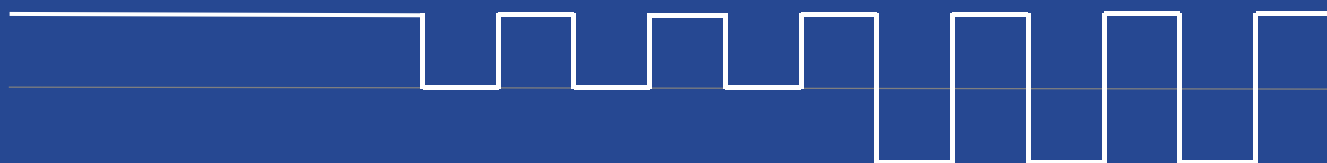


Plasma Power-Supply PLASMA *TEC*



**J. Schneider
Elektrotechnik**



from **DC** to **UNIPOLAR** to **BIPOLAR**

www.j-schneider.de

Plasma Power-Supply

PLASMA^{TEC}



J. Schneider
Elektrotechnik

SERIES OVERVIEW

The **PLASMA^{TEC}**-Series is a highly reliable, primary switched-mode power supply product line. The **PLASMA^{TEC}**-Series reveals improved process technology for thin film plasma applications. With this state of the art water-cooled power supplies, J. Schneider offers different application dedicated systems to suit the specific demand. The **PLASMA^{TEC}**-Series are characterized by the most sophisticated, flexible and adjustable arc management with extremely low passive output energy, and a high output power density.

The **PLASMA^{TEC}** power supplies are available in a wide output power range, 3kW, 5kW, 10kW, 12kW, 15kW or 20kW. Its modularity enables connections in parallel to increase the output power up to 200kW. Ideal for vacuum coating processes for hard and decorative coatings, architectural / industrial glass, flat-panel, semiconductor, data-storage, optical-, tribological- and solar applications.

PLASMA^{TEC} DC_p, **PLASMA^{TEC} A_p**, **PLASMA^{TEC} AC**, **PLASMA^{TEC} M_p** products are dedicated for magnetron sputtering deposition and PECVD processing.

PLASMA^{TEC} ARC series is special design for state of the art pulsed cathodic arc processes.

PLASMA^{TEC} DC_p provides a DC voltage or a unipolar pulsed output voltage, for planar or rotatable targets, with the most sophisticated, flexible, adjustable arc management. Ideal for single magnetron sputtering applications.

PLASMA^{TEC} A_p provides a DC voltage or a pulsed output voltage. In combination to the regular negative working pulses for thin film deposition the **PLASMA^{TEC} A_p** provides fully adjustable positive pulses including ARC detection to enhance the coating properties.

PLASMA^{TEC} AC supplies a bipolar DC pulsed wide range output voltage, with the most advanced arc handling, for dual magnetron applications. Dedicated for defect free, state of the art processing of metals, oxides and nitrides.

PLASMA^{TEC} M_p virtually combines all functions in one device, an extremely flexible power supply. It is capable of all operating modes, an improved DC operation pulse, an unipolar pulsed operation and a bipolar pulsed operation.

PLASMA^{TEC} ARC the new DC and pulsed DC cathodic ARC supply. Opens new process windows for advanced coatings for the pulsed cathodic ARC deposition technology. Optimized for stable, high rate processing and lowest droplet rate.

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Plasma Power-Supply PLASMA^{TEC}



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SELECTION TABLE	PLASMA ^{TEC} DCp	PLASMA ^{TEC} Ap	PLASMA ^{TEC} AC	PLASMA ^{TEC} Mp	PLASMA ^{TEC} ARC
	✓	✓		✓	✓
	✓	✓		✓	✓
		✓			
					✓
			✓	✓	
				✓	
Parallel switched or synchronized mode	✓			✓	✓
Interfaces: analog / digital and RS232	✓	✓	✓	✓	✓
Touch Panel	0	0	0	0	0
Fieldbus: Profibus, EtherCat, CAN, ProfiNet	0	0	0	0	0
✓ = Standard, 0 = Option					

