



DC/DC and AC/DC

planar wide temperature range converters for land, maritime and aero-space application

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"Always choose the most difficult path - you will not meet competitors there"

Charles de Gaulle



Alexander Goncharov CEO, founder, general designer

ALEXANDER ELECTRIC s.r.o. was founded in Prague, Czech Republic, in 2006, as a start-up company for design and creation of new power supply systems to compete with American companies like SYNQOR, VPT, INTERPOINT.

The braveness of the company was rewarded with many interesting projects from England, Spain, Israel, India, South Korea, USA and other countries.

Cooperation with European contract manufactures made us into a producer of both serial and custom AC/DC and DC/DC power supply units and converters o both serial and custom products with appropriate lead times.

ALEXANDER ELECTRIC s.r.o. has recently become a member of Czech defense industry association "AOBP" ("DSIA" in English), which defined new constructive-technical properties and abilities for us to reach in our updated products.

In 2023 **ALEXANDER ELECTRIC s.r.o.** has specialized in design and production of planar AC/DC and DC/DC fan-less power units aimed at application in mission-critical equipment owing to unique characteristics of operation while under effect of extreme environmental factors like ultralow and ultrahigh temperatures, pollution, salt mist, strong vibrations and impacts.

Our core competencies are in the development and production of power supply units and systems for application in:

- 1. Flying objects artillery shells, rockets, planes, helicopters, drones.
- 2. Different types of radar (including APAR and long-distance radars).
- 3. Armored vehicles transporters, tanks, launchers, etc.
- 4. Communication and radio-electronics equipment, including optical fiber equipment.
- 5. Repairs and modernization of power supply systems for obsolete specialized equipment.

Features and properties of our products:

- Operating case temperature from -60°C to +125°C makes possible functioning in compartments with loss of sealing on land, in mountains and deserts, at low and high altitudes, up to near space.
- Low profile power supply construction allows minimization of space occupied by the power supply in the whole device, thereby saving up space for most important part of the device. Our units reach power density of more than 200 W/in³ for DC/DC units and more than 40 W/in³ for AC/DC units.
- The units and power blocks offer **adaptation** ("**flexibility**") of its geometric dimensions, including changing the location of mounting points which is essential when replacing or modernizing a product of other manufacturers.
- Our products are designed to be **cooled conductively** and therefore don't contain any fans which (having moving parts) are an element of unreliability. The ability to use conduction cooling is crucial **in airtight spaces** where air extraction not possible.
- Resistance to mechanical shocks and heavy vibrations due to special potting makes possible application in artillery shots with overload of up to 10000 G and more.

Our outlook into the future is optimistic. We're in search for partners and investors for further development of our company.

Best regards, Alexander Goncharov CEO.

Parameters	DC/DC JETDiR-SP	DC/DC JETDiV	DC/DC JETDiR	DC/DC JETDi	AC/DC JETA-LP	AC3PH/DC JETNA-LP
Input type (AC also accepts DC)	DC	DC	DC	DC	AC 1 ph.	AC 3 ph.
Maximum power, W	300	600	1 500	150	3 000	10 000
Maximum power density, W/in3	57	82	205	124	28	47
Number of channels possible	1, 2, 3	1, 2	1, 2	1, 2	1, 2	1
DC "28W" 16-50 VDC, surge 80 VDC	•		•	•		
DC "28" 16-40 VDC, surge 50 VDC	•		•	•		
DC "48" 34-75 VDC, surge 100 VDC	•		•	•		
DC "48W" 9-80 VDC, surge 100 VDC	•		•	•		
DC HV "150" 82-200 VDC, surge 230 VDC		•				
DC HV "270" 155-400 VDC, surge 450 VDC		•				
AC 1ph. "115" 80-138 VAC, surge 150 VAC					•	
AC 1ph. "230W" 100-264 VAC					•	
AC 3ph. "220" 187-253 VAC						•
AC 3ph. "400" 323-440 VAC						•
l out max 25 A				•		
l out max 30 A	•					
l out max 50 A		•	•			
l out max 100 A					•	
l out max 270 A						•
Tcase -50 +100°C					•	
Tcase -60 +100°C						•
Tcase -60 +110°C		•				
Tcase -60 +125°C	•		•	•		
Mounting holes	•	•	•		•	•
ON/OFF	•	•	•	•	•	•
Active parallel operation	•	•	•		•	•
Remote sense	•	•	•		•	•
Constant current mode for charging large capacities					•	•

JETDiR-SP series, 5 - 300 W, DC/DC converters for aero-space applications. BRICK formfactors. Reinforced metal case. Counter-bore mounting holes. Up to two output channels. Operating case temperature range -60 ... +125°C. No optocouplers inside, built-in filters, CE MIL-STD-461



- Brick form factors with double-sided count-bore mounting holes.
- Built-in input and output EMC filters (MIL-STD-461), no opto-couplers circuit solutions.
- Input mains: 28W, 28, 48 and 48W.
- Ultra-wide case operating temperature range -60 ... +125°C.
- Outputs with galvanically isolated channels, which allows them to be connected in series to obtain high-voltage output.

