and choke or transductor.

As far as the ballasts described so far are concerned, an ignitor is required to ignite the UV lamp. In these cases, ignition devices operating at a maximum ignition voltage of 4 kV are used.

For arc voltages of more than 450 V, leakage transformers are used. Their leakage inductance has a current-limiting effect and at the same time their ratio of turns provides a higher voltage for the operation of the UV lamp. Choke circuits or transductor power stages can also be added.



Chokes

Partial-load chokes

In order to be able to switch the lamp power in steps using leakage-field transformers, e.g. 50% and 100%, one partial-load choke is required per additional step. This choke is connected in series with the transformer on the mains power side (primary side) to reduce the power accordingly. For full-load operation, the choke is bridged by a contactor/switch.

Multiple-step ballasts can be built by connecting several suitable partial-load chokes in series or in parallel.

If the partial-load choke(s) is (are) replaced by a controllable transductor, the result is a continuously variable ballast. Precise tuning of partial-load choke(s) to the transformer and the desired lamp power is also required here.

(Ballasts) Chokes

Low-voltage lamps with a power of up to approx. 5 … 6 kW (in special cases also somewhat higher) can be operated with one or more chokes directly connected to the mains. The resulting lamp voltages are as follows:

< 160 V on 230 V mains,
< 300 V on 400 V mains.

In principle, one choke is sufficient for operating a lamp at a preset power level. The choke limits the lamp current to the desired value. Therefore, the choke must be selected depending on the lamp and on the desired power as well as on the mains voltage and the mains frequency.

By connecting several suitable chokes in parallel (more rarely also in series), a ballast can be switched in different steps to match different lamp power levels. If the choke(s) is (are) replaced by a controllable transductor, this results in continuously adjustable ballast.

In most cases, a separate ignition unit is required for starting/igniting the lamp.

As chokes are inductive components, they generate an undesired phase shift between mains voltage and mains current which must be compensated by “compensation” capacitors.

cos φ choke = usually approx. 0.5 … 0.55
cos φ target = approx. 0.9 due to the capacitors

Autotransformers

Autotransformer-choke ballasts

For lamp output in the range between 6 … 9 kW, an autotransformer-choke ballast usually suits best. In most cases, this solution is less expensive than a leakage-field transformer.

An autotransformer transforms the mains voltage to, typically, 660 Volts. This enables the use of chokes, connected in parallel if necessary, to operate a lamp. Depending on the design of the chokes, the operation at various steps is also possible, up to a lamp operating voltage of approx. 320 to 450 Volts; the typical value is 440 … 450 Volts. Commercially available contactors can still be used up to a voltage of 660 Volts; these are usually also suitable for voltages of up to 690 Volts.

If the choke(s) is (are) replaced by a controllable transductor, the result would be a continuously variable ballast.

An additional ignitor starts the lamp. In spite of the 660 Volts, the commercially available 400 Volts ignition units can be used if the circuit is designed accordingly.

As autotransformers and chokes are inductive components, they generate an undesired phase shift between mains voltage and mains current that must be compensated for by compensation capacitors.

cos φ choke = mostly approx. 0.5 … 0.55

cos φ target = approx. 0.9 due to the capacitors

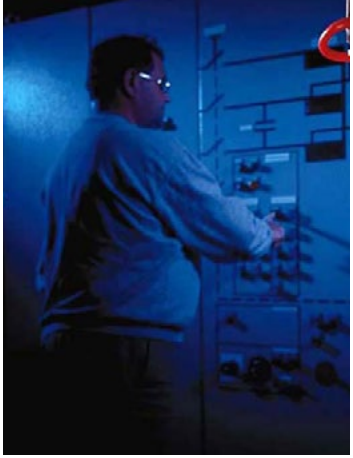
Transductors

Transductors

Transductors are controllable choke coils with a shaped or curved magnetic characteristic. They are also called magnetic amplifiers. Transductors are mainly used as DC-biased AC chokes that have power amplification between the active winding and control winding.

Although transductors have become redundant in many areas due to the use of modern power electronics and microprocessor technology, some niches remain where these components are still used, e.g. in cathodic corrosion-prevention rectifiers and charging units. In this case, the transductor is preferred despite higher costs as it provides the following benefits:

- High operational reliability
- No maintenance required
- Immediately ready for operation
- Floating active and control windings
- Shock resistance



Leakage-field transformers

Leakage-field transformers

Leakage-field transformers provide the required high ignition and operating voltages for lamps that cannot be connected to the mains directly via chokes due to their higher operating voltage. They differ from „normal“ transformers by their „softness“. They are usually used from a lamp power of approx. 10 kW.

„Soft“ in this context means that the output voltage of the transformer drops to a significantly lower value under load. In this way, it fulfils two functions simultaneously:

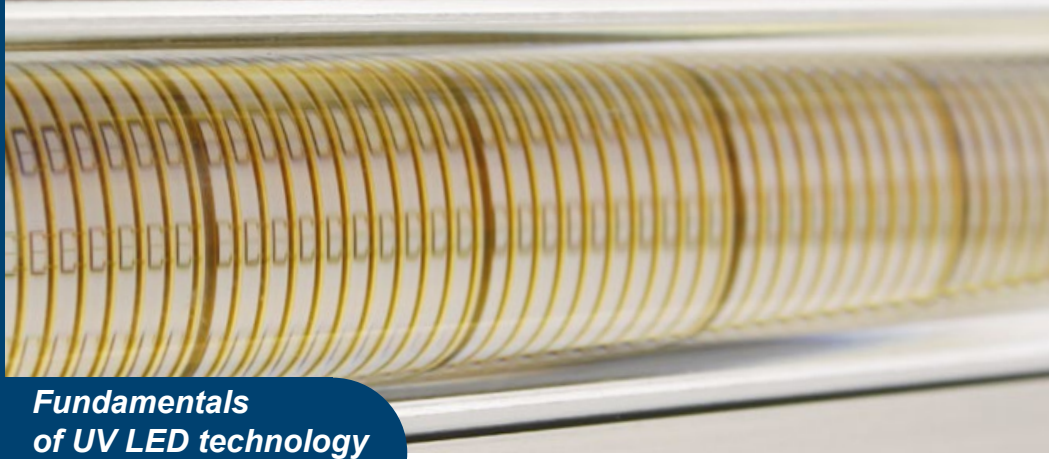
1. Without load, i.e. if the lamp has not been started, it outputs its complete open-circuit voltage (also called ignition voltage) which is at a value sufficiently high enough for the connected lamp to start immediately.

2. When the lamp has started, the output voltage drops to the operating-voltage level of the lamp due to the now flowing current. As soon as the lamp has reached its operating temperature, the current adjusts itself to what is needed for the required lamp power.
As the characteristics of the lamps can be different depending on the type and also on the required power, a leakage-field transformer must be tuned exactly to these values and built accordingly. Dependence on the mains voltage and the mains frequency must also be taken into account.

Versions for all mains voltages (AC) and frequencies found worldwide are feasible, also with tappings for different outputs. Due to the design principle, it is not possible to switch during lamp operation, the lamp would extinguish during the switching. Separate “partial-load chokes” which can be switched using contactors are required for switching during operation.

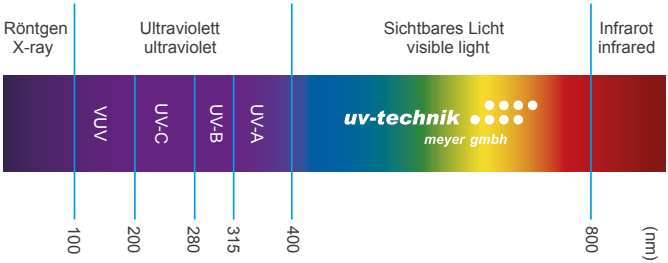
As leakage-field transformers are inductive components, they generate an undesired phase shift between mains voltage and mains current which must be compensated by compensation capacitors.

cos φ transformer = usually approx. 0.5 … 0.55
cos φ target = approx. 0.9 due to the capacitors



Fundamentals of UV LED technology

UV LEDs



Basics of the technology

The use of UV radiation for the curing of inks and lacquers has been established in the market for many years. The radiation sources that are most frequently used for this purpose are UV medium-pressure lamps. Their emitted radiation spectrum can be adapted to the photo initiators of the inks and lacquers used by doping the lamp.. However, it is the infrared range (IR) that accounts for the largest proportion of the emitted radiation, and is not needed for initiating the polymerisation reaction of the UV reactive inks and lacquers. Cold-light mirrors or multilayer-coated glass, ” transmitters”, can filter out part of the IR radiation.

It is therefore obvious that research regarding alternative radiation sources has been going on for years, aiming, on the one hand, at generating “cold UV light”, and, on the other hand, at providing a radiation source that allows for easy switching on and off without start-up and cooling times that are features of UV medium-pressure lamps. At the same time, this new source must show a good long-term performance.

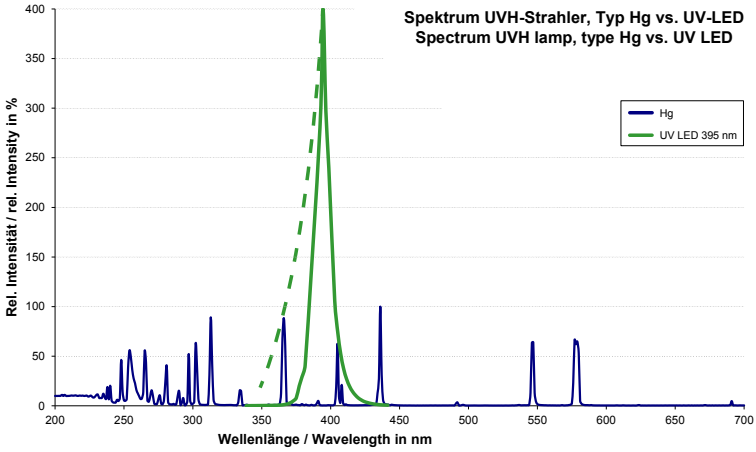
Light-emitting diodes (LEDs) meet these requirements. However, after both the discoveries of the semiconductor effect (pn effect) by Karl Ferdinand Braun in 1876 and the so-called “Round” effect – the light emission produced by applying a potential to an inorganic semi-conductive material – by Henry Joseph Round in the year 1907, it took a great deal of research until the first UV LEDs were presented in the 1990s.

Some publications praise the high efficiency of UV LEDs. This may be due to the fact that LEDs are increasingly used for general lighting purposes, and indeed, the efficiency of LEDs for lighting, in comparison with gas discharge lamps (e.g. high-pressure sodium lamps) has meanwhile become more favourable.

