

High Voltage Power-Supply



**J. Schneider
Elektrotechnik**



ELECTRONICS IN HIGHEST VOLTAGE

from **1kV - 150kV** and **2kW - 21kW** till **145kW**

www.j-schneider.de

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FROM A VISION TO THE FINAL PRODUCT

At J. Schneider Elektrotechnik, technology is backed up by an innovative development team of hardware and software developers, electronic engineers and skilled workers. Our engineers and technicians respond to constant market observation at an early stage; client's projects for the future are identified and jointly realized. This high degree of engineering potential reflects our feeling for quality, so that we are open for tomorrow's ideas and tasks.

NEW DEVELOPMENTS OPEN NEW HORIZONS

In order to survive in the global market, we constantly and continually redefine our product range: together with the customer and in close cooperation with technical institutes and universities, new products are developed and produced.

CUSTOMIZED SOLUTIONS

We have made our brochure / homepage easy to use in order to assist you in finding the power supply to satisfy your requirements. If you are not finding the power supply which meets your requirements, we would be pleased to develop a customized solution for you.

DISTRIBUTION AND SERVICE

Since development, production, distribution and service lay at the company of J. Schneider Elektrotechnik GmbH in one hand, a close teamwork in each stage of the lifecycle is granted. Further developments are made close to the market requirements, customer specified modifications are realized in tight cooperation between sales department and development department. Very good product acknowledgement guarantees an optimized service and maintenance.

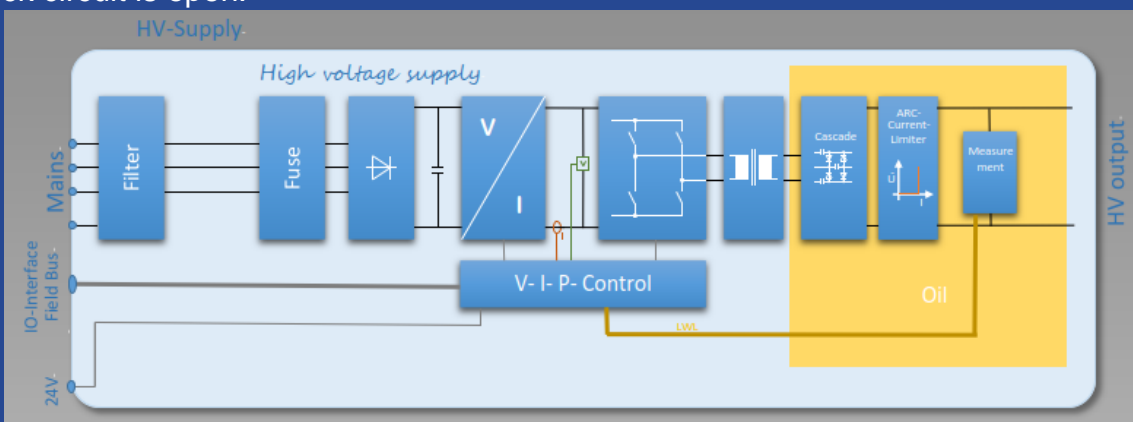
MADE IN GERMANY

All J. Schneider high voltage / plasma power supplies were developed and produced in Germany. Before delivery, each of these power supplies undergoes a final device test and a burn-in test.

USED CIRCUIT TOPOLOGY

The High voltage power supplies comes within the modern CFC (Current Fed Converter) technology, a digital regulation as well as a configurable Arc-management. The extreme compact high voltage devices had our patented Arc current limitation included, which limits the output current up to max 5 times of the nominal output current and therefore the process runs more smoothly and stable. Those enhance optimal results regarding the process quality.

For control every high voltage power supply would delivered within a galvanic isolated analogue / digital I/O-interface and RS232-interface. The interfaces are partially powered by a separate 24V supply. This ensures communication with the high voltage even when the interlock circuit is open.



Advantages at a glance:

- ☺ rugged current-fed technology
- ☺ high frequency design for fast transient response and low output ripple
- ☺ high efficiency
- ☺ very low output energy
- ☺ patented Arc-current limitation to max. 5 times nominal current
- ☺ very fast and multiple Arc detection and fast response
- ☺ easy adjust of control and steering parameters due to digital technology
- ☺ fully digital control leads to
 - fast control loop
 - fast reaction to unsteady events e.g. an arc
 - smooth tuning of the process
- ☺ logging of all supply data for the most supplies
- ☺ bootloader for service

PRODUKTION

All J. Schneider high voltage power supplies were developed and produced in Germany. Before delivery, each of these power supplies undergoes a final device test and a burn-in test at 40°C ambient temperature under full load. Each device has a unique serial number, which ensures traceability over the entire life cycle of the product.

High Voltage Power-Supply

Series overview



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CAPTEC

The capacitor charge power supplies type **CAPTEC** are switched mode power supplies which charges the connected capacitor to the desired DC voltage. Till 10kV the devices are air insulated and from >10kV till 60kV they are oil insulated. Individual modules are available in the power range from 2kW, 3kW, 5kW, 10kW to 21kW. The individual modules can be connected in parallel operation to increase the output power.

GLOWTEC

The power supplies of the **GLOWTEC** DC series are specially adapted for high voltage plasma processes like glow processes. Due to the extensive voltage and power range as well as the various adjustment possibilities, the devices are successfully used in a wide range of other applications. Options for the devices are an integrated interlock for the safe separation of the power converter from the mains, a patented ARC-current limitation which limits current peaks to five times of the rated current as well as an ARC-counter.

Within this series we also offer the **GLOWTEC DCp** a high voltage power supply with an unipolar pulsed output voltage with an output frequency of 76kHz and the **GLOWTEC AC** a high voltage power supply with a bipolar pulsed output voltage with an output frequency of 38kHz and a voltage range from 2kVAC till 5kVAC or 8kVAC on request.

VAPTEC

The power supplies of the **VAPTEC** series are specially designed for electron-beam evaporation processes. This series includes the high voltage power supply NHCR which provides an output voltage of 8kVDC or 10kVDC as well as the necessary cathode-heat transformer NDRG and the XY-sweep amplifier RNTR. At the 2kW / 3kW supplies the high voltage power supply also includes the cathode heat transformer in the cabinet.

Because at improved evaporation processes an ion-source is used to accelerate the electrons, we have also developed the necessary ion source supply NDOR in the VAPTEC series.

LITEC

The high voltage power supplies of the **LITEC** series are developed for the requirement of linear ion-sources which works according the anode layer principle. The **LITEC** are available with two different output voltages of 3kV or 5kV and output ratings of 6kW and 12kW. The **LITEC** series is extremely compact because it is water cooled power supply.