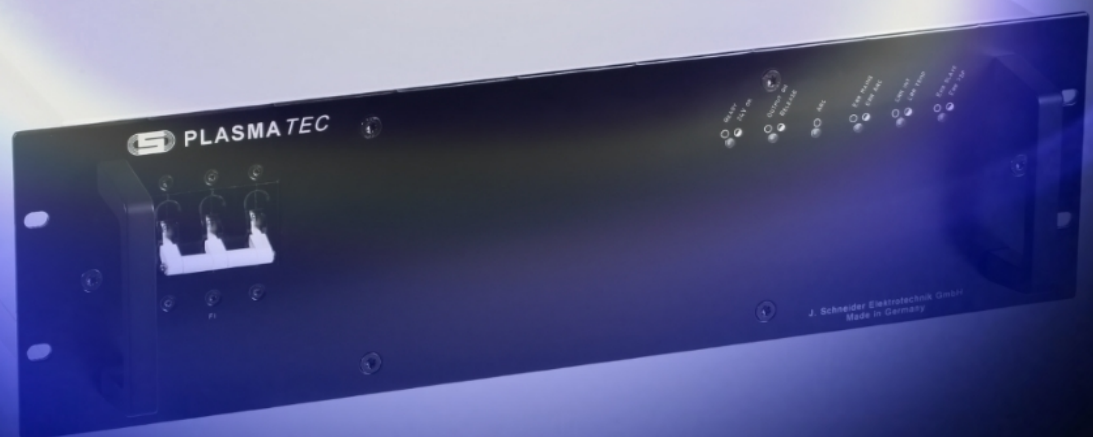
Unipolar Pulsed DC Power-Supply PLASMA^{TEC} DC_p



**J. Schneider
Elektrotechnik**

The **PLASMA^{TEC} DC_p**, the Unipolar Pulsed DC power supply from the proven J. Schneider **PLASMA^{TEC}** power supply platform for PVD, is a switched-mode power supply with the state of the art CFC (Current Fed Converter) technology. By the use of the CFC technology the output of the power supply is a true current source, the most sophisticated solution for defect free plasma processing. The **PLASMA^{TEC} DC_p** delivers DC or unipolar pulsed DC at an output frequency of 76kHz. The power supply is available with 3kW, 5kW, 10kW or 20kW. The systems can be put in parallel mode to increase the power up to 160kW. The regulation of current, voltage and power reach most accurate values via digital regulation. The **PLASMA^{TEC} DC_p** is characterized by a high power density and great robustness. Extremely low stored output energy and a sophisticated, flexible, adjustable arc management. It is ideal for industrial applications as well as for research equipment for surface developments. Its main applications are in vacuum coating processes for hard/decorative, tribological and functional coatings, optical glasses, solar cells, architecture glasses or for flat screens.

- Optimized for defect-free processing, for state of the art thin film technologies
- Small footprint, up to 20kW in 3HU
- Extremely low internal stored energy (<3mJ / 10kW)
- Water cooled



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Unipolar Pulsed DC Power-Supply PLASMA TEC DCp



**J. Schneider
Elektrotechnik**

BASIC TECHNICAL DATA:

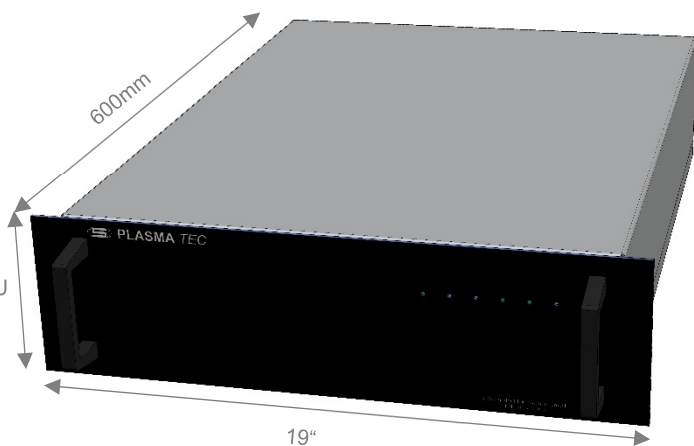
Mains:

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

Output:

Nom. output voltage V_{av} please see selection table
Nom. output power kW please see selection table
Nom. output current A_{av} please see selection table
Max. ignition voltage V_{ig} please see selection table
Nom. Output frequency 76kHz
Duty cycle 7.6% to 93.8% (1 to 12.2 μ sec)

Front view:

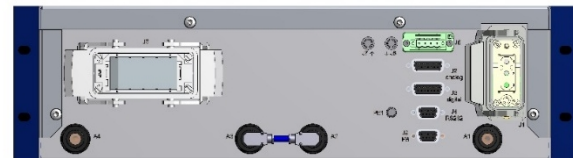


Back view:

NDCR1306F01001, NDCR1014F01001, NDCR1016F01001



NDCR1018F01001



Height : 3 HU = 133,35mm
Wide : 19" = 482,6mm
Deep : 600mm = 740 mm inclusive plug

SELECTION TABLE:

MAXIMUM OUTPUT RATING				MODULE NUMBER	ARTICLE NUMBER
V_{av}	A_{av}	kW	V_{ig}		
400-800	7.5 - 3.75	3	1400	PLASMA TEC DCp 0k83k7	NDCR1306F01001
400-800	12.5 - 6.25	5	1400	PLASMA TEC DCp 0k86k2	NDCR1014F01001
400-800	25.0 - 12.5	10	1400	PLASMA TEC DCp 0k812k	NDCR1016F01001
400-800	50.0 - 25.0	20	1400	PLASMA TEC DCp 0k825k	NDCR1018F01001

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Active Pulsed DC Power-Supply PLASMA TEC Ap



**J. Schneider
Elektrotechnik**

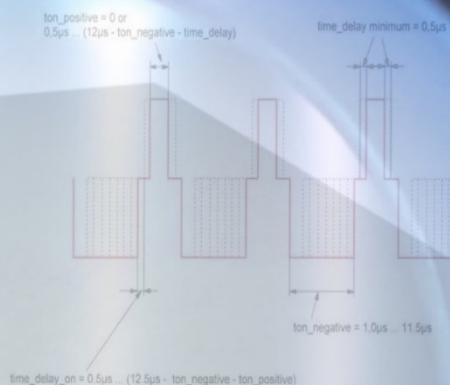
The **PLASMA TEC Ap**, the Unipolar Pulsed DC power supply from the proven J. Schneider **PLASMA TEC** power supply platform for PVD, is a switched-mode power supply with the state of the art CFC (Current Fed Converter) technology. By the use of the CFC technology the output of the power supply is a true current source, the most sophisticated solution for defect free plasma processing. The **PLASMA TEC Ap** alternatively provides a DC or unipolar pulsed DC current / voltage at an output frequency of 76kHz. Unique for this **PLASMA TEC Ap** unit is the optional and fully active adjustable reverse pulse mode with Arc detection.

The power supply is available with 5kW and 10kW. The 10kW can be put in parallel mode to increase the power up to 80kW. The regulation of current, voltage and power reach most accurate values via digital regulation. The **PLASMA TEC Ap** is characterized by a high power density and great robustness. Extremely low stored output energy and a sophisticated, flexible, adjustable arc management. It is ideal for industrial applications as well as for research equipment for surface developments. Its main applications are in vacuum coating processes for hard/decorative, tribological and functional coatings, optical glasses, solar cells, architecture glasses or for flat screens.