Due to the semiconductor materials used for UV LEDs, such favourable yields can not be currently achieved by UV LEDs. It can be assumed that the efficiency is about 30 to 40% for the common wavelength range between 385 and 395 nm, in comparison, a UV medium-pressure lamp emits 15% within the UV-C range.

An argument that is often put forward in favour of UV LEDs is “cold” UV radiation. It is a fact that no IR radiation is emitted in the direction of the substrate to be cured. Nevertheless, the power loss generated in the UV LED (i.e. approx. 80 – 90%) must be dissipated, as otherwise it will harm the structure of the semiconductors, thus dramatically decreasing their service life. If a UV LED segment is measured using an appropriate spectrometer, it can quickly be established that the irradiance of the wavelength emitted by the UV LED segments (e.g. 395 nm) for powerful UV LED segments is significantly higher than the irradiance of a UV medium-pressure lamp for the same wavelength. The reason for this is that the UV radiation emitted by a UV LED is generated in a single wavelength.

An example of this is shown in the diagram below. The green solid line shows that the 395 nm peak is significantly higher than the 365 nm peak of a mercury lamp. In comparison, the dashed line indicates the efficiency of UV LEDs with wavelengths < 395 nm. LEDs with shorter wavelengths show a considerably lower intensity. This is the reason why currently, almost exclusively, “long-wave” UV LEDs are used in the market.



UV LEDs

If UV LEDs are used for curing purposes, the ink and UV LED must match each other to achieve an effective curing result. This concerns not only the virtually “monochromatic radiation”, i.e. the wavelength of the UV LED, but also the irradiance (in W/cm²) and the radiation (dose in J/cm²).

It makes sense that the irradiance value, often called intensity, refers to the radiation hitting the substrate, i.e. the place where the curing occurs. The irradiance for UV medium-pressure lamp applications is stated in mW/cm².

The actual UV radiation dose required must usually be determined empirically, just as with UV medium-pressure lamps. The aim should be to position the UV LED unit, with uniform illumination, as close to the substrate to be cured as possible, in order to reach the highest possible irradiance; with UV LED units, the focus cannot be set, unlike the well-established reflector units supplied by uv-technik meyer.

Typical applications:

The limitations due to technical reasons (low total power, no short-wave UV radiation) have resulted in UV LEDs mainly being used in niche applications. These include, for example:

- small-area point-by-point curing
- adhesive cross linking
- curing of sealing compounds
- pinning (pre-gelling)
- dental applications
- fluorescence examinations (e.g. in forensics)
- …

It is necessary to weigh the advantages against the disadvantages (see table).

Advantages	Disadvantages
• No significant start-up time	• High initial costs
• Short switching-on/switching-off times	• Limited possible applications
• Compact UV module designs possible	• Special (and therefore costly) coatings required
• No IR radiation in the direction of substrate	• Easy replacement of single defective chips is only possible with few UV LED module designs
• Mercury-free	• Water cooling system required
• Long service life	• Quasi-monochromatic radiation
	• Efficiency

Irradiance measurement on UV LED modules

Measuring the irradiance of UV LED modules requires appropriate UV measuring equipment.

A radiometric measuring system adapted to the UV LED radiation is sufficient for most practical applications. It is important that the correct UV sensor, with regard to irradiance and wavelength, is selected for the narrow-band LED radiation.

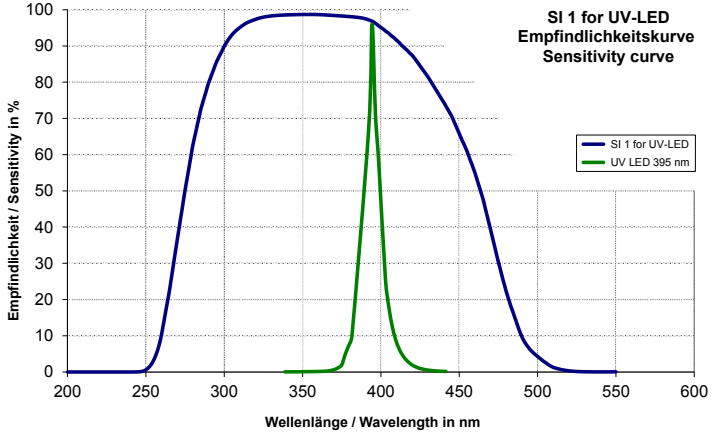
The wavelength tolerance of UV LEDs is usually indicated with λ ± 5 nm. The diagram shows that the resulting measurement error for wavelengths between 320 and 395 nm is < 10%. This is generally acceptable for most measurements.

For measurement, we recommend a radiometer that is designed for high irradiance for short-term measurements, such as the UV sensor SI 1 with the handheld unit HI 1 shown above. If other wavelength ranges, e.g. for medium-pressure lamps, are to be measured, suitable sensors are also available. The handheld unit does not need to be exchanged for this purpose, as the calibration data is stored in the “intelligent” sensor connector.

If possible, a continuous flow unit such as the UV integrator UV Control can also be used. In this case, the measured values of all radiation sources during a measurement are stored on an SD card and can be evaluated and documented on a PC.

Detailed information about UV LEDs is available for download at:

www.uv-technik.com



UV LEDs

The OmniCure **AC275** and **AC2110** UV LED systems are designed with advanced front-end optics to provide high peak irradiance and exceptional uniformity. The AC2 systems provide a reduced output angle from typical LED systems, ideal for printing applications, to help eliminate back reflection of the light to the print heads. All AC2 Series come with a flat outer surface that allows for easy cleaning and replacement for ongoing maintenance.

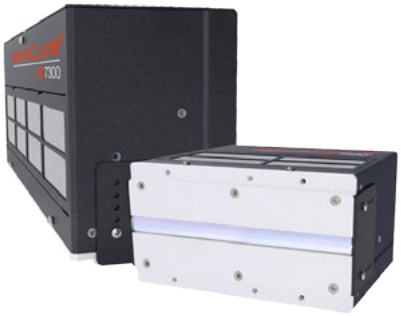
AC2	Peak Irradiance		Lens	Short Description		Art. No.
	in W/cm2 @395 nm	in W/cm2 @365 nm				
AC275 	2,6	./.	P	Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength: 395 nm:	76 x 10 mm yes 79 x 29 x 129 mm 0.3 kg **Type:** **AC275-395**	A006065
AC2110 	2,6	./.	P	Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength: 395 nm:	114 x 10 mm yes 117 x 29 x 129 mm 0.4 kg **Type:** **AC2110-395**	A006066

The OmniCure **AC450** and **AC475** UV LED systems utilize high emission LEDs which achieve over 8 W/cm² (395 nm) at the optics window. The systems include advanced front-end optics to provide high peak irradiance at long working distances with extended clearance of conveyed parts. This allows for easier curing, or the option of focusing the light at different working distances for adapting to a specific UV process.

AC4	Peak Irradiance		Lens	Short Description		Art. No.
	in W/cm2 @395 nm	in W/cm2 @365 nm				
AC450 	8,0	4,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength:	50 x 25 mm no 110 x 68 x 190 mm 1.1 kg **Type:**	
			✓	365 nm:	**AC450-365**	A005082
			✓	395 nm:	**AC450-395**	A005083
			P	365 nm:	**AC450P-365**	A006124
			P	395 nm:	**AC450P-395**	A006125
AC475 	8,0	4,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength:	75 x 25 mm no 110 x 68 x 190 mm 1.1 kg **Type:**	
			✓	365 nm:	**AC475-365**	A005084
			✓	395 nm:	**AC475-395**	A004991
			P	365 nm:	**AC475P-365**	A006126
			P	395 nm:	**AC475P-395**	A006127

The OmniCure **AC550** and **AC575** UV LED systems utilize high emission LEDs which achieve 14 W/cm² at the optics window. The systems include advanced front-end optics to provide high peak irradiance at long working distances with extended clearance of conveyed parts. This allows for easier curing, or the option of focusing the light at different working distances for adapting to a specific UV process.

AC5	Peak Irradiance in W/cm2 @395 nm	Lens	Short Description		Art. No.
AC550 	14		Active Optical Area: Stackable: Dimensions (L x B x H) Weight: Wavelength:	50 x 25 mm yes 110 x 68 x 190 mm 1.1 kg (2.4 lbs) **Type:**	
		✓	395 nm:	**AC550-395**	A006614
		P	395 nm:	**AC550P-395**	A006615
AC575 	14		Active Optical Area: Stackable: Dimensions (L x B x H) Weight: Wavelength:	75 x 25 mm yes 110 x 68 x 190 mm 1.1 kg (2.4 lbs) **Type:**	
		✓	395 nm:	**AC575-395**	A006616
		P	395 nm:	**AC575P-395**	A006618



The OmniCure **AC7** Series UV LED systems utilize high emission LEDs which achieve over 5,2 W/cm² (395 nm) at the optics window. The systems include advanced front-end optics to provide high peak irradiance at long working distances with extended clearance of conveyed parts.

AC7	Peak Irradiance		Lens	Short Description		Art. No.
	in W/cm2 @395 nm	in W/cm2 @365 nm				
AC 7150 	5,2	2,8	P	Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength: 365 nm: 395 nm:	152 x 15 mm yes 152 x 100 x 148 mm 1.8 kg **Type:** **AC7150-365** **AC7150-395**	 A006069 A006070
AC7300 	5,2	2,8	P	Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength: 365 nm: 395 nm:	305 x 15 mm yes 305 x 100 x 148 mm 3.2 kg **Type:** **AC7300-365** **AC7300-395**	 A006071 A006072

The OmniCure **AC8** Series UV LED systems utilize high emission LEDs which achieve over 8 W/cm² (395 nm) at the optics window. The systems include advanced front-end optics to provide high peak irradiance at long working distances with extended clearance of conveyed parts. The 'P' versions of the AC 8 Series (AC8150P and AC8225P) have enhanced optics to optimize the dose for short working distances required by print applications.

AC8	Peak Irradiance		Lens	Short Description		Art. No.
	in W/cm2 @395 nm	in W/cm2 @365 nm				
AC8150 	8,0	4,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight (395 / 365 nm): Wavelength:	150 x 25 mm yes 159 x 80 x 218 mm 2.5 / 3.6 kg **Type:**	
			✓	365 nm:	**AC8150-365**	A005468
			✓	395 nm:	**AC8150-395**	A005469
			P	395 nm:	**AC8150P-395**	A005470
AC8225 	8,0	4,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight (395 / 365 nm): Wavelength:	225 x 25 mm yes 235 x 80 x 218 mm 2.7 / 4.4 kg **Type:**	
			✓	365 nm:	**AC8225-365**	A005471
			✓	395 nm:	**AC8225-395**	A005472
			P	395 nm:	**AC8225P-395**	A005473
AC8300 	8,0	4,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight (395 / 365 nm): Wavelength:	300 x 25 mm yes 311 x 80 x 218 mm 2.9 / 5.2 kg **Type:**	
			✓	365 nm:	**AC8300-365**	A005474
			✓	395 nm:	**AC8300-395**	A005475

The OmniCure **AC9** Series UV LED systems utilize high emission LEDs which achieve 14 W/cm² at the optics window. The systems include advanced front-end optics to provide high peak irradiance at long working distances with extended clearance of conveyed parts. The 'P' versions of the AC 9 Series (AC9150P, AC9225P and AC9300P) have enhanced optics to optimize the dose for short working distances required by print applications.