WELTEC

The power supplies of the **WELTEC** series are specially developed for e-beam welding, e-beam melting, industrial x-ray applications and sterilization applications. They are water- / oil cooled and it is possible to integrate the necessary auxiliary supply such as heat or wehnelt supply. They are available with output voltages of 60kV, 120kV up to 150kV and with output ratings of 5kW, 10kW and 15kW.

Capacitor Charge Power-Supply CAPTEC



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The capacitor charge power supplies type **CAPTEC** are switched mode power supplies which works with the state-of-the-art CFC (current fed converter) technology. By the use of this technology the output of the power supply acts like a current source, which is ideal for the charge of capacitors. The regulation of current, voltage and power reach excellent precision by the use the digital regulation board.

After the device has been switched on, the power supply unit charges the connected capacitor to the set point value U_{out} . The charging time depends on the capacity as well as the adjusted set points for I_{out} and P_{out} . If the device has reached the desired set point / output voltage (c-full), the power supply switches off internally. This would reported via all interfaces. If the output voltage falls below the adjusted value, the power supply unit still waits the adjusted "pause time" before it starts again autonomously with the next charging process. The release does not have to removed during the charging and discharging phase. A counter contains the current number of loads since the last release. If the capacitor to be charged is to be held in the charged state for an extended period of time, it is possible to activate the so-called "maintenance charge". The power supply always charges the capacitor with an adjustable control value as soon as the actual value of the output voltage deviates by an adjustable value.

Standard

- Analogue and digital I/O-interface
- RS232-interface
- Digital regulation (U,I,P)
- No output voltage overshoot
- Conservation charging

Description

- till 10kV air cooled and air insulated
- above 10kV oil insulated
- Remote control (RS232 ↔ Hyper terminal) possible

Options

- Profibus, Canbus or EtherCat

APPLICATIONS:

CAPACITOR CHARGE



SHOCKWAVE RECYCLING

Shockwave recycling uses mechanical shock waves generated within a fluid medium to fragment materials. The shock waves are generated by an electrical arc between two electrodes.



FLASH LAMP ANNEALING

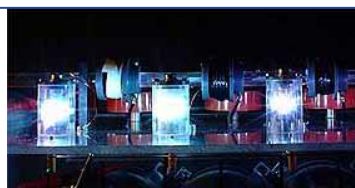
Flash lamp annealing is a tempering process, which is often used in thin-film technology to improve electrical or optical properties.



MARX GENERATOR



TESTING APPLICATIONS



PRODUCTS THAT DELIVER BURSTS OF PULSED ENERGY



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Capacitor Charge Power-Supply CAPTEC



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BASIC TECHNICAL DATA:

Mains:

Input voltage : 3 x 400V AC \pm 10%
Frequency : 50 / 60 Hz \pm 5%

Output:

Output voltage : continuous, stable adjustment from 0 to rated voltage/current/power
1kV to 60kV
Output power : 1kJ/sec to 7.5kJ/sec till 60kV (higher voltages on request)
1kJ/sec to 10.5kJ/sec till 40kV (higher powers realized by parallel connection)

Interfaces:

Analogue set point : 0-10V for voltage, current, power directly proportional
Analogue monitor : 0-10V current, voltage directly proportional
Digital set point / monitor :
RS232 : PLC-mode or Terminal-mode (
Field bus : please see page options

SELECTION TABLE CAPTEC:

MAXIMUM OUTPUT RATING				MODULE DIMENSION	COOLING	ISOLATION	MODULE NUMBER	ARTICLE NUMBER
kV _{DC}	mA	kW	J/sec	(H x W x D)			* specify polarity N for negative P for positive	
1	2000	2	1000	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 0012k0	
1	3000	3	1500	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 0013k0	
1	5000	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0015k0	NHCR1622E01001
1	10000	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 00110k	NHCR
2	1000	2	1000	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 0021k0	
2	1500	3	1500	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 0021k5	
2	2500	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0022k5	
2	5000	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0025k0	
3	500	1.5	750	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 003500	
3	1000	3	1500	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 0031k0	
3.3	1500	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 3k31k5	
3.3	3000	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 3k33k0	
5	400	2	750	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 005400*	
5	600	3	1500	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 005600*	
5	1000	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0051k0*	
5	2000	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0052k0*	
4	5000	20	10000	3HU x 19" x 600mm *c.)	Water	Air	CAPTEC 0045k0*	NHCR1625E01001
8	250	2	750	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 008250*	
8	375	3	1500	3HU x 19" x 580mm *a.)	Air	Air	CAPTEC 008375*	
8	625	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 008625*	
8	1250	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0081k2*	
10	500	5	2500	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 010500*	
10	1000	10	5000	4HU x 19" x 660mm *b.)	Air	Air	CAPTEC 0101k0*	
20	500	10	5000	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 020500*	
20	1050	21	10500	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 0201k0*	NHCR1347E01001
30	333	10	5000	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 030333*	
30	700	21	10500	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 030700*	
40	250	10	5000	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 040250*	
40	525	21	10500	7HU x 19" x 725mm *d.)	Water	OIL	CAPTEC 040525*	
50	200	10	5000	9HU x 19" x 725mm *e.)	Water	OIL	CAPTEC 050200*	
50	300	15	7500	9HU x 19" x 725mm *e.)	Water	OIL	CAPTEC 050300*	
60	166	10	5000	9HU x 19" x 725mm *e.)	Water	OIL	CAPTEC 060166*	
60	250	15	7500	9HU x 19" x 725mm *e.)	Water	OIL	CAPTEC 060250*	

Higher voltages on request

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High Voltage Power-Supply

GLOWTEC DC or DCp or AC



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The Glow discharge power supplies of the **GLOWTEC** series are switched mode power supplies which works with the state-of-the-art CFC (current fed converter) technology. Through the use of this technology the output of the power supply acts like a current source, which is ideal for the use in glow discharge and high voltage plasma processes. The regulation of current, voltage and power reach excellent precision by the use the digital regulation board. Every of this power supplies comes with an integrated configurable arc management. For simple DC Glow discharge processes the right choice is the **GLOWTEC DC** in which the output current would be limited by a resistor. For more sophisticated DC processes, optional the patented arc current limitation (which limits the output current to max. five times of the nominal current during an arc) could be used instead of the simple resistor. Within this series also the **GLOWTEC DCp** and the **GLOWTEC AC** are available. The **GLOWTEC DCp** delivers a square wave unipolar pulsed output voltage up to 5kV (8kV on request) at an output frequency of 76kHz and the **GLOWTEC AC** a bipolar pulsed output voltage up to 5kV (8kV on request) at an output frequency of 38,5kHz. The duty cycle could be adjusted in wide range from 1µsec up to 11,8µsec.