- Optimized for defect-free processing, for state of the art thin film technologies
- Small footprint, up to 10kW in 3HU within active adjustable reverse pulsing
- Extremely low internal stored energy (<3mJ / 10kW)
- Water cooled

Negative pulse:
- maximum peak output current = 24 A
- output voltage range = 0 ... 1000 V
- nominal output voltage at maximum power = 500 ... 1000 V
- maximum output power = 12 kW
- ignition voltage = 1200 ... 1400 V

Positive pulse:
- maximum output current = 12 A
- output voltage range = 0 ... 1000 V
- nominal output voltage at maximum power = 500 ... 1000 V
- maximum output power = 6 kW



Active Pulsed DC Power-Supply PLASMA TEC Ap



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Elektrotechnik**

BASIC TECHNICAL DATA:

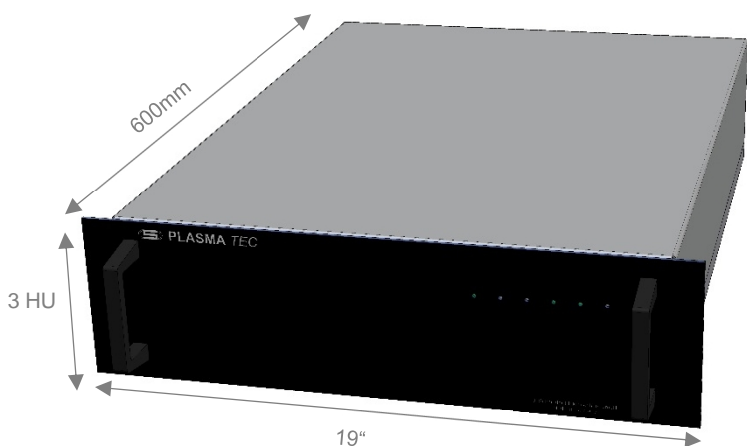
Mains:

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

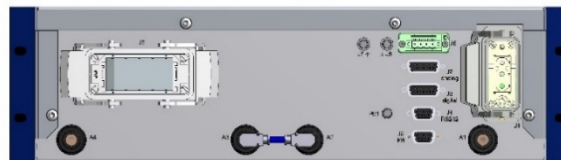
Output:

Nom. output voltage V_{av} please see selection table
Nom. output power kW please see selection table
Nom. output current A_{av} please see selection table
Max. ignition voltage V_{ig} please see selection table
Nom. Output frequency 76kHz
Duty cycle (DC and unipolar pulse mode) 7.6% to 88.5% (1 to 11.5 μ sec)
Duty cycle (unipolar with reverse pulse) 7.6% to 88.5% (1 to 11.5 μ sec)

Front view:



Back view



Height : 3 HU = 133,35mm
Wide : 19" = 482,6mm
Deep : 600mm = 740 mm inclusive plug

SELECTION TABLE:

MAXIMUM OUTPUT RATING				MODULE NUMBER	ARTICLE NUMBER
V_{peek}	A_{peek}	kW _{peek}	V_{ig}		
500-1000	24 – 12	12	1400	PLASMA TEC Ap 1k012k	NDCR1703F01001
500-1000	12 - 6	6	1400	PLASMA TEC Ap 1k06k0	NDCR1702F01001

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Bipolar Pulsed DC Power-Supply PLASMA TEC AC



**J. Schneider
Elektrotechnik**

The **PLASMA TEC AC**, the Bipolar Pulsed DC power supply from the proven J. Schneider **PLASMA TEC** power supply platform for PVD and PECVD is a switched-mode power supply with the modern CFC (Current Fed Converter) technology. By the use of the CFC technology the output of the power supply is a true current source, the most sophisticated solution for defect free plasma processing. The **PLASMA TEC AC** delivers a bipolar output current with an output frequency of 38.46 kHz. The pulse duration can be selected from 1µsec to 12.7µsec. This enables an ultra wide range duty cycle from 7.6% to 97.7%. The regulation of current, voltage and power reach most accurate values via digital regulation.

Internal tap setting enable a flexible, wide output voltage range. The **PLASMA TEC AC** is the ideal choice for dual magnetron applications.