AC9	Peak Irradiance in W/cm2 @395 nm	Lens	Short Description		Art. No.
AC9150 	14,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength:	150 x 25 mm yes 159 x 80 x 218 mm 1.8 kg **Type:**	
		✓	395 nm:	**AC9150-395**	A006589
		P	395 nm:	**AC9150P-395**	A006590
AC9225 	14,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength:	225 x 25 mm yes 235 x 80 x 218 mm 2.7 kg **Type:**	
		✓	395 nm:	**AC9225-395**	A006591
		P	395 nm:	**AC9225P-395**	A006592
AC9300 	14,0		Active Optical Area: Stackable: Dimensions (L x W x H) Weight: Wavelength:	300 x 25 mm yes 311 x 80 x 218 mm 3.6 kg **Type:**	
		✓	395 nm:	**AC9300-395**	A006593
		P	395 nm:	**AC9300P-395**	A006594

Other UV LED systems or customized versions on request.

Conveyor belt with UV LED system

EDcure Lab 75

With the conveyor belt curing system **EDcure 75** UV inks, varnishes and other UV-reactive substances can be cured in a continuous means of intense UV LED radiation. The conveyor belt is extremely compact design. The adjustable UV LED power in combination with in a wide range variable belt speed and an adjustabe irradiation distance make the EDcure Lab 75 especially for use in laboratories suitable. Under realistic conditions, the various parameters can be validated in conjunction with the chemistry.

The ready to operation unit includes a maintenance-free, air-cooled UV LED system that delivers a high irradiance. The optical system includes a collimator lens, which provides also for bigger distances optimized UV intensities. By this practical results can be achieved.

EDcure Lab	
Belt speed	2.0 ... 20.0 m/min
Belt width	various widths available
UV-LED	395 nm or 365 nm; air-cooled
Irradiance UV-LED	various irradiances available; dimmable 20 % … 100%
Height adjustment	stepless hight-adjustable 15 ... 60 mm
Mains voltage	230 V, 50 Hz

Power Supply Units (PSU) for UV LEDs

SC Series

SC Series system controllers are tailored specifically for OmniCure® AC Series UV LED curing products. Designed with application flexibility in mind, customers can select the system controller that best meets the needs of their particular curing application.

The SC0650 provides a small form factor solution, suitable for many single LED head applications with minimal requirements of customers‘ existing infrastructure and quickest commissioning time.

The SC0750, SC1000, SC2000 and SC3000 system controllers integrate seamlessly into standard industrial equipment racking, providing multiple power outputs in a robust, high-density, and scalable solution for large area curing applications. All models of the OmniCure® SC Series have the same DC power connector interface and voltage specifications to ensure compatibility across the entire AC Series of UV LED curing systems. The OmniCure® SC Series should be used in conjunction with OmniCure® DC-power cables which can be ordered separately.

1. General

Reflector units are necessary to hold the uv-lamp and reflect a large portion of the UV onto the printed area which otherwise would be wasted. In conjunction with the correct flow of cooling air, they also facilitate the cooling, appropiate to the needs of the lamp. By splitting and rotating both segments of the reflector in front the lamp, the UV and IR radiation is blocked (shutter) protecting the substrate when the transport stops. UV reflector units are produced of corrosion-rsistant materials, all critical components are made of aluminum or high-grade steel.

2. Precautionary Measures

The UV-radiation emitted by uv-lamps is dangerous to skin and eyes and personel have to be shielded during operation.. Never look directly at a UV lamp or its reflected light with unprotected eyes! During operation, the quartz tube of the lamp reaches a surface temperature of approx. 700 to 900 °C, therefore during maintainance or service the lamp and the reflector unit must be allowed to cool before they can be handled. Despite sufficient cooling, the reflector unit itself can reach temperatures of more than 50 °C in some areas. Due to the high temperature of the lamp, use in “explosion proof zones” is not possible! If, for example, in combination dryers, when printing with coatings that contain solvents. and also printing with uv-curing coatings, ensure that BEFORE switching on the uv-lamp, that the solvent containing air in the dryer is sufficiently rarefied / eliminated! Reflector units with shutters do not stop all UV radiation, a residual leakage radiation will still be emitted. This has to be taken into account when personel are working in the area of this residual radiation. We recommend the use of protective clothing and our UV protective goggles.

3. Installation and Shutter control of the Reflector Unit

Reflector units are designed for mounting into a larger housing provided by the customer (e.g. dryer unit), which guarantees a sufficient protection against touch (heat) and especially against uv-radiation.The fastening of the unit may be done in various ways, e.g. to attach to rails (do NOT cover the air inlet vents along the sides between the outer wall and the reflector), or by fixings (screws) on the rear or the front of the unit. If fastened on the rear drill holes in the inside “wings” of the edge profile but not in the rear coversheet for better stability.

For reflector units with shutters to function they have to be fitted with a linear or rotating pneumatic / electrical cylinder /motor by the customer. Care has to be taken with regards to the “end stops” (open and closed stops) of the shutter. The driver has to close/open the shutter smoothly, not with force ! Otherwise early damage of the shutter mechanism will occur. It is recommended to install two end switches to reliably control the function of the shutter.

4. Cooling

The required amount of cooling depends on the power of the lamp. The air should be extracted from the rear of the unit. In special cases it might be necessary to blow the air from the rear of the reflector over the lamp toward the front of the unit, but it is more difficult to control the right flow of air in this case, due to “jet effects” and partial cooling of the lamp.

Guidance values regarding the amount of cooling air required is shown in the following table. These values have to be multiplied with the power of lamp in kW.

About 80 to 100% air volume may have to be added to the calculated values for the cooling of the surrounding housing and machinery provided by the customer.

Example:
electrical lamp power 6 kW at 120 W/cm necessary amount of cooling air for the reflector unit: approx. 300 m³/h

additional amount of cooling air for the housing: approx. 270 m³/h

total amount of air about 600 m³/h

Cooling					
Lamp power	40 to 60 W/cm	70 to 90 W/cm	100 to 130 W/cm	140 to 180 W/cm	200 to 240 W/cm
Air volume	30 m^3/h * kW	40 m^3/h * kW	50 m^3/h * kW	65 m^3/h * kW	90 m^3/h * kW

General experience has shown that an exhaust temperature of 60 °C measured near the air outlet of the dryer means sufficient cooling is in place. A lower temperature of <40°C often indicates over cooling, but not always. A clear indication can be made by monitoring the lamp voltage. It has to be close to the nominal value according to the lamp data (it 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 the uv-lamp too much. Overcooling could be indicated by a lowering lamp voltage falling lower than about 80% of the nominal lamp voltage. The cooling reduction should be established by testing, since it also depends on practical conditions of use. The air may be reduced by means of a motor-operated throttle valve or by a two-step blower or other.

Take care, that the amount of cooling air at standby power differs significantly between open and closed shutters! With open shutters the cooling should be calculated using the above formula. With closed shutters the low air volume will be too little for cooling the closed and heated shutter profiles. So a much higher volume is recommended, it may be, that the maximum available airflow is necessary. This has to be tested via lamp voltage (see above) and/or profile temperature; it should not exceed 300°C.

The exhausted air has to be removed via roof or equivalent because of the ozone content. Due to the relatively high temperature of the exhausted air, the ozone decays rapidly (some metres or minutes)..

Reflector units for UV medium-pressure lamps

Possible applications:

When in operation, UV medium-pressure lamps should have a quartz glass surface temperature of 700 to 900 °C. Therefore, forced cooling is required in most cases to achieve this. Lamp cooling is usually achieved by extracting air. In this process, ozone that may be generated during the operation is also evacuated.

The UV radiation should usually be directed or focused onto the substrate. For this reason, our reflector units are equipped with reflectors made of mirror-finish anodised aluminium. In the reflector unit types Aachen, Köln and Ellwangen, the focusing of the reflector shells can be preset. Thus, the focus can be adjusted to the distance of the reflector unit from the substrate.

The reflector unit types, **Aachen, Köln** and **Ellwangen** can be supplied in different lengths according to customer specifications and, of course, as special designs. Numerous optional components are available for the reflector units, such as, for example, quartz glass plates, UV transmitters, high-voltage plug-in connectors, and cold light reflectors.

If the UV lamp power needs to be changed, the corresponding cooling air volume must be adjusted accordingly. This function can be fulfilled by our exhaust air control system that comes as an easy-to-install complete set. The controller is fully programmable. If ordered in combination with a reflector unit, the latter will be supplied with a pre-installed temperature sensor. Reflector unit, type **Mini** has been designed for curing small surface areas. Typical applications for the Mini reflector unit are adhesives and small-area curing, e.g. inkjet printing. The unit has deliberately been designed to be simple and robust.

The reflector unit ,type **Stuttgart** has been developed as a replacement unit for Gallus printing presses (R160 and R200 series). Because of the higher output due to an improved reflector, this unit only requires one UV lamp and can be operated with the existing, only slightly adapted electrical system. The maintenance effort (lamp replacement, replacement of reflector plates or cleaning of the cooling plate) is minimal due to the plug connection and the possibility of simply drawing out the reflector unit towards the front. An exhaust air controller including throttle valve (Ø 80 mm) and regulator (24 V DC) are included.

	Art. No.	Shutter	Remarks
 Reflector unit Aachen	5202-...	-	Available for the following lamp power values: Arc Length: Power: 100 – 1650 mm 240 W/cm 1660 – 1900 mm 200 W/cm 2000 – 2400 mm 160 W/cm Depending on the lamp power, one or two exhaust vents DN100, DN125 or DN140 are installed on the rear of the unit. Special feature: an ignition unit can be integrated into the reflector unit on the front.
 Reflector unit Köln	5201-...	-	Available for the following lamp power values: Arc Length: Power: 100 – 1650 mm 240 W/cm 1660 – 1900 mm 200 W/cm 2000 – 2400 mm 160 W/cm Depending on the lamp power, one or two exhaust vents DN100, DN125 or DN140 are installed on the rear of the unit.