Standard

- Analogue and digital I/O-interface
- RS232-interface
- Digital regulation (U,I,P)
- Configurable ARC-Management
- Up to 5kV potential free output (from 5kW)

Description

- till 10kV air cooled and air insulated
- above 10kV oil insulated
- Remote control (RS232 ↔ Hyper terminal) possible

Options

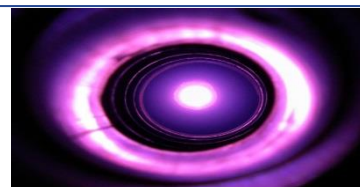
- Profibus, Canbus or EtherCat

APPLICATIONS:

PRE CLEANING



GLOW DISCHARGE



LINEAR IONSOURCES

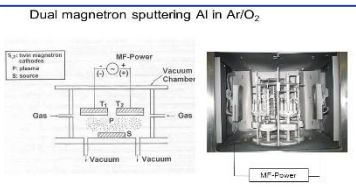


MICROWAVE PROCESSES

- | | |
|--|---|
| <ul style="list-style-type: none"> Food Processing + Defrosting + Drying / roasting / baking + Pasteurization Drying Industry + Wood / fibers / textiles + Pharmaceuticals + Brick / concrete walls Polymer Chemistry + Rubber curing, vulcanization + Polymerization | <ul style="list-style-type: none"> Ceramics / Materials + Alumina sintering + Welding, smelting Plasma + Semiconductors Waste Remediation + Sewage treatment |
|--|---|



HIGH VOLTAGE PLASMA LIKE PECVD



ION BEAM SPUTTERING CORONA TREATMENT



High Voltage Power-Supply

GLOWTEC DC or DCp or AC



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BASIC TECHNICAL DATA:

Mains:

Input voltage : 3 x 400V AC \pm 10% / 50 - 60 Hz \pm 5%
Frequency : 50 / 60 Hz \pm 5%

Output:

Output voltage V_{av} : continuous, stable adjustment from 0 to rated voltage/current/power
2kV to 60kV
Output power : 2kW to 15kW (21kW) (higher powers can be realized by parallel connection)
Output current A_{av} : please see selection table
Nom. Output frequency DC : pure DC
Nom. Output frequency DCp : unipolar pulsed 76kHz
Nom. Output frequency AC : bipolar pulsed 38.5kHz
Duty cycle (DCp and AC) : adjustable from 7.6% to 93.8% (1 to 12.2 μ sec)

Interfaces:

Analogue set point : 0-10V for voltage, current, power directly proportional
Analogue monitor : 0-10V current, voltage directly proportional
Digital set point / monitor :
RS232 : PLC-mode or Terminal-mode
Field bus : please see page options

SELECTION TABLE GLOWTEC:

MAXIMUM OUTPUT RATING			MODULE DIMENSION	COOLING	DC MODULE NUMBER	DCp MODULE NUMBER	AC MODULE NUMBER
kV _{DC}	mA	kW	(H x W x D)		* specify polarity N for negative P for positive	square wave unipolar pulsed output	square wave bipolar pulsed output
2	1000	2	3HU x 19" x 580mm *a.)	Air	GLOWTEC 0021k0		
2	1500	3	3HU x 19" x 580mm *a.)	Air	GLOWTEC 0021k5		
2	2500	5	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0022k5	GLOWTEC DCp 0022k5	GLOWTEC AC 0022k5
2	5000	10	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0025k0	GLOWTEC DCp 0025k0	GLOWTEC AC 0025k0
3	500	1.5	3HU x 19" x 580mm *a.)	Air	GLOWTEC 0030k6		
3	1000	3	3HU x 19" x 580mm *a.)	Air	GLOWTEC 0031k0		
3.3	1500	5	4HU x 19" x 660mm *b.)	Air	GLOWTEC 3k31k5	GLOWTEC DCp 3k31k5	GLOWTEC AC 3k31k5
3.3	3000	10	4HU x 19" x 660mm *b.)	Air	GLOWTEC 3k33k0	GLOWTEC DCp 3k33k0	GLOWTEC AC 3k33k0
5	400	2	3HU x 19" x 580mm *a.)	Air	GLOWTEC 005400		
5	600	3	3HU x 19" x 580mm *a.)	Air	GLOWTEC 005600		
5	1000	5	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0051k0	GLOWTEC DCp 0051k0	GLOWTEC AC 0051k0
5	2000	10	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0052k0	GLOWTEC DCp 0052k0	GLOWTEC AC 0052k0
8	250	2	3HU x 19" x 580mm *a.)	Air	GLOWTEC 008250*		
8	375	3	3HU x 19" x 580mm *a.)	Air	GLOWTEC 008375*		
8	625	5	4HU x 19" x 660mm *b.)	Air	GLOWTEC 008625*	GLOWTEC DCp 008625	GLOWTEC AC 008625
8	1250	10	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0081k2*	GLOWTEC DCp 0081k2	GLOWTEC AC 0081k2
10	500	5	4HU x 19" x 660mm *b.)	Air	GLOWTEC 010500*		
10	1000	10	4HU x 19" x 660mm *b.)	Air	GLOWTEC 0101k0*		
20	500	10	7HU x 19" x 725mm *d.)	Water	GLOWTEC 020500*		
20	1050	21	7HU x 19" x 725mm *d.)	Water	GLOWTEC 0201k0*		
30	333	10	7HU x 19" x 725mm *d.)	Water	GLOWTEC 030333*		
30	700	21	7HU x 19" x 725mm *d.)	Water	GLOWTEC 030700*		
40	250	10	7HU x 19" x 725mm *d.)	Water	GLOWTEC 040250*		
40	525	21	7HU x 19" x 725mm *d.)	Water	GLOWTEC 040525*		
50	200	10	9HU x 19" x 725mm *d.)	Water	GLOWTEC 050200*		
50	300	15	9HU x 19" x 725mm *d.)	Water	GLOWTEC 050300*		
60	166	10	9HU x 19" x 725mm *d.)	Water	GLOWTEC 060166*		
60	250	15	9HU x 19" x 725mm *d.)	Water	GLOWTEC 060250*		