Application: DC/DC **aerospace JETDiR-SP** series is designed to operate in both (a) protected sealed and (b) unprotected compartments of various equipment sensitive to impulse EM interference including:

- analogue signal processing equipment,
- radio-receiving and radio-transmitting equipment,
- radars and digital informational equipment,
- equipment powering gyroscopes.

Beyond standard long-term application **JETDiR-SP** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- short-term over-maximum-power operation.

Electric features: the units operate with three variants of input mains: **28W** (16-50 VDC, 80 VDC tran.), **28** (16-40 VDC, 50 VDC tran.), **48W** (9-80 VDC, 100 VDC tran.) and **48** (34-75 VDC, 100 VDC tran.). The power supplies have the standard range of service functions, including parallel operation in high-power models. Efficiency of up to 93 % due synchronous rectification in most models makes possible operation with up to +125°C of case temperature.

Design features: JETDIR-SP as a series with complete built-in filtering presents unprecedentedly high power density up to 56 W/in³. Reinforced aluminum units cases contain double-side counter-bore mounting holes which provide space for screw heads. Case base has stiffening ribs and also serves for conductive cooling. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – resistance to and durability against mechanical stress is unique.

The converters are meant to be mounted on a coldplate or heatsink for one sided conductive or forced-air cooling. In certain cases purely convectional cooling method is allowed.

Absence of internal cavities and materials emitting gases in vacuum conditions allows the JETDiR-SP series to be used at all altitudes, including near-space.

													EMC standard	ds
Type of the unit	Maximum power when ordering, W	Dimensions, mm without flanges	Maximum output current, A	Power density, W/in3	Number of outputs	Input 28W (16-50 V), surge 80 V	Input 28 (16-40 V), surge 50 V	Input 48 (34-76 V), surge 100 V	Input 48W (9-80 V), surge 100 V	Isolation input-output, kV	Trimming	Parallel operation	Additional EMC filter	MIL-STD-461 CE
JETDiR-SP-10	10	R1: 32x21x10 DIP 24	2	25	1	•	•	•	•	=1.5	•		JETDF2.5	•
JETDIR-SP-15	15	R2 : 26x26x10 1x1 "	3	35	1	•	•	•	•	=1.5	•		JETDF2.5	•
JETDiR-SP-20	20	R3: 37x26x10 1/16 BRICK	4	31	1	•	•	•	•	=1.5	•		JETDF2.5	•
JETDIR-SP-50	50	R4: 51x26x11 1/8 BRICK	10	57	1	•	•	•	•	=1.5	•		JETDF5	•
JETDIR-SP-80	80	R5: 58x37x11 1/4 BRICK	16	56	1	•	•	•	•	=1.5	•		JETDF5	•
JETDIR-SP-150	150	R6: 61x59x12 1/2 BRICK	20	53	1	•	•	•	•	=1.5	•	•	JETDF10	•
JETDIR-SP-300	300	R7: 117x61x13 FULL BRICK	30	53	1	•	•	•		=1.5	•	•	JETDF20	•

Notes: • - available, the standard version of the input voltage is highlighted in blue. A graph of the relationship between power and ambient temperature is shown on the page <u>22</u>.

Possible cooling methods

These power supplies can operate with conductive heat removal or with forced as an example, see the temperature diagram of **JETDiR-SP-80** (90% efficiency) unit without an additional heatsink with case temperature controlled and maintained under +125°C -air cooling., as well as output power dependence from ambient temperature with no heatsink. As the ambient temperature rises, the output power needs to be reduced.



JETDiV series, 50 - 600 W, high input voltage DC/DC planar converters with output voltage up to 400 VDC. Open-slot mounting holes. Up to two output channels. Wide operating case temperature range -60 ... +110°C.



- Brick form-factors with open-slot mounting holes.
- High voltage input mains: **150** and **270**.
- Output voltage variants from 5 VDC to 400 VDC.
- Wide case operating temperature range -60°C ... +110°C.
- Outputs with galvanically isolated channels, which allows them to be connected in series to obtain high-voltage output.