Optional equipment: **Reflector units Aachen and Köln**		
		The axial-flow fan set has been designed for applications involving constant lamp power. The fan(s) is/are designed for exhaust air temperatures of up to 90 °C. Wiring ready for connection.

Reflector units for UV medium-pressure lamps

	Art. No.	Shutter	Remarks
 Reflector unit Mini	A001899	-	• Fe-doped UV lamp with an electrode gap of 31 mm and a lamp power of 450 W • ignition device integrated in the reflector unit • axial-flow fan (230 V AC) mounted on the upper side • choke ballast 230 V / 50 Hz, installed in an external metal box • mirror finish anodised aluminium reflectors • reflector unit: 225 x 115 x 183 mm, approx. 2.1 kg • ballast: 400 x 300 x 212 mm, approx. 10 kg • length of power cable with Schuko (safety) plug: 2 metres Also available for other uv lamps
 Reflector unit Stuttgart	5230	✓	• replacement reflector unit for Gallus printing presses (types R160 and R200) • 1 UV lamp with 120 W/cm (instead of 2 lamps, as previously fitted), delivering better curing results • including exhaust air control • simple installation • connector plugs on the reflector unit • for UV lamps with an electrode gap of 200 mm or 240 mm
 Reflector unit Koblenz (this article equipped with pneumatic shutter drive)	5250-...	✓	Reflector unit with shutter. Available for the following lamp power values: Arc Length: Power: 100 – 580 mm 240 W/cm 670 – 830 mm 200 W/cm 840 – 1040 mm 160 W/cm 1050 – 1100 mm 140 W/cm 1250 – 1450 mm 120 W/cm Depending on the lamp power, one or two exhaust vents DN100 - DN140 are installed on the rear of the unit.

Customized versions on request.

High power reflector units with shutters for uv medium pressure lamps

UV Cure

The **UV Cure** reflector units from uv-technik meyer gmbh is specifically designed for industrial UV curing applications. The reflector unit UV Cure is cooled by air only. The maximum lamp power is 180 W/cm.

Typical applications are in the areas of:
- Continuous printing
- Flexo and screen printing
- Letterpress

Features of the reflector unit UV Cure:
- available with or without jaw
- rack system for lamp change
- compact dimensions
- closed system with quartz glass protection window
- integrated temperature sensor (PT 100)
- montoring of the reflector unit using temperature switch
- easy to service lamp and reflector change
- built in pneumatic shutter actuator (DC 24 V) with monitored shutter position

A006215 /
A006222

A006216 /
A006223

	UV Cure 360		UV Cure 450	
Art. No.	A006215	A006216	A006222	A006223
Jaw	no	yes	no	yes
Arc lengths	360 mm	360 mm	450 mm	450 mm
Max. lamp power	180 W/cm	180 W/cm	180 W/cm	180 W/cm
Dimensions (L x W x H in mm) without light shield and handle	680 x 120 x 200	680 x 120 x 250	770 x 120 x 200	770 x 120 x 250
Weight	9.9 kg	13.1 kg	11.1 kg	15.0 kg
UV window	Quartz glass window			
Window sizes	380 x 100 mm	380 x 100 mm	470 x 100 mm	470 x 100 mm
Cooling	forced-draught exhaust cooling			

Ellwangen - reflector unit

Reflector unit with shutter for UV medium-pressure lamps, type Ellwangen.

The reflector unit of type Ellwangen is available in many different lengths. The reflectors have a dual function and are also used as shutters. The initial focus can very easily be set during installation. The reflectors consist of an extruded aluminium profile and replacable reflector plates (mirror finish anodised aluminium mirror plates or dichroic 'cold UV' reflector panels) inserted into the profile.

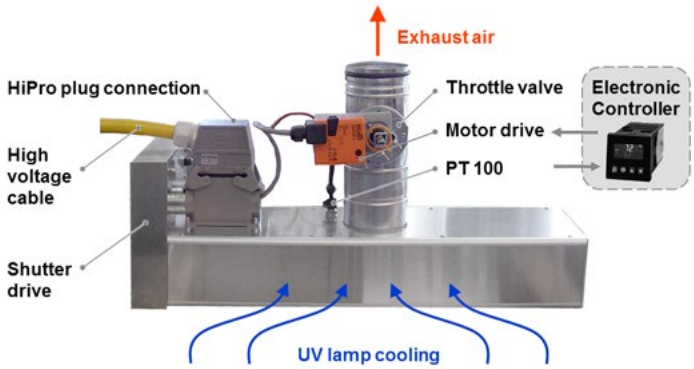
Lamp lengths with electrode gaps of up to 580 mm and a specific lamp power of 240 W/cm, or even longer units with reduced specific power, can be supplied.

Cooling is achieved using air that is usually extracted from the top of the unit. For this purpose, the reflector unit is equipped with one or more exhaust air vents.

	Art. No.	Shutter	Remarks
 Reflector unit Ellwangen (this article equipped with pneumatic shutter drive)	5220-...	✓	Reflector unit with shutter. Available for the following lamp power values: Arc Length: Power: 100 – 580 mm 240 W/cm 670 – 830 mm 200 W/cm 840 – 1040 mm 160 W/cm 1050 – 1100 mm 140 W/cm 1250 – 1450 mm 120 W/cm Depending on the lamp power, one or two exhaust vents DN100 - DN140 are installed on the rear of the unit.
 Shutter drive pneumatic	5202-1 A005505		The shutter drive includes: pneumatic cylinder or electrical servomotor, limit switch, terminal strip, three/two-way valve, stainless steel hood Pneumatic shutter drive: 4…8 bar, dimensions 225 x 180 x 56 mm, or Electrical shutter drive: DC 24 V or AC 24 V, dimensions: 225 x 180 x 106 mm

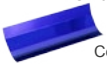
Reflector units for UV medium-pressure lamps

Ellwangen



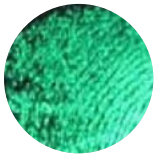
Reflector unit type Ellwangen with options

	Art. No.	Optional equipment: Reflector unit Ellwangen and Koblenz
 Exhaust Control Complete Set	A002927 (DN 80) (DN 100) (DN 125) (DN 140)	If the UV lamp power is to be be continuously adjusted, the exhaust air required for the UV lamp must be adjusted according to the lamp power. The exhaust air control unit then controls the volume of exhaust air automatically. The complete set consists of: • Temperature sensor PT 100 with cable • Electronic controller (programmed ready for connection) for front panel installation, 48 x 48 mm • Throttle valve with mounting accessories • Motor drive DC 24 V for throttle valve

		Optional equipment: Reflector unit Aachen, Köln and Ellwangen
 Quartz glass holder   UV transmitter plates  Cold light reflector UV Flex / Al  HiPro plug connection	9000	Up to a length of 500 mm, the holder of the quartz glass plate consists of two individual holders mounted on the front. For lengths of 500 mm and more, a surrounding frame is supplied which allows for the cost-effective mounting of several quartz glass plates. Quartz glass plates: 3 mm thick as standard. Other material thicknesses on request. UV transmitters: multilayer coating on quartz glass in order to reduce the heat transfer onto the substrate. Cold light reflector (cold mirror), L = 175 mm Other lengths on request. HiPro plug connection: • 2 high-voltage contacts AC 4.5 kV (30 A to 60 °C) • 10 control contacts AC 250 V (10 A at 20 °C).

UV Floodlight 250 W, UV Hand-Held Lamp 250 W

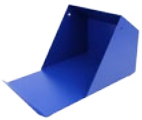




Both the **UV floodlight 250 W** and the **UV hand-held lamp 250 W** are equipped with a black light filter as standard. Both consist of the actual floodlight with handle and the ballast; these components are connected using a cable.

The application for these lamps is small area irradiation for paint repairs or the curing of sealing compounds. The UV floodlight 250 is selected for surface irradiation while the UV hand-held lamp has a central focus so that a high intensity radiation point is achieved.

The areas of application include, for example, crack detection in welds or metals, visualisation of fluorescent inks, e.g. on bank notes, in advertising and in other fields.

	Art. No.	
 UV floodlight 250 W		The UV floodlight 250 W is used where small areas are to be irradiated, e.g. for paint repairs or the curing of sealing compounds. Mains power: 230 V, 50 Hz Comprises of the following: ballast, floodlight with handle and filter pane.
	A002083 A002291 A002947	Fe-doped lamp and UV-A filter (black light filter) Mercury lamp and quartz glass plate Ga-doped lamp and quartz glass plate
 Storage box	A002292	Box for short-term storage of the floodlight 250 W
 UV hand-held lamp 250 W		UV hand-held lamp 250 W, lamp for focused irradiation Mains power: 230 V, 50 Hz Electrical lamp power: 250 W
	A002554 A002555	with Fe-doped UV lamp with mercury (Hg) lamp
 Filter plates	A001962 A001961	Black light filter Borofloat filter

Detailed information is available for download at: **www.uv-technik.com**

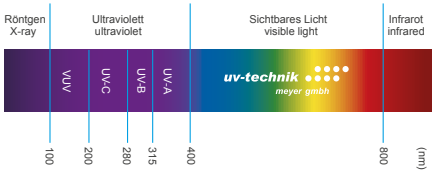
UVC Cold Cure unit CCure

CCure curing modules are used in industrial UVC curing applications. The modules are equipped with several UV low pressure lamps that emit highly efficient UVC radiation at 254 nm.

With matched paints and varnishes these modules have compared to classical UV modules with medium-pressure UV lamps which emit in a wide spectral range following advantages:

- Highly efficient UVC emission
- low power consumption / low heat generation
- broad emission area for high UV dose
- no shutter necessary
- short running-up time
- ozone free UV curing
- low maintenance costs due to extremely durable low-pressure UV lamps
- available colours are more stable than colours that are reactive in the long UV wavelength region
- can be combined with conventional medium pressure UV moduls and also with UV LED which emit at longer wavelength
- easy to use; easy to implement in existing machines
- low weight
- simple air cooling

By perfect adaptation of electronic ballast (EPS) to our UVC low pressure lamps and their air cooling CCure curing modules are highly efficient UVC sources for harsh industrial applications.



Introduction

As a user of UV curing systems, you wonder about the quality of the UV irradiation and, consequently, about the quality of the curing of the ink or varnish. This issue consists of two different questions: on the one hand, the question regarding the “required UV power”, and, on the other hand, the question concerning the result of the application of the UV power, i.e. the curing based on the UV power. Therefore, in practice, many customers proceed as follows. They restrict themselves to testing the result, i.e. the more or less cured ink (or varnish), by applying various methods (cross-cut test, tape test, FINAT test methods, etc.). However, it makes more sense to measure the amount of UV that reaches the substrate. This means carrying out a quantitative measurement before the ink or varnish has been cured in order to avoid production rejects.