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E-Beam Power-Supply VAPTEC

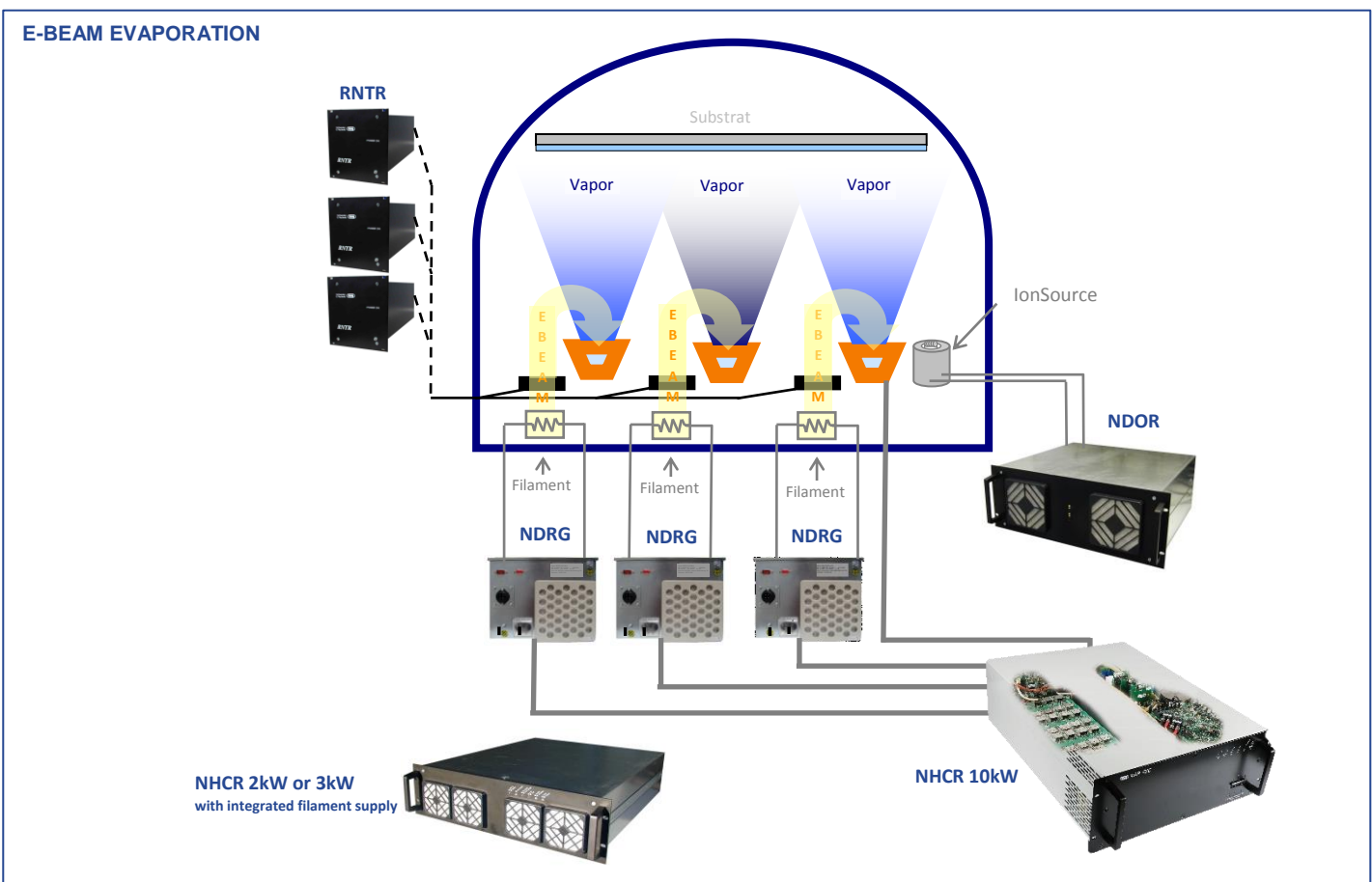


**J. Schneider
Elektrotechnik**

The **VAPTEC** series are specially designed for electron-beam evaporation processes. This series contains the high voltage power supply NHCR as well as the necessary cathode-heat transformer NDRG and the XY-sweep amplifier RNTR.

The new developed NHCR, is a switched-mode power supply with the state of the art CFC (current-fed-converter) technology within an digital regulation, a configurable ARC management and our patented ARC-current limitation. If an ARC was recognized, the patented ARC-current limitation limits the output current peaks up to max. five times of the rated current. Recently a 2kW, 3kW and 10kW version is available. At the 2kW, 3kW supply the high voltage power supply also includes the cathode heat transformer in one cabinet. The 2kW, 3kW high voltage power supply delivers an output voltage of 8kV and the 10kW an output voltage of 10kV. The integrated cathode transformer of the 2kW, 3kW version provides a heat current of 26A, 35A at an output voltage of 8V DC.

Because for the most evaporation processes an ion-source is used to accelerate the electrons, the necessary Ion supply NDOR was developed within the **VAPTEC** series. It includes the anode power supply, the filament supply and measurements for the neutralization current. The XY-sweep amplifier RNTR is a power amplifier designed to drive inductive loads. Typically it works as a power source. This power amplifier is used, to drive the coil device of the horizontal deflection circuit of the electron beam for the purpose of uniform material evaporation. Normally in these application the beam should be deflected horizontally in both the X and Y directions. Therefore, the deflection stage has two independent channels.



E-Beam Power-Supply

VAPTEC



J. Schneider
Elektrotechnik

BASIC TECHNICAL DATA:

Mains:

Input voltage	:	NHCR: 3 x 400V AC \pm 10%
		NDRG: 2 x 400VAC \pm 10%
		NDOR: 3 x 400V AC \pm 10%
Frequency	:	50 / 60 Hz \pm 5%

Output:

Output NHCR	:	continuous, stable adjustment from 0 to rated voltage/current/power
Output NDRG	:	continuous, stable adjustment from 0 to rated current
Output NDOR	:	

More details please see selection table below

Interfaces:

Analogue set point	:	0-10V for voltage, current, power directly proportional
Analogue monitor	:	0-10V current, voltage directly proportional
Digital set point / monitor	:	
RS232 for NHCR	:	PLC-mode or Terminal-mode
Field bus for NHCR	:	please see page options

SELECTION TABLE VAPTEC:

MAXIMUM OUTPUT RATING						MODULE DIMENSION	COOLING	MODULE NUMBER	ARTICLE NUMBER
NHCR									
High voltage power supply			Filament power supply						
kVDC	mA	KW	VDC	A	W	(H x W x D)			
-8	250	2	8	26	208	3HU x 19" x 580mm *a.)	Air	VAPTEC 008250	NHCR0540E03001
-8	375	3	8	35	280	3HU x 19" x 580mm *a.)	Air	VAPTEC 008375	NHCR1036E01001
-10	500	5	-	-		4HU x 19" x 660mm *b.)	Air	VAPTEC 010500	NHCR
-10	1000	10	-	-		4HU x 19" x 660mm *b.)	Air	VAPTEC 01001k	NHCR1001E01001
-20	1050	21				7HU x 19" x 725mm *d.)	Water	VAPTEC 021k0	NHCR
-30	700	21				7HU x 19" x 725mm *d.)	Water	VAPTEC 030700	NHCR
-40	525	21				7HU x 19" x 725mm *d.)	Water	VAPTEC 040525	NHCR
-60	350	21				9HU x 19" x 725mm *d.)	Water	VAPTEC 060350	NHCR
NDRG									
Filament power supply			Included regulations						
VDC	A	W	filament	emission		(H x W x D)			
8	50	400	yes	Yes		190 x 238 x 370mm	Air	NDRG 0850	NDRGL03E1M01
6	60	360	yes	Yes		190 x 238 x 370mm	Air	NDRG 0660	NDRG0422E01001
6	60	360	yes	no		190 x 238 x 370mm	Air	NDRG 0660	NDRG0506E02001
NDOR									
Anode power supply			Filament power supply						
VDC	A	W	VDC	A	W	(H x W x D)			
180	6	1080	40	25	1000	4HU x 19" x	Air	NDOR 180006	NDOR0239E01001
RNTR									
Input voltage Ui			Output voltage Uo (2 channels)						
VDC			VDC	A		(H x W x D)			
24 \pm 10%			= Ui - 2.5	0-3A		3HU x 21TE x 300mm	Air	RNTR 2403	RNTRL45E1M01

High Voltage DC Power-Supply LITEC



**J. Schneider
Elektrotechnik**

The high-voltage power supplies of the **LITEC** series are water-cooled and specially designed for the requirements for Linear Ion source which developed after the anode layer principle. They are available with output voltages of 3 kV and 5 kV and output power of 6 kW and 12kW. The **LITEC** series is characterized by a sophisticated flexibly adjustable (via the integrated touch panel in the front panel) arc management and due to the water-cooling by an extremely compact design. In addition, both the positive or either the negative pole of the output could connected to ground. To increase the power these devices could connected in parallel. Typical applications in conjunction with a linear anode layer gridless ion source are pre-cleaning, etching, surface modification, ion beam sputter deposition (IBD) and ion beam assisted deposition (IBAD).

Standard

- Analogue and digital I/O-interface
- RS232-interface
- Digital regulation (U, I, P)
- Configurable Arc-management (up to four parameter sets store able)
- Parallel mode to increase power
- Integrated Touch Panel

Description

- Device are in different output voltage available
- Remote control (RS232 ↔ Hyper-Terminal) possible

Options

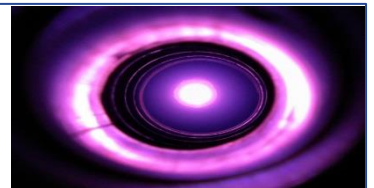
- Profibus, Canbus or EtherCat

APPLICATIONS:

PRE CLEANING



GLOW DISCHARGE



LINEAR IONSOURCES



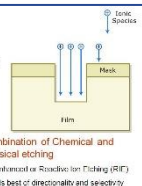
PLASMA PRE-/POST TREATMENT



HIGH VOLTAGE PLASMA

PHYSICAL ETCHING

- Wafer exposed to inert gas and/or plasma
- Etch is from momentum transfer from accelerated ions
 - Acting anisotropically
 - Good etch definition
 - Low selectivity
 - Rate is mass transport dependent
- Parallel version of Focused Ion beam etching



High Voltage DC Power-Supply

LITEC



J. Schneider
Elektrotechnik

BASIC TECHNICAL DATA:

Mains:

Input voltage : 3 x 400V AC \pm 10%
Frequency : 50 / 60 Hz \pm 5%

Output (positive or negative output could be grounded) :

Nom. output voltage V : please see selection table
Nom. output power kW : please see selection table
Nom. output current A : please see selection table

Interfaces:

Touch panel in standard integrated : for more details please see page "options"
Analogue set point : 0-10V for voltage, current, power directly proportional
Analogue monitor : 0-10V current, voltage directly proportional
Digital set point / monitor :
RS232 : PLC-mode or Terminal-mode
Field bus : please see page options

SELECTION TABLE LITEC:

MAXIMUM OUTPUT RATING			MODULE DIMENSION	COOLING	ISOLATION	MODULE NUMBER	ARTICLE NUMBER
kV _{DC}	mA	kW	(H x W x D)				
3	2000	6	4HU x 19" x 650mm	Water	Air	LITEC 0032k0	NHCR1118F01001
3	4000	12	4HU x 19" x 650mm	Water	Air	LITEC 0034k0	NHCR1119F01001
5	1200	6	4HU x 19" x 650mm	Water	Air	LITEC 0051k2	NHCR1116F01001
5	2400	12	4HU x 19" x 650mm	Water	Air	LITEC 0052k4	NHCR1117F01001

E-Beam welding Power-Supply

WELTEC



J. Schneider
Elektrotechnik

The power supplies of the **WELTEC** series are specially developed for e-beam welding, e-beam melting, industrial x-ray applications and sterilization applications. The High voltage power supply comes within the modern CFC (Current Fed Converter) technology, a digital regulation, our patented Arc current limitation as well as a configurable Arc-management. The Arc current limitation limits the output current in case of an Arc and therefore the process runs more smoothly and stable. They are water- / oil cooled and it is possible to integrate the necessary auxiliary supply such as heat or wehnelt supply. They are available with output voltages of 60kV, 120kV up to 150kV and with output ratings of 7.5kW, 10kW and 15kW.

Standard

- Analogue and digital I/O-interface
- RS232-interface
- Digital regulation (U, I, P)
- Configurable Arc-management (up to four parameter sets store able)
- Bootloader for service

Description

- Device are in different output voltage available
- Remote control (RS232 ↔ Hyper-Terminal) possible

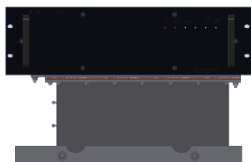
Options

- Integration of the necessary auxiliary supplies
- Profibus, Canbus or EtherCat

APPLICATIONS:

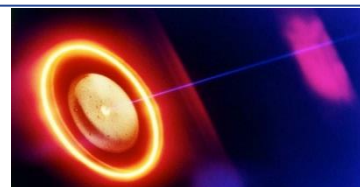
E-BEAM WELDING

Is a fusion welding process in which a beam of high-velocity electrons is applied to two materials to be joined.