Application: DC/DC power supply units of **JETDIV** series are meant for a wide range of application where high input voltage is obtained by rectification and filtration of 3-phase mains or is provided by high voltage lithium battery (and similar). Fit to be used in:

- flying and stationary objects at low, medium, and high altitudes (including long wired power supply lines),

- aircraft and missiles with strong vibrations and mechanical shocks,
- maritime equipment and transport,
- gyroscopes and capacitive energy storage,
- telecommunication facilities and radars.

Beyond standard long-term application **JETDiV** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- short-term over-maximum-power operation.

Electric features: the units operate with three variants of input mains: **150** (113-196 VDC, 210 VDC tran.) and **270** (240-425 VDC, 450 VDC tran.). The power supplies have the standard range of service functions, including parallel operation in high-power models. Efficiency of up to 90 % makes possible operation with up to +110°C of case temperature.

Design features: JETDiV series presents small dimensions and high power density up to 81 W/in³. Reinforced aluminum units cases contain open-slot mounting holes allowing certain freedom in choosing of mounting coordinates. Case base has stiffening ribs and also serves for conductive cooling. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – resistance to and durability against mechanical stress is unique.

The converters are meant to be mounted on a coldplate or heatsink for one sided conductive or forced-air cooling. In certain cases purely convectional cooling method is allowed.

The table below shows basic parameters of this series.

Type of the unit	Maximum power when ordering, W	Dimensions, mm without flanges	Maximum output current, A	Power density, W/in3	Number of outputs	Input 150 (82-200 V), surge 230 V	Input 270 (155-400 V), surge 450 V	Isolation input-output, kV	Trimming	Parallel operation	MIL-STD-461 CE
JETDiV75	75	V1: 58x37x11 1/4 BRICK	15	53	1	•	•	=1.5	•		•
JETDiV150	150	V2: 61x59x12 1/2 BRICK	20	53	1	•	•	=1.5	•	•	•
JETDiV300	300	V3: 117x61x13 FULL BRICK	40	53	1	•	•	=1.5	•	•	•
JETDiV600	600	V4: 119x63x16 FULL BRICK+	50	82	1	•	•	=1.5	•	•	•

Notes: • - available, the standard version of the input voltage is highlighted in blue. A graph of the relationship between power and ambient temperature is shown on the page <u>22</u>.

Possible cooling methods

These power supplies can operate with conductive heat removal or with forced-air cooling. As an example, see the temperature diagram of **JETDiV75** (91% efficiency) unit without an additional heatsink with case temperature controlled and maintained under +110°C, as well as output power dependence from ambient temperature with no heatsink. As the ambient temperature rises, the output power needs to be reduced.



JETDiR universal series, 15 - 1500 W, planar DC/DC units for aerial, land and maritime applications. Aluminum case of BRICK format. Minimized dimensions and weight. Operating case temperature range -60 ... +125°C



- Brick form factors with double-sided count-bore mounting holes.
- Flexible cases customization of case dimensions is available (dimensions can be increased only).
- A wide selection of input mains: 28, 28W, 48, 48W.
- Ultra-wide case operating temperature range -60 ... +125°C.

Application: DC/DC power supply units of **JETDiR** series are meant for universal application with different low voltage DC input ranges. In both (a) protected sealed and (b) unprotected compartments of:

- flying and stationary objects at low, medium and high altitudes,
- ground transport, i.e. railway, automobile, and tracked types of vehicles,
- maritime equipment,
- telecommunication facilities, radars, supercomputers,
- digital signage equipment, flat displays and other informational devices.

Beyond standard long-term application **JETDiR** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- operation in case of contaminaton by sand, in salt fog, in high humidty,
- short-term over-maximum-power operation.

Electric features: the units operate with three variants of input mains: **28W** (16-50 VDC, 80 VDC tran.), **28** (16-40 VDC, 50 VDC tran.), **48** (34-75 VDC, 100 VDC tran.), **48W** (9-80 VDC, 100 VDC tran.). The power converters offer the standard range of service functions, including parallel operation in high-power models. Efficiency of up to 93 % due synchronous rectification in most models makes possible operation with up to +125°C of case temperature.

Design features: JETDiR series presents small dimensions and high power density up to 205 W/in³. Reinforced aluminum units cases contain double-side counter-bore mounting holes which provide space for screw heads. Case base has stiffening ribs and also serves for conductive cooling. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – resistance to and durability against mechanical stress is unique.

The converters are meant to be mounted on a coldplate or heatsink for one sided conductive or forced-air cooling. In certain cases purely convectional cooling method is allowed.

JETDIR series units may be modified to offer different dimensions (increased), mounting holes placement, additional constructive components (like cooling ribs).