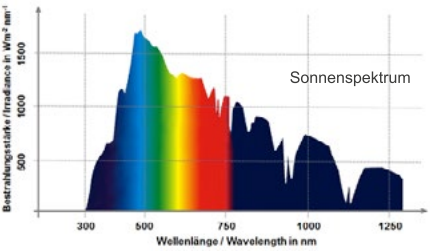
There is a trend showing that users increasingly focus on the measurement of UV. It is simply too costly to produce rejects. Apart from that, quality management systems require that processes be documented.

Those who are deeply involved in UV measurement technology often notice that measuring equipment made by different manufacturers provide different measurement results. What is the reason for this? This is the question that is explored more thoroughly in the following sections. I will explain some basics of physics. Furthermore, I will show some solutions regarding the use of UV measurement tasks in practice.

The electromagnetic spectrum

As we all know, the light of the sun contains the entire colour spectrum, from short-wave violet (wavelength = 400 nm) to long-wave red (700 nm). Therefore, sunlight is also called white light.

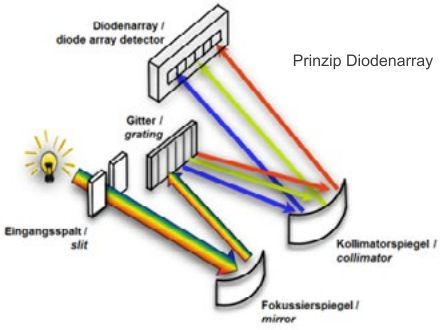
However, this range only represents part of the electromagnetic spectrum. Apart from the solar spectrum, there is even longer-wave radiation, the so-called infrared radiation (IR, $\lambda > 400$ nm), and shorter-wave radiation, the ultraviolet spectrum (UV, $\lambda > 400$ nm). Infrared is known to us as heat radiation, and anybody who has ever been sunburnt knows what UV radiation is.



Sonnenspektrum

The individual wavelength ranges are defined as follows according to the German industrial standard DIN 5031-7 [1] (CIE publications differ slightly):

UV-C = 100 to 200 nm (vacuum UV)
= 200 to 280 nm (far UV)
UV-B = 280 to 315 nm
UV-A = 315 to 400 nm (according to DIN only defined up to 380 nm, but frequently indicated up to 400 nm)
UV-VIS = 400 to 450 nm (requently indicated from 395 to 445 nm; not defined according to DIN)
Light (VIS) = 380 to 780 nm (frequently indicated from 400 to 780 nm)



Prinzip Diodenarray

The solar radiation down to the earth provides more than just “light“ – you can easily realise this by looking at the wavelengths when they have been recorded and displayed separately from each other. This can be done by using a spectrometer, which enables recording more or less each wavelength individually within a certain band.

It can be clearly seen that the individual parts of the colour spectrum occur with different intensity. It also becomes evident that below a value of approx. 300 nm, no UV radiation occurs in nature. Additionally, the radiation is continuous, which means that all wavelengths occur within the visible range of light.

However, the UV medium-pressure lamps used for curing inks and varnishes particularly emit radiation within the short-wave UV range. This is why they are especially interesting, as UV inks only marginally react with natural light.

UV Measurement

Radiation sources for UV curing applications and their spectra

UV medium-pressure lamps are usually used in industrial UV applications for curing inks/varnishes. A further source of radiation that is increasingly used for special curing applications is the UV LED light source. The latter virtually emits only one wavelength.

The spectra of these radiation sources look as shown on the right page:

Conclusion:
The radiation emitted by a UV medium-pressure lamp is discontinuous. The optical power is emitted in the form of so-called spectral lines. This means that discrete intensity peaks, i.e. peaks separated from each other, occur. These are called spectral lines. The same applies if doped UV lamps are used. Due to the doping, the spectrum remains discontinuous but shows a different distribution regarding the individual UV ranges.

UV LED systems emit quasi monochromatic radiation, usually around the UV threshold.

Radiometric measured quantities

Radiometric quantities (also called radiation-related quantities) are exclusively used for calculations in the field of UV measurement. According to DIN 5031, their symbols are indexed “e” (for “energetic”).

These radiometric quantities are, contrary to the field of photometry (light measurement), unweighted quantities (in photometry: index “v” for visual, i.e. the sensitivity curve of the human eye has been taken into account):

Irradiation Ee (frequently also called intensity or peak):

Irradiance, intensity Ee:

[E] = W/m² or mW/cm²

Using the irradiance over time, the radiant exposure He (also called dose) can be calculated.

Radiant exposure, dose He:

[H] = J/m² or mJ/cm²

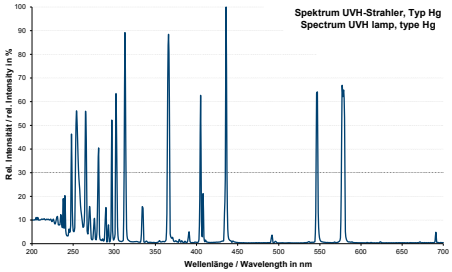
The radiant exposure (dose) is calculated as follows:

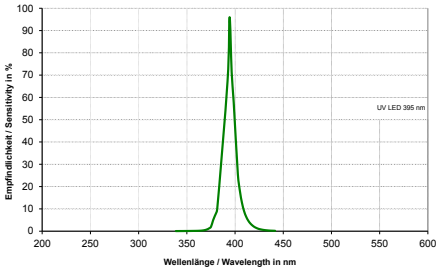
Dose He = Irradiance, intensity Ee x time t

In order to calculate the dose, the time t must be given in seconds.

Furthermore, the following applies for conversions:

1 mW/cm² = 10 W/m²
1 mJ/cm² = 10 J/m²





In practice, the dose is measured using a so-called UV integrator. The UV integrator either "collects" the incident radiation during a certain period of time (forming the integral of the irradiance over time, therefore it is called "integrator"), or the integrator measures the UV irradiance and the respective duration and multiplies these two values together. The result is the radiant exposure (dose). The sampling rate indicates how many measured values are recorded per second.

The above mentioned physical **optical quantities** must not be confused with the **electrical data** of a UV medium-pressure lamp. For example, the indication "120 W/cm" cannot simply be used to determine the amount of UV radiation (mW/cm2) that reaches the substrate to be radiated, as "120 W/cm" only describes the specific electrical power of the UV lamp while the irradiance in mW/cm2 indicates how much UV radiation impacts on the substrate (optical quantity).

The following crucial factors influence the result:

- Distance between UV lamp (or, the lower edge of the UV module) and substrate
- Reflector geometry and reflective properties of the reflector unit
- Reflective properties in the proximity of the UV reflector unit
- Spectrum of the UV lamp
- …

Radiation sensors for measuring UV radiation

In order to obtain a meaningful result of the UV radiation measurement, the radiation receiver must allow for both a qualitative and a quantitative evaluation of the UV radiation [3].
Qualitative in this case means that the user knows about the wavelength range that is used for measurement; quantitative means that the measuring instrument provides absolute values. In practice, however, different solutions are also used, for example, if a UV measuring instrument measures across the entire UV range (so- called wideband sensor), or if a sensor only supplies a relative output signal. Examples for the different kinds of UV sensors are shown further below.

Directional dependence of the sensor response

Furthermore, the spatial and temporal behaviour of the sensor are important. In this case, spatial means that the measurement result depends on the direction of incidence of the radiation. A sensor should reasonably measure in line with the cosine law (“cosine corrected”).

Fig. 6: Influence of the angle of incidence:
A cosine-corrected sensor measures a 100% value in the case of perpendicular incidence (direction of incidence of the radiation), a 60% value in the case of 45° incidence, etc.
Sensors that are not cosine-corrected show specific directional characteristics. Such sensors usually measure a significantly higher value for incident light from the front.

Temporal behaviour – Sampling rate

Temporal behaviour comprises the inertia of the sensor, or the temporal resolution. This is important when fast pulses should be measured. This is indicated by the so-called “sampling rate”. The sampling rate is particularly relevant in the case of fast-operating machines (e.g. for cup printing), pulse operation or with pulsed LED systems.

A typical sampling rate would be 10 ms which means 100 measurements/second for all channels. For special applications, e.g. fast-operating bottle-printing machines, solutions that measure more rapidly can be realised. The technical implementation of the measurement task depends on the corresponding application.

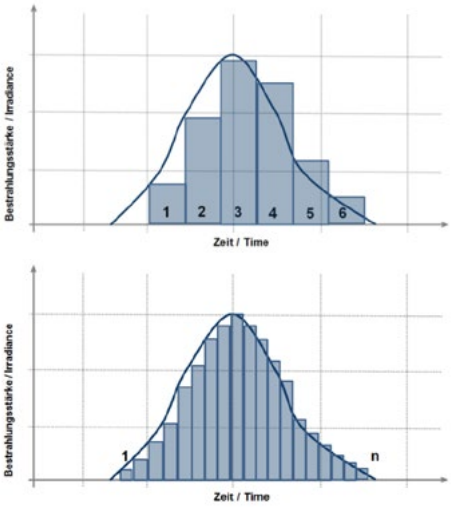


Fig. 7: Influence of the sampling rate on the measurement accuracy. The figure shows the time curve of the irradiance. Top: Measuring instrument with low sampling rate. Huge measurement errors can occur for fast-operating machines. Bottom: The sampling rate is sufficiently high.

Wavelength-specific sensitivity

Generally, possible radiation receivers for UV radiation are:

a) chemically reactive layers (UV measuring strips),
b) radiometrically operating sensors (radiometers, intensity meters, dosimeters),
c) spectrometers

UV measuring strips will not be covered any further here as these usually perform wideband measurements and frequently do not meet the requirements.

Intensity meters, dosimeters as well as spectrometers are described in the following.

Intensity meters and dosimeters

Wavelength sensitivity

The so-called intensity meters or dosimeters usually operate according to the principle of a radiometer and therefore contain one or more photodiodes. In most cases, SiC diodes are used as photodiodes, which have been specially developed for harsh UV applications. They usually consist of the actual photodiode and a filter fitted in the radiation entrance area. Where appropriate, another suitable filter is located above the photodiode. This filter selects the wavelength band to be measured from the incident radiation. In the measuring instrument itself, a diffusor and an entrance shutter are also usually placed in front of the UV diode.