E-BEAM MELTING

Metal 3D Printing



E-BEAM STERILIZATION



COLD CATHODE EB GUN



E-BEAM WELDING



INDUSTRIAL X-RAY



E-Beam welding Power-Supply

WELTEC



J. Schneider
Elektrotechnik

Basic Technical Data:

Mains:

Input voltage : 3 x 400V AC \pm 10%
Frequency : 50 / 60 Hz \pm 5%

Output:

Output voltage : continuous, stable adjustment from 0 to rated voltage/current/power
More details please see selection table below

Interfaces:

Touch panel : for more details please see page "options"
Analogue set point : 0-10V for voltage, current, power directly proportional
Analogue monitor : 0-10V current, voltage directly proportional
Digital set point / monitor :
RS232 : PLC-mode or Terminal-mode
Field bus : please see page options

SELECTION TABLE WELTEC:

MAXIMUM OUTPUT RATING				MODULE DIMENSION	COOLING	ISOLATION	MODULE NUMBER	ARTICLE NUMBER
kV _{DC}	mA	kW	J/sec	(H x W x D)				
60	125	7.5		14HU x 19" x 725mm *d.)	Water	Oil	WELTEC 060125	NHCR
60	166	10		14HU x 19" x 725mm *d.)	Water	Oil	WELTEC 060166	NHCR
60	250	15		14HU x 19" x 725mm *d.)	Water	Oil	WELTEC 060250	NHCR
120	62	7.5		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 120062	NHCR
120	83	10		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 120083	NHCR
120	125	15		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 120125	NHCR
150	50	7.5		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 150050	NHCR
150	66	10		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 150066	NHCR
150	100	15		1020 x 19" x 764mm *d.)	Water	Oil	WELTEC 150100	NHCR1442E01001

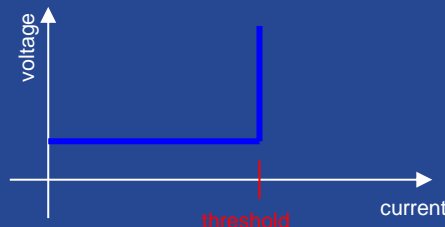
High Voltage Power-Supply

Patented ARC-Limitation



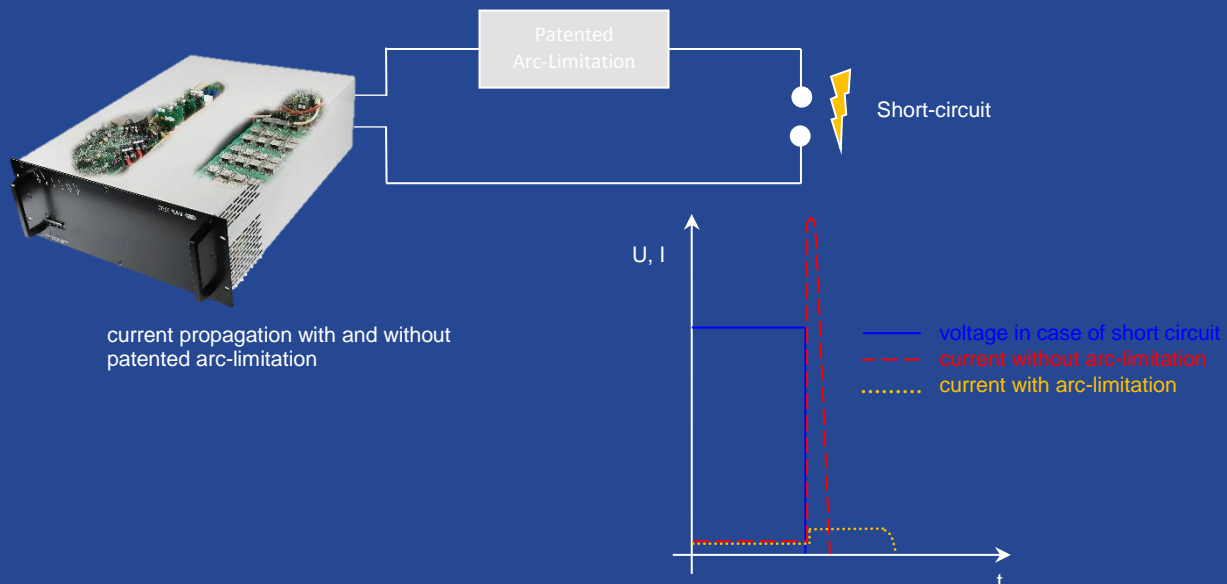
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Elektrotechnik

The patented arc current limitation works like a non-linear resistance. Until a specific current level is reached, it has low ohm resistance. Once that level would exceeded, the resistance changes, so that current remains constant, whatever voltage applies. A graph showing the idealized voltage/current relationship across the resistance is given below.



Once the current threshold is reached, current remains constant despite increasing voltage. The resistance progressively increases in this area.

The arc current limiter is switched into the high voltage circuit like a resistance. If there is an arc, it is absolutely sure, that current stays limited at the threshold level.



Without arc current limiting, current peaks up to 1000 times the rated current can occur. Our patented arc current limitation keeps current peaks down to 4 times of the rated current, at the very most.

Advantages:

Prolonged life of filament in electronic beam guns

Processes, such as coating, run more smoothly as arcs are suppressed, instantly

- Almost complete elimination of the contamination of deposited film which normally arises from the extremely high currents associated with arcs
- higher stoichiometry
- Enhanced equipment reliability
- Due to the very small current fluctuations (di/dt), there are fewer breakdowns. This leads to cost savings on such items as cables, filters and surge-voltage protection devices.

The Arc current limiter could configured to meet your specific requirements. Versions for continuous current levels up to 10A or voltages of up to 150kV are already provided.

High Voltage Power-Supply RS232-Interface



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With the RS232-Interface the nominal values for the output values can be adjusted and the corresponding actual values can be read out. Furthermore the unit can be released and error messages can be read out. With this service interface further adjustments and parameterization of the high voltage power unit can be done. Therefore two modes are available.

TERMINAL-MODE:

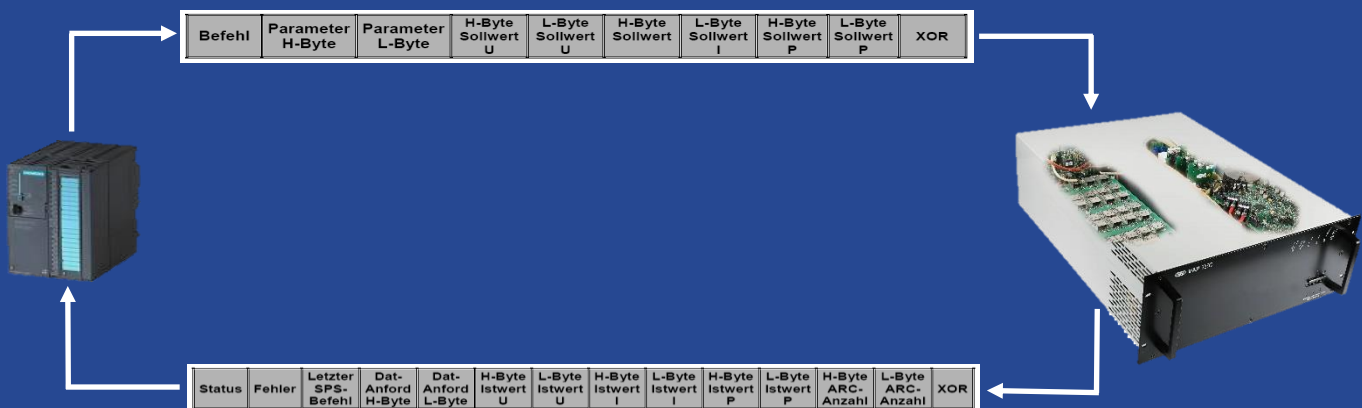
In Terminal-Mode the power supply communicates with a simple terminal program such as Hyper-Terminal or TeraTerm for example.