- Optimized for defect-free processing, for state of the art thin film technologies
- Small footprint
- 12kW from up to 450V to 2800V
- Inherent Current Source Characteristic, that insures no current overshoot by an ARC
- Extremely low internal stored energy
- Water cooled



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Bipolar Pulsed DC Power-Supply PLASMA TEC AC



**J. Schneider
Elektrotechnik**

BASIC TECHNICAL DATA:

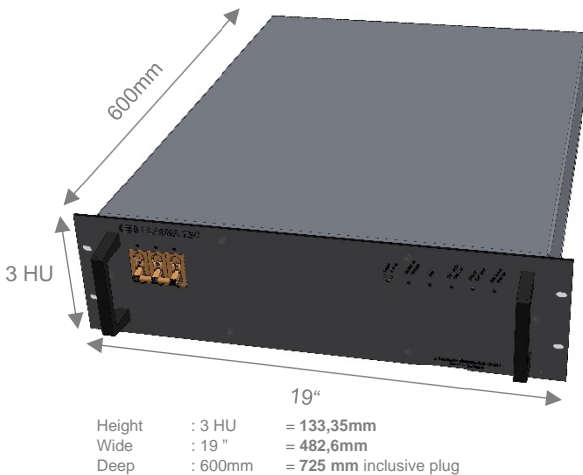
Mains:

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

Output:

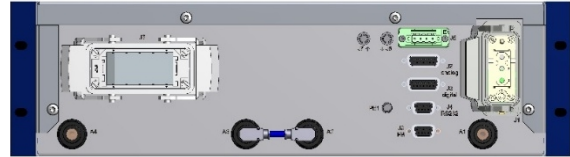
Nom. output voltage V_{av} please see selection table
Nom. output power kW please see selection table
Nom. output current A_{av} please see selection table
Max. ignition voltage V_{ig} please see selection table
Nom. Output frequency 38,46kHz
Duty cycle 7.6% to 97.7% (1 to 12.7 μ sec)

Front view:

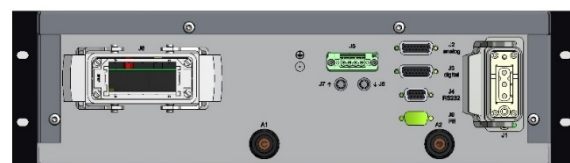


Back view:

NACR1620F01001, NACR1621F01001, NACR1621F01001



NACR1325F01001, NACR1326F01001, NACR1135F01001



SELECTION TABLE:

MAXIMUM OUTPUT RATING				MODULE NUMBER	ARTICLE NUMBER
V_{av}	A_{av}	kW	V_{ig}		
400-800	12,5 – 6.25	5	1400	PLASMA TEC AC 0k86k2	NACR1620F01001
400-800	25 – 12.5	10	1400	PLASMA TEC AC 0k812k	NACR1621F01001
400-800	50 – 25	20	1400	PLASMA TEC AC 0k825k	NACR1622F01001
450-2800 450-1150 870-2200 1100-2800	26 – 4.3 26.0-10.4 13.5-5.5 10.6-4.3	12	2550 3550 4200	PLASMA TEC AC 2k84k3	NACR1325F01001
360-1800 360-920 550-1300 750-1800	32.5 – 6.5 32.5-12.7 21.3-9.0 15.6-6.5	12	1350 1800 2700	PLASMA TEC AC 1k86k5	NACR 1326F01001
650-2000 650-1000 950-1400 1300-2000	22.5 – 7.3 22.5-14.6 15.4-10.4 11.25-7.3	15	1250 1780 2540	PLASMA TEC AC 2k07k3	NACR 1135F01001

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DC / Unipolar / Bipolar pulsed PLASMA TEC Mp



**J. Schneider
Elektrotechnik**

The **PLASMA TEC Mp** is the most flexible power supply from the proven J. Schneider **PLASMA TEC** power supply platform. The **PLASMA TEC Mp** power supplies provides / delivers multiple pulse shapes, an improved DC, unipolar pulse or bipolar pulse output current / voltage and are specially developed for plasma processes till 800V. In the range of 400V till 800V the full output power could be available.

At DC mode the device provides an improved DC output current / voltage which reduces the ARC tendency compared to pure standard DC.

At unipolar pulse mode the device provides an output frequency of 76kHz. The pulse duration can selected from 1 μ sec to 11 μ sec. This enables a wide range duty cycle from 7.6% to 85%.