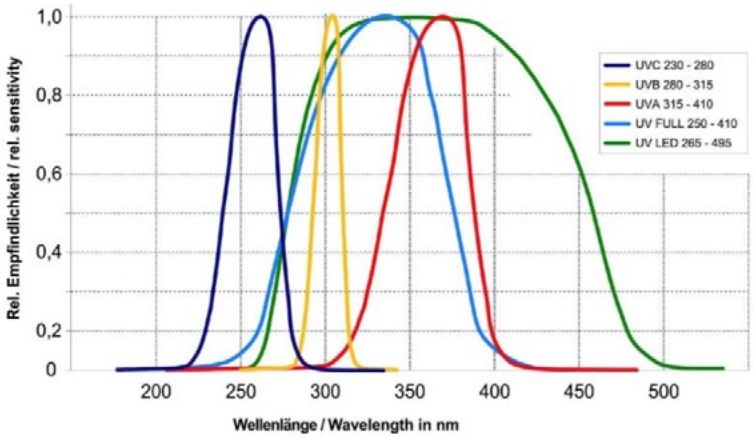


Fig. 9: Sensitivity curves of the different wavelength ranges of the UV integrator UV Control

Fig. 8: Example of a photodiode (source: TI)

The illustration above shows that photodiodes always have a peak sensitivity at a certain wavelength. This is reasonably in the middle of the UV range to be measured, or in the range of the emission maximum of the UV medium-pressure lamp (e.g. at 365 nm for UV-A). From there, the sensitivity decreases towards the shorter and longer wavelengths similar to a Gaussian bell curve. Optimally, the measuring sensitivity amounts to zero at the limits of the standardised UV ranges.

An example to illustrate this is shown in the two following figures. The upper figure shows the sensitivity curves of the UV-A, UV-B and UV-C diodes of the UV integrator UV Control. These are well adapted to measure these three UV ranges in an optimal way.

Conclusion: The sensitivity curves of a radiometer must be selected in an optimal way to ensure that practically applicable values are measured. This is the main reason why different UV measuring instruments provide different measured values. In addition, there are of course further tolerances caused by manufacturing (diode tolerances, filter tolerances, etc.)

This also applies for measuring using UV LEDs. However, in this case, the requirement regarding the wave- length is lower as an LED practically emits for only one wavelength. As the UV LED curing systems that are relevant in practice emit within the extremely long-wave UV range or at the beginning of the short-wave visible range, again, the largest sensitivity peak of the measuring diode must also be in a range where the LED radiates.

The example below shows an UV LED system emitting at 395 nm. The SI 1 is an appropriate sensor. It is suitable for 365 as well as for 395 nm LEDs.
For all UV-measuring devices, we recommend a calibration interval of one year.

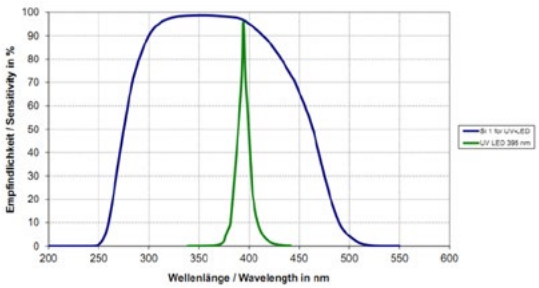


Fig. 10: UV LED (395 nm) and sensor curve of the SI 1

References

[1] DIN 5031-7
[2] Naumann, Schröder - Bauelemente der Optik, 6. Auflage, Carl Hanser Verlag, 1992
[3] Bergmann, Schaefer – Lehrbuch der Experimentalphysik Band III Optik, 8.Auflage, Springer Verlag, 1987

UV Disc, UV Micro Puck

Measuring equipment is indispensable nowadays to achieve consistent UV results.

These measuring devices provide you with the certainty of a functioning UV system and therefore ensure a reliable and stable manufacturing process.

UV sensors for on-line measurement and readjustment in the case of lowering UV power, UV intensity meters for measuring the peak irradiance in mW/cm², integrators for measuring the UV radiation in mJ/cm² as well as IR measuring equipment for monitoring quartz tube temperatures.

Numerous measuring devices and related equipment supplied by uv-technik meyer gmbh are available to assist and provide you with accurate information to assure a reliable production process.

		Value			
UV Integrators	**Range**	**Peak mW/cm²**	**Dose mJ/cm²**	**Short Description**	
 UV Disc A002400 A003371 (UV-C) A004346 (UV-B) A003909 (UV-A) A002915 (UV-Vis) A004192 (UV-LED)	Full UV UV-A UV-B UV-C UV-Vis UV-LED		✓	**Type** Spectral measuring range Measuring ranges Display range Display Dimensions Weight	**UV Disc** UV-Full: 250 – 410 nm UV-A: 315 – 410 nm UV-B: 280 – 315 nm UV-C: 230 – 280 nm UV-VIS: 395 – 445 nm UV-LED: 265 – 495 nm (for UV-LEDs 320...405 nm) 1 – 5.000 mW/cm² 1 – 10.000 mW/cm² (A004192) 1 – 999 999 mJ/cm² LCD 6 digits Ø 90mm, height 12 mm approx. 140 g
 UV Micro Puck Multi Integrator A002197 (Handheld) UV Sensors: A002201 (UV full) A002198 (UV-C) A002199 (UV-B) A002200 (UV-A) A005156 (UV-Vis) A004094 (UV-LED)	Full UV UV-A UV-B UV-C UV-Vis UV-LED		✓	**Type** Spectral measuring range Measuring ranges Display range Display Dimensions Sensor weight Sensors Special feature	**UV Micro Puck Multi Integrator** UV-Full: 230 – 410 nm UV-A: 315 – 410 nm UV-B: 280 – 315 nm UV-C: 230 – 280 nm UV-VIS: 395 – 445 nm UV-LED: 265 – 495 nm (for UV-LEDs 320...405 nm) 1 – 5.000 mW/cm² 0 – 2.000 mJ/cm² 0 – 20.000 mJ/m² (10x) LCD, 2x16 digits 40 mm x 14 mm x 12 mm approx. 30 g cable-less UV sensors switchable sensitivity (10x)

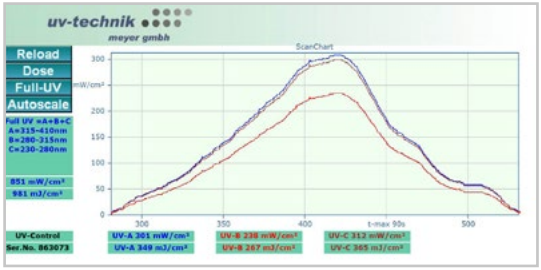
UV Control

UV Integrators	Range	Value: Peak mW/cm²	Value: Dose mJ/cm²	Short description	
		✓	✓	**Type**	**UV Control 3C** **UV Control 3C LED** **UV Control 3CT** **UV Control 3CT LED** > for **three** UV ranges **UV Control 4C** **UV Control 4CT** **UV Control 4C LED** > for **four** UV ranges
UV Control 3C A006664 **UV Control 3C LED** A006667 **UV Control 3CT** A006665 **UV Control 3CT LED** A006669 **UV Control 4C** A006666 **UV Control 4CT** A006668 **UV Control 4C LED** A006670	UV-A UV-B UV-C UV-Vis* UV-LED* Temp.*			Spectral measuring ranges Temperature Measuring range Recording cycle Display Dimensions Weight Special feature	UV-A: 315 – 410 nm UV-B: 280 – 315 nm UV-C: 230 – 280 nm UV-Vis*: 395 – 445 nm (4C, 4CT) UV-LED*: 265 - 495 nm (3C LED, 4C LED or 3CT LED) 0 – 110 °C* (3CT u. 3CT LED, 4CT) 1 – 2.000 mW/cm² 1 – 20.000 mW/cm² (UV-LED) 90 s LCD 2 x 16 digits 140 x 65 x 12 mm approx. 250 g The integrator has a SD card slot to save the data. With the included software the data can be displayed as graphs and the data can be stored on a computer. Scope of delivery: software, USB cable, SD card and plastic case.
A006649 	Smartphone not included. 			**WLAN functonality for UV Control** Wireless file transfer from UV Control to smartphone or PC via Web App. This Web App reads out and shows UV Controls measured values (mW/cm² / mJ/cm²) and displays the irradiance profile on smartphone or PC. Scope of delivery: FlashAir™ SD card with installed Web App software. Note: The WLAN functionalty is device-related.	

WLAN functionality

UV Control

Measured data are transferred wireless from
UV Control to smartphone / tablet / laptop or PC via Web App.
This web app reads out and shows
UV Controls measured values (mW/cm² / mJ/cm²) and displays the irradiance profile on smartphone, tablet, laptop or PC.

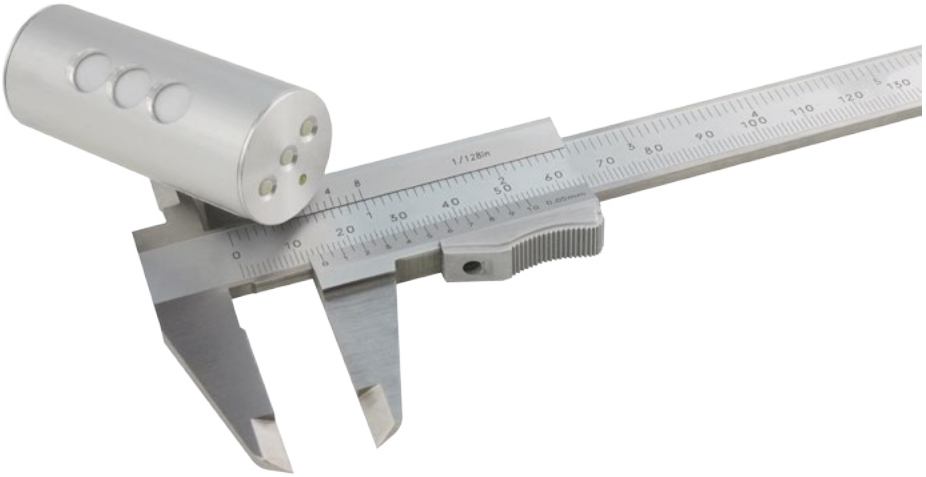


Scope of delivery:
FlashAir™ SD card with installed Web App software.
Note: The WLAN functionalty is device-related.

Smartphone / Tablet / Laptop not included.