Annotations for the Terminal-Mode screenshot:

- Status message like the choice of the user interface you could see here.
- Failure message
- Power supply enabled / disabled
- Set point with description of unit
- Control value regulation
- Warnings, which do not disable the device.
- Interlock close / open
- Numbers of ARC's, Numbers of ignitions since the last enable.
- Number of ARC's / second, Ignitions / second
- Here you could see the last command. If you type h (help) you will see all possible commands

PLC-MODE:

In PLC-Mode the power supply communicates with a PLC. The PLC have to send a byte-sequence of specified numbers of bytes to the power supply. The power supply would be answer with a status-sequence of specified numbers of bytes.



High Voltage Power-Supply *Dimensions*

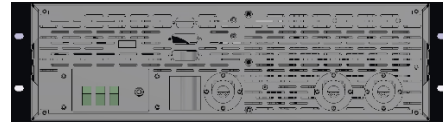


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Front view *a.):



Back view *a.):



Front view *b.):



Back view *b.):



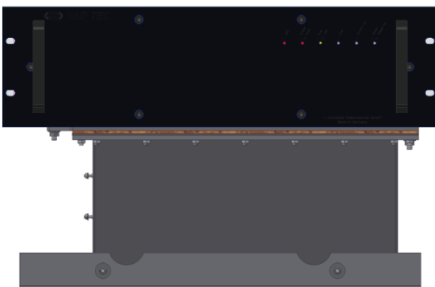
Front view *c):



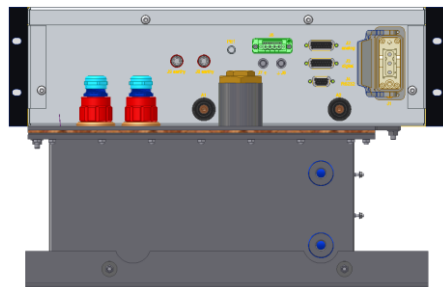
Back view *c.):



Front view *d) or e):



Back view *d) or e):



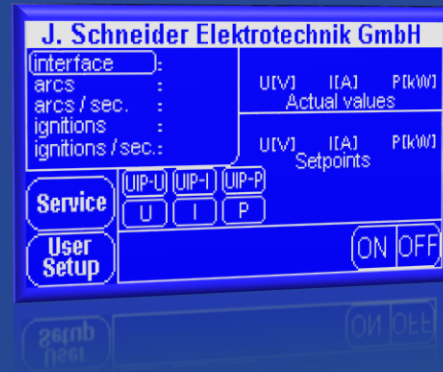
High Voltage Power-Supply Options



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Option 1: Touch panel in front plate

With the touch panel (resolution of 320 x 240 pixel in blue-white LED-backlight) the nominal values for the output values (voltage, current and rating) can be adjusted, the corresponding actual values, number of arcs, arcs / sec, ignitions, ignitions / sec as well as error messages can be read out. Also the release can be issued. With the touch panel more profound adjustments respectively parameterization of the unit is possible.



Option 2: Fieldbus-Interfaces

For easy communication with a PLC there are 4 different fieldbus slave modules available:

- 
 CANopen: 1 x Sub-D9 male, up to 1 Mbit/s
- 
 PROFIBUS DP: 1 x Sub-D9 female, DP-V1, up to 12 Mbit/s
- 
 PROFINET I/O-RT: 2 x RJ45, 100 Mbit/s, Class B Slave
- 
 EtherCAT: 2 x RJ45, 100 Mbit/s, up to 1 ms cycle time



Necessary changes at the order number for the options:

NHCRXXXE 01 0 01

0 = Without Touch panel in front plate (if it is not already integrated in standard)
1 = With Touch panel in front plate
(for some types of devices, the touch panel could not be integrated into the front plate)

01 = Standard Digital- / Analogue- Interface
20 = additional PROFIBUS DP
30 = additional CANopen
40 = additional EtherCAT
50 = additional PROFINET

High Voltage Power-Supply HV-System Solutions



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Elektrotechnik**

The high voltage power supply of the type series **CAPTEC**, **GLOWTEC**, **VAPTEC**, **LITEC** and **WELTEC** could be work in parallel mode to increase the output power. For this purpose, the power supplies could be connected in parallel mode by means of optical fibers cables and one of the power supplies have to be configured as master and the others as slave. The total power, then divided evenly on a percentage on the devices connected in parallel. If desired, J. Schneider also takes over the installation of these devices in the necessary control cabinet included

- all necessary pre-fuses
- the necessary auxiliary voltages
- the necessary interlock circuit
- if necessary, necessary cooling water circuit
- the desired sub-distribution

The maximum possible total output per device series can be found in the following table.

SELECTION TABLE

MODULE	NO. OF MAX. PARALLEL UNITS	VOLTAGE RANGE	POWER RANGE FROM – TO MAX.
CAPTEC	7	1kV – 10kV	10kW – 70kW
	7	20kV – 40kV	21kW – 147kW
	2	50kV – 60kV	15kW – 30kW
GLOWTEC DC	7	2kV – 10kV	10kW – 70kW
	7	20kV – 40kV	21kW – 147kW
	2	50kV – 60kV	15kW – 30kW
GLOWTEC DCp	7	2kV – 5kV	10kW – 70kW
GLOWTEC AC	2	2kV – 5kV	10kW – 70kW
VAPTEC	7	8kV – 10kV	10kW – 70kW
	7	20kV – 60kV	21kW – 147kW
LITEC	10	2kV or 5kV	12kW – 120kW
WELTEC	2	60kV – 150kV	15kW – 30kW

The control cabinets are constructed according to the DIN VDE 0100 regulations the protective conductor system is tested according to DIN VDE 0100, part 600; Insulation and functional testing largely carried out in accordance with DIN VDE 0113 / 06.93 EN 60204.