The table below shows basic parameters of this series.

	vhen vithout		rent, A	~					t, kV			EMC standard	ds
Type of the unit	Maximum power whe ordering, W	Dimensions, mm with flanges	Maximum output cur	Power density, W/in3	Input 28W (16-50 V), surge 80 V	Input 28 (16-40 V), surge 50 V	Input 48 (34-75 V), surge 100 V	Input 48W (9-80 V), surge 100 V	Isolation input-outpu	Trimming	Parallel operation	Additional EMC filter	MIL-STD-461 CE
JETDiR20	20	R1: 32x21x10, DIP 24	4	49	•	•	•	•	1.5	•		JETDF2.5	•
JETDiR30	30	R2: 26x26x10, 1x1"	6	73	•	•	•	•	1.5	•		JETDF2.5	•
JETDiR40	40	R2B: 37x26x10, 1/16 BRICK	6	62	•	•	•	•	1.5	•		JETDF2.5	•
JETDiR100	100	R3: 51x26x11, 1/8 BRICK	12	113	•	•	•	•	1.5	•		JETDF5	•
JETDiR150	150	R4: 58x37x11, 1/4 BRICK	20	105	•	•	•	•	1.5	•		JETDF10	•
JETDiR300	300	R5: 61x59x12, 1/2 BRICK	40	106		•	•		1.5	•	•	JETDF20	•
JETDiR700	700	R6: 117x61x13, FULL BRICK	50	124		•	•		1.5	•	•	external	•
JETDiR1500	1500	R6E: 119x63x16, FULL BRICK+	50	205		•	•		1.5	•	•	external	•

Notes: • - available, the standard version of the input voltage is highlighted in blue. *A graph of the relationship between power and ambient temperature is shown on the page <u>22</u>.*

Possible cooling methods

These power supplies can operate with conductive heat removal or with forced-air cooling. As an example, see the temperature diagram of **JETDiR40** unit without an additional heatsink with case temperature controlled and maintained under +125°C, as well as output power dependence from ambient temperature with no heatsink. As the ambient temperature rises, the output power needs to be reduced.



JETDi series, 10 - 150 W, DC/DC converters with no mounting holes for simple installation. Copper thin-walled cases, minimized weight and dimensions. Operating case temperature range -60 ... +125°C



- Thin-walled copper cases with excellent heat conduction, pin-to-pin compatible with most popular models of other manufacturers that can be replaced by JETDi with improvement of basic specifications (like power output).
- Ultra-wide case operating temperature range -60 ... +125°C.
- A wide selection of input mains: **28W**, **28**, **48** and **48W**.
- Feasibility of two-channel output with galvanically isolated channels, which allows them to be connected in parallel or in series to obtain high-voltage output.
- Lightweight construction doesn't require additional mounting.

Application: DC/DC power supply units of **JETDi** series are designed to operate in various conditions. However due to simplified casing without any mounting holes the units should only be used with medium-strength vibrations and mechanical shocks, in equipment of:

- flying and stationary objects at low and medium altitudes,
- ground transport, i.e. railway, automobile, and tracked types of vehicles,
- maritime equipment,
- telecommunication facilities, radars, supercomputers,
- digital signage equipment, flat displays and other informational devices.

Beyond standard long-term application **JETDi** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- operation in case of contaminaton by sand, in salt fog, in high humidty.

Electric features: the units operate with three variants of input mains: **28W** (16-50 VDC, 80 VDC tran.), **28** (16-40 VDC, 50 VDC tran.), **48** (34-75 VDC, 100 VDC tran.), **48W** (9-80 VDC, 100 VDC tran.). The power supplies have the standard range of service functions, including parallel operation in high-power models. Efficiency of up to 93 % due synchronous rectification in most models makes possible operation with up to +125°C of case temperature.

Design features: JETDi series presents small dimensions and high power density up to 122 W/in³. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – **resistance to and durability against mechanical stress is high.**

The converters are meant to be attached to a coldplate or heatsink via thermal adhesive for one sided conductive or forced-air cooling. In certain cases purely convectional cooling method is allowed.