Integrator for measuring UV intensity and dose plus temperature

UV Tube 3C, 3CT

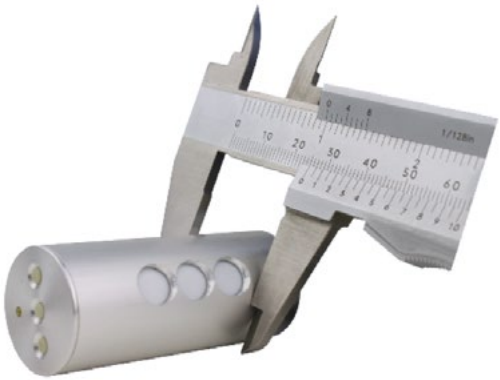


+ UV-A, -B -C intensity in mW + Dose in mJ + Full UV intensity in mW/cm² + dose in mJ/cm²
+ Temperature in °C / °F (UV Tube 3CT, 4CT, 4CT LED)*
+ high sampling rate
+ Storage of all measured values on SD card
+ PC software with many user-friendly features

The UV Tube Integrator is UV multi-channel-measuring instrument for curing applications. It is designed to measure, record and display peak UV intensity, UV dosage and temperature* (UV Tube 3CT) in bottle/tube machines. The sensor has to be fixed during passage in a customer-side dummy. The small size and extremely low weight of the UV Tube allows UV measurements under realistic conditions.

Due to its different UV sensors and the integrated microprocessor the UV Tube can measure and record the peak of the UV intensity for each UV band individually. Additionally, this UV-Integrator is calculating the uv dosage of the uv energy supplied during the time of exposure of one measuring cycle for each uv bandwidth seperately. This allows to determine not only the total energy, but also how that energy is delivered, i.e. what intensity and dose at what uv band. The measuring sensors are located next to each other on the cylindrical housing wall of the integrator.

The readings are stored on the included SD card and can be downloaded to a PC, edited and stored, e.g. to document a diagram based on the measured values history of a UV lamp through graphics.



UV Tube

Spectral ranges	Art. No.	Spectral ranges
C B A	A005097: UV Tube 3C	UV-A 315 – 410 nm UV-B 280 – 315 nm UV-C 230 – 280 nm
C B A Tmp	A005739: UV Tube 3CT	

Measuring range	1 to 2.000 mW/cm²
Sampling Rate	10 msec (100/sec)
Recording cycle	90 sec
Trigger time	120 sec
Accuracy	± 5%
Position photo diodes	Positioned on the longitudinal axis in 10 mm distances from each other
Display	./.
Power source	LiPO 3.7 V permanently installed, Auto-Off after 1 minute, service life: approx. 100 hrs. Recharging is done with USB cable (scope of delivery).
Dimensions / weight	Ø 25 mm, L = 60 mm / approx. 40 g
Housing	Aluminium housing. The housing must be protected from strong UV light and heat, eg by a suitable support or light shield.
Temperature range	0 to 110° C / 32 to 230° F (UV Tube 3CT)
Operating temperature	0 to 45° C / 32° to 113° F, ambient temp. max. 110 °C / 230 ° F for 10s
Scope of delivery	UV Tube, micro SD card, USB cable, PC software, plastic case
Calibration	Calibration is conform to DIN EN ISO/IEC 17025 and can be traced back to PTB (Phys. Technische Bundesanstalt).

UV Spectro

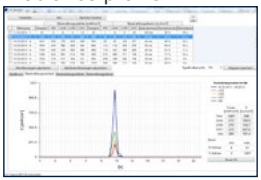
The UV Spectro combines two functions in one device: First, it is a spectrometer for measurements in the UV range from 200 to 440 nm, in addition, it is a UV-integrator for measuring the intensity profile when passing under a medium-pressure UV lamp or UV LED. Also, the dose can be measured.

The UV Spectro is, due to its flat design, the world's slimmest UV spectral radiometer, being only 14 mm high, it is therefore a versatile instrument. During the measuring process, the individual wavelengths by means of a specially-developed collation of rays with a combined diode array continuously record and store the results in the internal memory. The stored results can be compared at a later time. The measured values and the measured curves can be viewed on the built-in display. The UV Spectro works as a fully autonomous device.

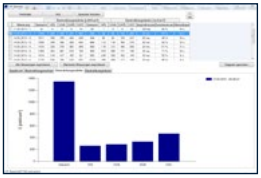
	Unit			
UV spectrometer UV Spectro	**Peak mW/cm²**	**Dosis mJ/cm²**		
	✓	✓	**Typ** Spectral range Spectral bandwidth Irradiance range Irradiance dose range Measurement time Sampling Rate Cosinus correction Display Dimensions Operating temperature Weight Delivery USB version incl. software Art. No. Art. No.	**UV Spectro / UV Spectro USB** 200 – 440 nm 2 nm 2 - 5,000 (25 - 35,000) mW/cm² 1 (25) mJ/cm² 600 (42,000) J/cm² 0 to 120 s 10 ms – 1,000 ms yes LCD, 128 x 64 ppi 160 x 100 x 14.4 mm 70 °C 375 g UV Spectro, plastic case, 3 x coin cell CR 2032, manual, calibration certificate **UV Spectro / UV Spectro USB** A003650 / A004452 A003667 / A004453

Spectrum:

Irradiance profile:



Irradiances as bar charts:



Doses as bar charts:

UV intensity, short time measurement

HI 1, SI 1, TS 1, PMI 41

		Unit			
UV intensity, short time measurement	**Range**	**Peak mW/cm²**	**Dose mJ/cm²**		
	UV-A UV-B UV-C UV-Full UV-VIS UV-LED	✓		**Type** Spectral ranges Max. intensity: Dim. / weight Hand-held HI 1 UV sensor SI 1 Special feat. HI 1 Special feat. SI 1; TS 1; PMI 41 HI 1 Art. No.	**HI 1 handheld + measuring cell SI 1** 315 – 395 nm, max. 340 nm 265 – 325 nm, max. 315 nm 215 – 280 nm, max. 265 nm 2.000 mW/cm² for max. 30 s Approx. 125 x 80 x 40 mm / 270 g Ø 36 mm, height 17mm / 70 g One handheld for different sensors, saving of max. and min. values, hold function Calibration saved in the sensor plug, available for different spectral ranges and intensities A002067

The intelligent sensor family:			**Art. No.**
	**UV Sensor SI 1**	UV-A UV-B UV-C UV-VIS UV-Full UV-LED	A002069 A002071 A002073 (A002072 / 20 mW/cm²) A002673 A003127 A002906
	**UV Sensor TS 1**	UV-A UV-B UV-C UV-VIS UV-Full	A004574 A004573 A004572 A004575 A004576
	**IR Sensor PMI 41** PMI 41 with intelligent connector PM 41 with cable Custom connector		 A004503 150 A004338

For detailed information kindly read the respective data sheets at: www.uv-technik.com

UV intensity quartz rod sensor

TS 1

The uv sensor TS 1 is a quartz glass rod sensor which can be inserted through a hole into the uv dryer to measure close to the uv lamp and the irradiated substrate. UV depreciation due to dust on the uv lamp, reflectors or blackening near the ends of the lamp can also be measured. Also darkening at the electrode can be measured. Through this realistic measurements will be achieved. The calibration is stored in the intelligent sensor plug. The values are shown on the optional handheld HI 1.

The quartz glass rod is protected by a ø 6 mm stainless steel tube. At the end of the stainless steel tube the measuring window is located on one side. Through this window the uv radiation enters into the quartz glass rod and is guided to the sensor to be converted into an electric signal. The TS 1 is designed for short-time measurements for curing applications.

Advantages:

- Easy to use uv intensity measuring device (mW/cm²)
- Indicates lamp aging, lamp blackening and reflector conditions
- Different sensors for UV-C, UV-B, UV-A, UV-VIS and full UV available
- Mounting plate and guidance plate are included
- Calibration is stored in the intelligent sensor plug
- Delivery as a complete set in a case
- Battery driven universal handheld HI 1 optionally available

UV online measurement

QSO 3

The **QSO 3** is suitable for continuous intense UV irradiation at UV curing applications. It emits a sensor signal that is proportional to the measured UV radiation in the form of a DC 0...10 V signal. The photodiode is located outside the actual radiation zone. The UV radiation incident on the quartz glass window is damped by total reflection in the quartz glass rod and thus reaches the photodiode. As a result, the temperature load of the photodiode is also minimised.
Most customers use this sensor in order to detect the lamp ageing, or they use the sensor signal to control the ballast via a machine controller. The purpose is to realise constant UV radiation by adjusting the electrical power of the lamp.

		Value			
UV intensity measurement	**Range**	**Peak mW/cm²**	**Dose mJ/cm²**		
	UV-A or UV-B or UV-C	✓ DC 0 – 10V		**Type:** Spectral ranges Sensitivity range: Amplification factor: Max. permissible int.: Max. permissible temp.: Supply: Output: Dim./weight sensor box: Stainless steel tube: Special feature: UV-A / Art. No. UV-B / Art. No. UV-C / Art. No.	**QSO 3** 315 – 395 nm, max. 340 nm 265 – 325 nm, max. 315 nm 215 – 280 nm, max. 265 nm 20 – 2.000 mW/cm² 1, 10, 100, 1000; x 0.3 10.000 mW/cm² (for max. 10 min) ~ 300° C quartz rod window External by DC 24 V, 5 mA DC 0-10 V, proportional to UV Approx. 45x45x34 mm / 200 g Ø 8 mm Air purging connection1/8” A002179 A002178 A002177

One-stop service

Safety Kit

UV lamp service and safety kit

All UV lamps contain a small amount of mercury. If a lamp breaks, mercury spillages should be contained and cleared away safely. To do this users of UV lamps should have a UV lamp service and safety kit close to their curing station or workplace. The UV lamp service and safety kit contains all the necessary instruments for changing lamps and is an excellent „First Aid Kit“for lamp breakages. It deals with the small quantities of mercury with ease. A detailed and simple to understand manual is included.

Incudes:

1. Safety goggles
High-strength, UV protection safety goggle (EN166 Grade 1F)

2. Lint-free nylon gloves
Important for handling and cleaning UV lamps. Gives protection to the quartz glass against fingerprints. Fingerprints can burn into the lamp during operation and have a significant effect on reducing lamp lifetime.

3. Material to dispose of spilled mercury (Hg)
Protective equipment for clearing up and disposal of spilled mercury if a lamp breaks. The UV lamp service and safety kit which works without chemicals contains: Safety goggles, gloves, cleaning tissues, fleece sponge, equipment to handle mecury, containers for disposal and manual.

4. Alcohol soaked cleaning tissues
The tissues are soaked in 70% iso-propanol for cleaning the quartz glass surface of uv lamps immediately after installation or during maintenance. They can also be used for cleaning the reflectors and glass filters.

The kit is available in two different versions: packed in a highly visible robust case or in a cardboard box.