High Voltage Power-Supply

Customized Solutions



**J. Schneider
Elektrotechnik**

This catalogue only contains our standard product portfolio of power supplies for High Voltage- and Vacuum-Process applications. Should you did not find any power supply which comes up to your application or your specification, please let us know and do not hesitate to contact us. Many power supplies we sell are indeed customized power supplies. Often it is possible to modify a standard power supply to meet your specific requirements. Should this not be possible, we are pleased to develop and produce a customized solution for your application. Therefore at J. Schneider Elektrotechnik GmbH a staff of high sophisticated development engineers is available.

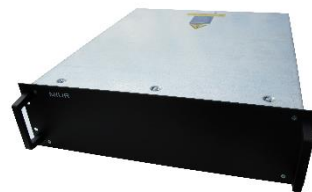
Enclosed some examples for customized solutions:



Capacitor Charger CAPTEC
35kV / 63kW / 31,5kJ



High voltage power supply
1,5kV AC / 5000mA / 38,5kHz ignition voltage ~ 2kV
3,0kV AC / 2500mA / 38,5kHz ignition voltage ~ 4kV



MIUR 3 channel emission current measurement
for 10 kV DC / 1A per channel



3kV DC / 1mA High Voltage power supply
for isolation tests



10kV DC / 10kW Electron beam power supply
with integrated sweep generator $\pm 500V$, 3,5kHz

High Voltage Power-Supply

Input- / Output- connectors / cables



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INPUT- CONNECTORS / CABLES

For the high voltage power supplies up to 10kV and up to 10kW no special mains input plugs are needed. On these devices, power input cable is connected directly to the feed-through terminals of the line filter.

ARTICLE NUMBER	USABLE FOR	CABLE TYP	CABLE LENTH		
	CAPTEC GLOWTEC VAPTEC ($V_{out} < 10kV$) ($P_{out} \leq 10kW$)	Ölflex 5 x 4mm ²		No spezial plug required. Directly connected at the terminals of the line filter.	
NDC70739F01002	LIPTEC or for	-	-	Harting plug 4mm ²	-
NDC41117F02002	CAPTEC	Ölflex 5 x 4mm ²	2 meter	Harting plug 4mm ²	Open
NDC41117F04002	GLOWTEC	Ölflex 5 x 4mm ²	4 meter	Harting plug 4mm ²	Open
NDC41117F06002	VAPTEC	Ölflex 5 x 4mm ²	6 meter	Harting plug 4mm ²	Open
NDC41117F08002	($V_{out} > 10kV$)	Ölflex 5 x 4mm ²	8 meter	Harting plug 4mm ²	Open
NDC41117F10002	($P_{out} = 10kW$)	Ölflex 5 x 4mm ²	10 meter	Harting plug 4mm ²	Open
NDC71018F01002		-	-	Harting plug 6mm ²	-
NDC41117F02002	CAPTEC	Ölflex 5 x 6mm ²	2 meter	Harting plug 6mm ²	Open
NDC41117F04002	GLOWTEC	Ölflex 5 x 6mm ²	4 meter	Harting plug 6mm ²	Open
NDC41117F06002	VAPTEC	Ölflex 5 x 6mm ²	6 meter	Harting plug 6mm ²	Open
NDC41117F08002	($V_{out} > 10kV$)	Ölflex 5 x 6mm ²	8 meter	Harting plug 6mm ²	Open
NDC41117F10002	($P_{out} \geq 20kW$)	Ölflex 5 x 6mm ²	10 meter	Harting plug 6mm ²	Open

OUTUT- CONNECTORS / CABLES

The high voltage cables, shown in the table below, as well as the plugs and sockets are suitable for voltages till 10kVDC. If you need cables or plugs for a high voltage power supply with higher voltage we would be pleased to offer them.

ARTICLE NUMBER	USABLE FOR	CABLE TYP	CABLE LENTH		
3405.3		-	-	ODU-socket 4mm	-
NHC41001E02001	CAPTEC GLOWTEC VAPTEC from NHCR => universal (up to max. 10kV)	RG213	2 meter	ODU-socket 4mm	Open
NHC41001E04001		RG213	4 meter	ODU-socket 4mm	Open
NHC41001E06001		RG213	6 meter	ODU-socket 4mm	Open
NHC41001E08001		RG213	8 meter	ODU-socket 4mm	Open
NHC41001E10001		RG213	10 meter	ODU-socket 4mm	Open
NHC41001E12001		RG213	12 meter	ODU-socket 4mm	Open
NHC41001E14001		RG213	14 meter	ODU-socket 4mm	Open
NHC41001E16001		RG213	16 meter	ODU-socket 4mm	Open
NHC41001E18001		RG213	18 meter	ODU-socket 4mm	Open
NHC41001E20001		RG213	20 meter	ODU-socket 4mm	Open

High Voltage-Power Supplies

Input- / Output- connectors / cables



**J. Schneider
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OUTUT- CONNECTORS / CABLES

ARTICLE NUMBER	USABLE FOR	CABLE TYP	CABLE LENTH		
NHC41001E02002	CAPTEC GLOWTEC VAPTEC <i>from NHCR => ground (up to max. 10kV)</i>	RG213	2 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E04002		RG213	4 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E06002		RG213	6 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E08002		RG213	8 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E10002		RG213	10 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E12002		RG213	12 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E14002		RG213	14 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E16002		RG213	16 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E18002		RG213	18 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E20002		RG213	20 meter	ODU-socket 4mm	Tube crimping lug M8
NHC41001E02003	VAPTEC <i>from NHCR => NDRG (up to max. 10kV)</i>	RG213	2 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E04003		RG213	4 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E06003		RG213	6 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E08003		RG213	8 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E10003		RG213	10 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E12003		RG213	12 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E14003		RG213	14 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E16003		RG213	16 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E18003		RG213	18 meter	ODU-socket 4mm	ODU-socket 4mm
NHC41001E20003		RG213	20 meter	ODU-socket 4mm	ODU-socket 4mm
NDC70739F01001	LITEC	-	-	EPIC plug	-
NHC41117E02003		RG213	2 meter	EPIC plug	Open
NHC41117E04003		RG213	4 meter	EPIC plug	Open
NHC41117E06003		RG213	6 meter	EPIC plug	Open
NHC41117E08003		RG213	8 meter	EPIC plug	Open
NHC41117E10003		RG213	10 meter	EPIC plug	Open
NHC41117E12003		RG213	12 meter	EPIC plug	Open
NHC41117E14003		RG213	14 meter	EPIC plug	Open
NHC41117E16003		RG213	16 meter	EPIC plug	Open
NHC41117E18003		RG213	18 meter	EPIC plug	Open
NHC41117E20003		RG213	20 meter	EPIC plug	Open
ODU-socket 4mm 3405.3		EPIC plug NDC70739F01001		Tube crimping lug M8	
					



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