At bipolar pulse mode the device provides an output frequency of 38kHz. The pulse duration also can selected from 1 μ sec to 11 μ sec, which comes up a duty cycle from 7.6% to 85%. The positive and negative pulses have the same output voltage. The number of pulses is adjustable from 1 till 255. The device is available with 5kW resp. 10kW and to increase the power it is possible to run up to 10 devices (100kW) in parallel mode.

The power supplies feature an extreme low output energy, an sophisticated flexible adjustable arc-management, a high power density as well as an incomparable robustness. Therefore they are ideal for the use in industrial coating plants as well as in laboratories for coating development of glasses, photovoltaic cells, large area coating for glass or for flat panels. The regulation of current, voltage and power reach most accurate values via digital regulation.

- Optimized for defect-free processing, for state of the art thin film technologies
- Small footprint
- Inherent Current Source Characteristic, that insures low current overshoot by an ARC
- Extremely low internal stored energy



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DC / Unipolar / Bipolar pulsed PLASMA TEC Mp



**J. Schneider
Elektrotechnik**

BASIC TECHNICAL DATA:

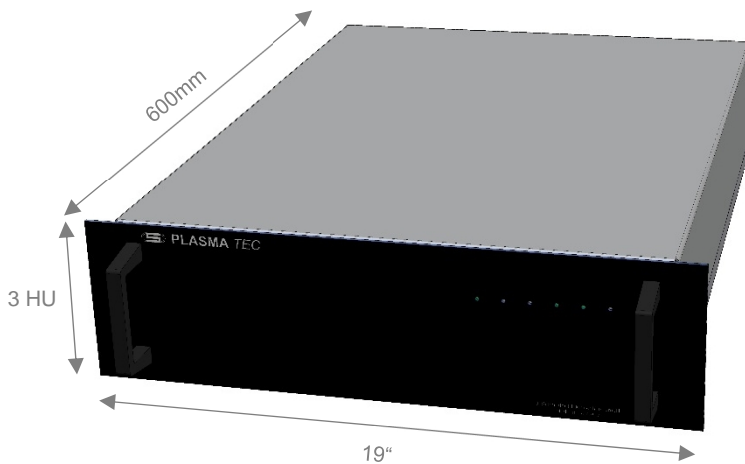
Mains:

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

Output:

Nom. output voltage V_{av} please see selection table
Nom. output power kW please see selection table
Nom. output current A_{av} please see selection table
Max. ignition voltage V_{ig} please see selection table
Nom. Output frequency unipolar 76kHz
Nom. Output frequency bipolar 38,46kHz
Duty cycle 7.6% to 85% (1 to 11 μ sec)

Front view:



Back view:



Height : 3 HU = 133,35mm
Wide : 19" = 482,6mm
Deep : 600mm = 725 mm inclusive plug

SELECTION TABLE:

MAXIMUM OUTPUT RATING				MODULE NUMBER	ARTICLE NUMBER
V_{av}	A_{av}	kW	V_{ig}		
400-800	12.5 – 6.25	5	1400	PLASMA TEC Mp 0k86k2	NDCR1015F01001
400-800	25.0 – 12.5	10	1400	PLASMA TEC Mp 0k812k	NDCR1017F01001

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Pulsed Cathodic ARC-Supply

PLASMA^{TEC} ARC



J. Schneider
Elektrotechnik

The **PLASMA^{TEC} ARC** is a high power switched mode power supply product line with state of the art CFC (Current Fed Converter) technology. The **PLASMA^{TEC} ARC** series are special designed for pulsed cathodic arc processes. The devices provide either straight DC or pulsed DC output current. In pulsed operation the base current and peak current and also the duty cycle can be set in a wide range. (Duty cycle can be set from 1-99%, the frequency 1-250Hz)

- Optimized for “droplet less” ARC / pulsed ARC processing
- Small footprint
- 12kW up to 400A (200A version planned)
- Inherent Current Source Characteristic, that insures stable ARC-Current (CFPP)
- Low stored energy
- Advanced pulsing capability (Multilevel Pulsing)
- Accurate Current Control with low overshoot



Pulsed Cathodic ARC-Supply PLASMA TEC ARC



**J. Schneider
Elektrotechnik**

Basic Technical Data:

Mains:

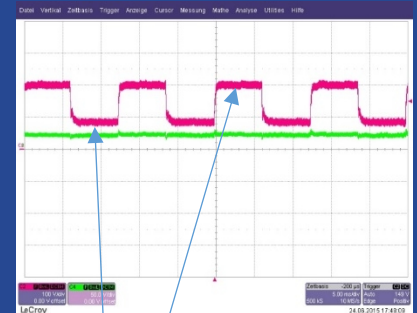
Input voltage: 3 x 400V AC ± 10%
Frequency: 50 / 60 Hz ± 5%

DC-Mode:

Nom. output voltage: 10-30 DC (60V open voltage)
Nom. output power: 12 kW
Nom. output current: 400 A @ 30V

Pulsed-Mode:

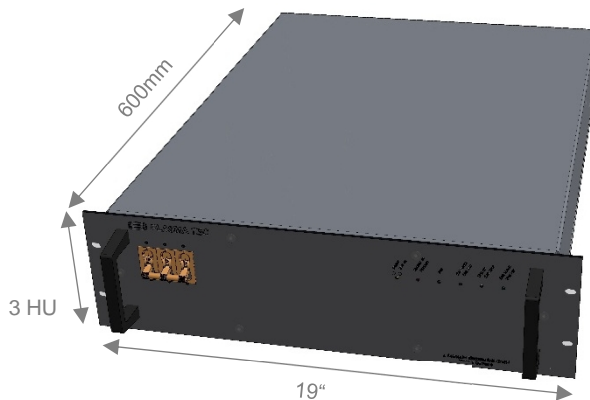
Max. output voltage: 30 V (60V open voltage)
Max. output power: 12 kW
Max. output base current: 400 A @ 30V
Max. output peak current: 400 A @ 30V
Pulsing Frequency: 1Hz to 250Hz
Duty cycle: 1% to 99%
Minimum pulse length: 500µsec
Nominal output current in pulse mode



I_{Base} : 80A
 I_{Peak} : 200A
Duty-Cycle 50%
Frequency: 200Hz

e.g. $I_{av} = [I_{Base} \times (1 - \text{Duty Cycle})] + I_{Peak} \times \text{Duty Cycle}$
 $I_{av} = [80A \times (1 - 0,5)] + (200A \times 0,5) = 140A_{av}$

Front view:



Height : 3 HU = 133,35mm
Wide : 19" = 482,6mm
Deep : 600mm = 650 mm inclusive clamps

Back view:



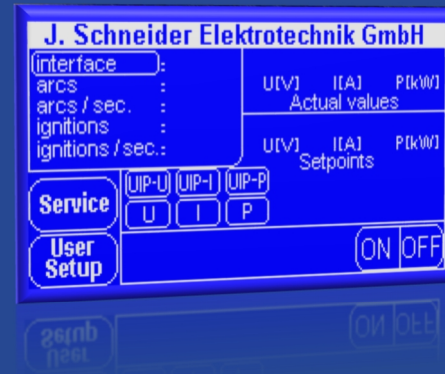
SELECTION TABLE:

MAXIMUM OUTPUT RATING				MODULE NUMBER	ARTICLE NUMBER
V_{av}	A_{av}	kW	V_{ig}		
30	200	6	60	PLASMA TEC ARC 030200	NACR1436F01001
30	400	12	60	PLASMA TEC ARC 030400	NACR1437F01001
80	200	16	140	PLASMA TEC ARC 080200	NACR1439F01001

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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: 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:

NACR1436F 01 0 01

↑ ↑
0 = Without Touch panel in front plate
1 = With Touch panel in front plate

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

Input / Output connectors

PLASMA TEC



J. Schneider
Elektrotechnik

INPUT CONNECTOR:

ARTICLE NUMBER	USABLE FOR	CABLE TYP	CABLE LENTH		
NDC70739F01002	PLASMA TEC DCp (5; 10kW)	non	0 meter		
NDC41117F02002		Öflex 5 x 4mm ²	2 meter		
NDC41117F04002		Öflex 5 x 4mm ²	4 meter		
NDC41117F06002		Öflex 5 x 4mm ²	6 meter		
NDC41117F08002		Öflex 5 x 4mm ²	8 meter		
NDC41117F10002		Öflex 5 x 4mm ²	10 meter		
NDC71018F01002	PLASMA TEC DCp (20kW)	non	0 meter		
NDC41018F02002		Öflex 5 x 6mm ²	2 meter		
NDC41018F04002		Öflex 5 x 6mm ²	4 meter		
NDC41018F06002		Öflex 5 x 6mm ²	6 meter		
NDC41018F08002		Öflex 5 x 6mm ²	8 meter		
NDC70739F01001	PLASMA TEC Mp	non	0 meter		
NHC41117F02001		2 x RG213	2 x 2 meter		
NHC41117F04001		2 x RG213	2 x 4 meter		
NHC41117F06001		2 x RG213	2 x 6 meter		
NHC41117F08001		2 x RG213	2 x 8 meter		
NDC71016F01001	PLASMA TEC DCp (5 -10kW)	non	0 meter		
NDC41016F02001		2 x H2010	2 x 2 meter		
NDC41016F04001		2 x H2010	2 x 4 meter		
NDC41016F06001		2 x H2010	2 x 6 meter		
NDC41016F08001		2 x H2010	2 x 8 meter		
NDC71018F01001	PLASMA TEC DCp (20kW)	non	0 meter		
NDC41018F02001		2 x Ecoflex 15	2 x 2 meter		
NDC41018F04001		2 x Ecoflex 15	2 x 4 meter		
NDC41018F06001		2 x Ecoflex 15	2 x 6 meter		
NDC41018F08001		2 x Ecoflex 15	2 x 8 meter		
NAC71325F01001	PLASMA TEC AC (5; 10; 12; 15kW)	non	0 meter		
NAC41325F02001		2 x RG213	2 x 2 meter		
NAC41325F04001		2 x RG213	2 x 4 meter		
NAC41325F06001		2 x RG213	2 x 6 meter		
NAC41325F08001		2 x RG213	2 x 8 meter		

OUTPUT CONNECTOR:

ARTICLE NUMBER	USABLE FOR	CABLE TYP	CABLE LENTH		
NDC70739F01001	PLASMA TEC Mp	non	0 meter		
NHC41117F02001		2 x RG213	2 x 2 meter		
NHC41117F04001		2 x RG213	2 x 4 meter		
NHC41117F06001		2 x RG213	2 x 6 meter		
NHC41117F08001		2 x RG213	2 x 8 meter		
NDC71016F01001	PLASMA TEC DCp (5 -10kW)	non	0 meter		
NDC41016F02001		2 x H2010	2 x 2 meter		
NDC41016F04001		2 x H2010	2 x 4 meter		
NDC41016F06001		2 x H2010	2 x 6 meter		
NDC41016F08001		2 x H2010	2 x 8 meter		
NDC71018F01001	PLASMA TEC DCp (20kW)	non	0 meter		
NDC41018F02001		2 x Ecoflex 15	2 x 2 meter		
NDC41018F04001		2 x Ecoflex 15	2 x 4 meter		
NDC41018F06001		2 x Ecoflex 15	2 x 6 meter		
NDC41018F08001		2 x Ecoflex 15	2 x 8 meter		
NAC71325F01001	PLASMA TEC AC (5; 10; 12; 15kW)	non	0 meter		
NAC41325F02001		2 x RG213	2 x 2 meter		
NAC41325F04001		2 x RG213	2 x 4 meter		
NAC41325F06001		2 x RG213	2 x 6 meter		
NAC41325F08001		2 x RG213	2 x 8 meter		



**J. Schneider
Elektrotechnik**



J. Schneider Elektrotechnik GmbH
Helmholtzstrasse 13
D-77652 Offenburg
Germany
Tel. +49 / (0) 781 / 206 – 0
Fax +49 / (0) 781 / 25318

www.j-schneider.de

info@j-schneider.de

180320

www.j-schneider.de