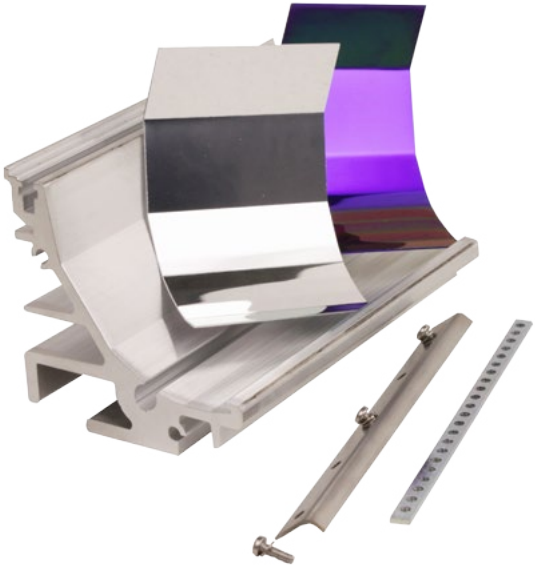
Art. No. A002329 (highly visible robust case)

Equipment for your UV application

Accessories

Accessories	
	The UV safety goggles are protective eyewear for use within UV work areas. They can be worn on top of most corrective glasses without any problems. UV protective goggles, clear, Art. No. 8211 UV protective goggles, green, Art. No. 8210 UV protective goggles, black, Art. No. 8209
	Spring steel brackets LS100 for UV lamp base, tools, tubes, Stanchions, etc. Standard Finish: Galvanized type (K).
	Spring steel brackets LS101 to UV lamp base, tools, tubes, Stanchions, etc. Standard Finish: Galvanized type (K) Surface of stainless steel type (S) „Rilsan“ surface type (N)
	Ceramic terminals Socket: Porcelain KER 111 DIN 40685 to the supporting surface (5-sided) Terminal Body: Nickel plated brass clamping screws: steel, galvanized, Terminal block to the DIN 46 284.
	Ceramic insulator (insulator) in a wide variety of designs.
	Compensation capacitors in a wide variety of designs. MKP capacitors, filled with biodegradable, environmentally friendly, non-PCB - containing.
	Ceramic discharge resistor with 20 cm cable and flat connector.
	Ignition devices in a variety of types.

For detailed information kindly read the respective data sheets at: **www.uv-technik.com**



Reflector profiles

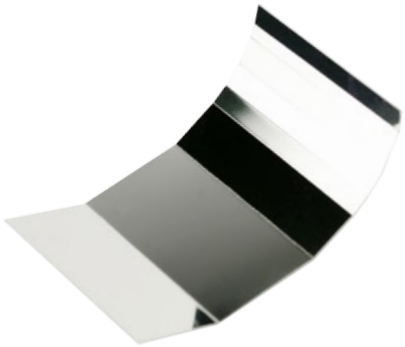
Whatever you may need for efficiently operating a UV system, we have got it. Extruded aluminium profiles with exchangeable reflector plates, for example. As well as the UV lamps the reflectors are also subject to wear, and age during use and have to be replaced now and then..

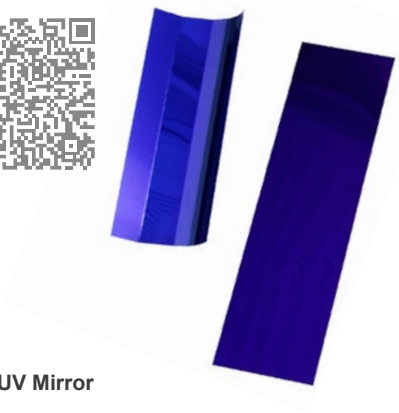
Why spend a lot of time and money on replacing the entire reflector? If you use our air-cooled reflector profile, you only need to replace the removable reflector plates.

The optimum shape of the reflectors ensure both a high UV yield and a high level of efficiency. This not only reduces the energy consumption but also the temperature of the substrates. In addition to saving you money, the option of energy reduction also extends the service life of your UV lamp.

The aluminium extruded profiles are available by the metre so that you are not subject to any restrictions when designing your system. Depending on the installation position, the reflector has either an elliptic (focused) or parabolic effect so that the incidental UV light hits the substrate at right angles. An additional benefit for you: you only need one reflector profile for many different applications.

Reflector Profiles
Reflector Plates





Cold UV Mirror

Highly reflective and wavelength selective Cold UV Mirror Aluminium, stainless steel or quartz glass.

UV curing is widely used in the processing of temperature sensitive substrates in printing and curing applications using solvent free UV inks, lacquers and adhesives. The ever increasing demands being placed on productivity and performance results in higher and higher power densities and the need for improved heat suppression.

uv-technik meyer gmbh offer a range of solutions for optimising the performance of UV curing modules. Dichroic UV cold reflectors especially designed for the commonly used UV-lamps result in an extremely high yield of UV-radiation. At the same time the heat load on the product to be cured is reduced to a minimum.

Standard reflectors, typically high gloss, reflect UV to a high degree, but also reflect light and IR. Coating of the reflector sheets with our UV-cold coating reflects the UV as efficiently as high gloss aluminium sheets, but absorbs a significant proportion of the IR radiation and dissipates it through the reflector body or the cooling air .Typical applications are: Printing machines (e.g. foils), optical storage media (CD, DVD), Electronics, surface treatment. A variety of customer-specific reflector geometries can be supplied on request.

Aluminium Reflectors

Highly polished anodised aluminium reflectors.

The electrolytically polished and anodised aluminium plates have been specially optimised for use as UV reflectors.

The reflector plates are available as individual sheets or cut to dimensions according to customer specification. They can also be supplied in curved geometries, e.g. as focused reflector.

Material thicknesses of 0.5, 0.75 and 1.0 mm are available as standard; standard sheet sizes of 810 mm x 1,000 mm are available depending on thickness. Special dimensions can also be supplied. The plates are delivered protected by a thin plastic film which should be removed before use.

Electronic Lamp Tester for UV lamps

LT 1

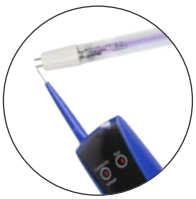
This unit is designed for testing the integrity of the gas fill in medium and low pressure lamps.

Simply touch the lamp contacts with the test probe and press the button. The gas inside the lamp will be ionized and should glow a bright blue. In addition the unit can be used for voltage tests and resistance tests. A small torch is integrated in the LT 1.
The probe is protected by a plastic cap, which must be removed before use.

Art. No. A002653

Technical data:

- Output approx. 3 kV/160 Hz
- Monitor for low resistance
- Monitor for lamp active test
- Voltage test
- Test range 60-250 V AC
- Resistance test with acoustic signal
- Mains supply 9 V - Battery
- Size (H x W x D) 225 x 60 x 40 mm
- Net weight approx. 450 g
- IEC 6LR61



Construction of switch cabinets and control panels for UV systems

Switch cabinets

The uv control cabinet is an important component to operate your UV system effectively.

We have developed efficient design solutions using modern electronic and electro-mechanical components. uv-technik meyer gmbh supplies switch cabinets that can fit your UV system in many shapes and sizes. All our switch cabinets meet the specific regulation requirements associated with sensitive measurement and control signals.

Our extensive experience, latest production technologies, performance simulator and own test facility ensure the switch cabinets are manufactured to the highest level of quality.

We have the expertise to take you through the design and development stage, through to manufacturing, documentation and even commissioning if required.

With uv-technik meyer gmbh, you will benefit from 30 years of experience in this field.

High voltage cables

The use of uv lamps usually requires the use of high voltage cables. This overview will help you select the correct cable type.

Stranded cables are used in ambient conditions where higher resistance to higher temperatures and uv radiation is necessary, e.g. in reflector units where reflected uv light and a higher temperature is present. In particular nickel strands are used if the ambient ozone concentration is higher than normal. In comparison to others, nickel plated copper stranded-wires have a lower electrical resistivity.

Single cables NYL, SiF and SiCSi are typically used between the control cabinet and the reflector unit. Depending on the power supply unshielded or shielded types are available. In the case of electronic power supplies (EPS), shielded cables are required.
The maximum permitted cable length between the uv lamp and the power supply depends on the EPS type and can be found in the product data sheet.

Some applications demand the use of multi-core cables, e.g. it should be possible to disconnect a reflector unit by using a high-voltage connector. For this reason we provide a multi-core cable which includes control cables. The high voltage cables for the lamp are, of course, shielded.

The cables can be ordered in multiple metre lengths, as a 100 m ring or on a 1000 m cable drum.

None of these cables are suitable for “drag chain” applications.

	Art. No.	Name	Electric strength in V_{eff}	Shield	Sheath	
	A000557	PTFE stranded 1,5 mm²	1 kV	-	PTFE	outer diameter: 2.4 mm Thermal resistance: 260 °c (short-time 300 °c)
	5042	PTFE Cu stranded 1,5 mm²	2 kV	-	PTFE	outer diameter: 3.2 mm Thermal resistance: 260 °c (short-time 300 °c)
	5041	PTFE Nickel stranded 2,5 mm²	2 kV	-	PTFE	outer diameter: 3.4 mm Thermal resistance: 260 °c (short-time 300 °c)
	5043	PTFE Cu stranded 2,5 mm²	2 kV	-	PTFE	outer diameter: 3.5 mm Thermal resistance: 260 °c (short-time 300 °c)
	5001	NYL-CU1,5-5kV	5 kV	-	PVC	1 x 1.5 mm²
	5015	SiF-2,5-6kV	6 kV	-	Silicone	1 x 2.5 mm²
	5014-1	SiCSi-2,5-3kV	3 kV	✓	Silicone	1 x 2.5 mm²
	5013	SiCSi-2,5-6kV	6 kV	✓	Silicone	1 x 2.5 mm²
	A005388	HK-SO- Li2G-C2G 2x2,5 -3kV	3 kV	✓	Silicone	2x 2,5mm², combined shielding
	A000188	PVC-2x4-3kV	3 kV	✓	PVC	2 x 4,0 mm², combined shielding
	A000832	PVC-2x4-YCY-3kV	3 kV	✓	PVC	2 x 4,0 mm², combined shielding, flame-retardant for ships
	A001294	PVC-2x4-YCYS-1kV	1 kV	✓	PVC	2 x 4,0 mm², combined shielded, flame-retardant for ships, reinforced
	5029	PMC-1,5+0,34-3kV	3 kV	✓	PVC	2 x 1,5 mm² + 1 x 1,5 mm² + 6 x 2 x 0,34 mm² single shielding
	5029-2,5	PMC-2,5+0,34-3kV	3 kV	✓	PVC	2 x 2,5 mm² + 1 x 2,5 mm² + 10 x 2 x 0,34 mm² single shielding

Detailed information is available for download at: **www.uv-technik.com**

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Technische Änderungen vorbehalten.
Mit Ausgabe dieses Katalogs verlieren alle bisherigen Kataloge ihre Gültigkeit.

competence in uv

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