	ר ordering, W	out flanges	ent, A			surge 80 V	rge 100 V	urge 100 V	Ž		EMC standard	ds
Type of the unit	Maximum power whe	Dimensions, mm with	Maximum output curr	Power density, W/in3	Number of outputs	Input 28W (16-50 V), 🤅	Input 48 (34-76 V), su	Input 48W (9-80 V), si	Isolation input-output,	Trimming	Additional EMC filter	MIL-STD-461 CE
JETDi20	20	C1: 32x21x10 DIP 24	4	49	1,2	•	•	•	1.5	•	JETDF2.5	•
JETDi30	30	C2: 26x26x10 1x1"	6	73	1,2	•	•	•	1.5	•	JETDF2.5	•
JETDi40	40	C2B: 26x26x10 1x1"	8	62	1,2	•	•	•	1.5	•	JETDF2.5	•
JETDi100	100	C3: 51x26x10 1/8 BRICK	15	124	1,2	•	•	•	1.5	•	JETDF5	•
JETDi150	150	C4: 58x37x11 1/4 BRICK	25	105	1	•	•	•	1.5	•	JETDF10	•

Notes: • - available, the standard version of the input voltage is highlighted in blue.

A graph of the relationship between power and ambient temperature is shown on the page 23.

Possible cooling methods

These power supplies can operate with conductive heat removal or with forced-air cooling. As an example, see the temperature diagram of **JETDi100** unit without an additional heatsink with case temperature controlled and maintained under +125°C, as well as output power dependence from ambient temperature with no heatsink. As the ambient temperature rises, the output power needs to be reduced.



JETA-LP series, 50 - 3000 W, 1 ph. AC/DC fan-less units. High precision CNC-milled aluminum cases. Top output power in low-profile. Operating case temperature range -50 ... +100°C



- CNC milled casings, mounting footprint replacing units of previous generations.
- Powered by 1-phase AC input or DC equivalent, up to 400 Hz on request.
- The max heights of the units of this series are from 19 mm (100 W) to 39 mm (3000 W).
- Ultra-wide case operating temperature range -60 ... +100°C.
- Dual-zone unit temperature sensor.
- Output up to 400 VDC on request.

Application: AC/DC 1 phase power supply units of **JETA-LP** series are designed to operate in both (a) protected sealed and (b) unprotected compartments of:

- flying and stationary objects at low and medium altitudes,
- ground transport, i.e. railway, automobile, and tracked types of vehicles,
- maritime equipment,
- telecommunication facilities, radars, supercomputers,
- digital signage equipment, flat displays and other informational devices.

Beyond standard long-term application **JETA-LP** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- operation in case of contaminaton by sand, in salt fog, in high humidty.

Electric features: the **JETA-LP** units operate with two variants of input mains: **230W** (100-264 VAC), and **115** (80-138 VAC, 150 VAC transient). The power supplies have the standard range of service functions, including parallel operation in high-power models. The series offers up to 95 % efficiency and +100°C of case operating temperature. Units of 300 W and higher contain active PFC.

Design features: JETA-LP series doesn't contain any fans, presents small dimensions, low profile and high power density up to 28 W/in³. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – **resistance to and durability against mechanical stress is high.**

The power supply units are meant to be attached to a coldplate or heatsink via thermal adhesive for one sided conductive or forced-air cooling. Power supplies of 300 W and higher are equipped with a dual-zone temperature sensor with one control zone in the lower area next to the baseplate, and the second control area in the upper part of the unit under the cover. This ensures high reliability and makes it possible to solve the problems of so-called thermal pockets in the unit's operating area, for example, under its casing.

	ц		ent, A			4C)	264 VAC) out. kVAC	, kvac				EMC St	anda	rds
Type of the unit	Maximum power whe ordering, W	Dimensions, mm	Maximum output curr	Power density, W/in3	Number of outputs	Input 115 (80 - 138 V/ surge 150 VAC	Input 230W (100 - 26 [,] no surge	Isolation input-output	Parallel operation	Trimming	Parallel operation	EN55022 Class B	EN55022 Class A	MIL-STD-461 CE
JETA100-LP	100	A1 : 100x51x19	16	17	1.2	×	•	3				•		•
JETA150-LP	150	A2: 110x61x21	24	18	1.2	×	•	3				•		•
JETA300-LP	300	A3: 133x83x25	30	18	1.2	×	•	3		•		JETAF5	٠	•
JETA700-LP	700	A4: 174x92x29	50	25	1	×	•	3	•	•	•	JETAF10	•	•
JETA1500-LP	1500	A5: 210x116x37	60	28	1	×	•	3	•	•	•	JETAF10	•	•
JETA2000-LP	2000	A6: 250x141x38	80	25	1	×	•	3	•	•	•	JETAF20	•	•
JETA3000-LP	3000	A7: 300x170x39	100	25	1	×	•	3	•	•	•	JETAF20	•	•

Notes: • - available, × - on request, the standard version of the input voltage is highlighted in blue. A graph of the relationship between power and ambient temperature is shown on the page 23.

Possible cooling methods

JETA100-LP, JETA150-LP and JETA300-LP units can be used without an additional heatsink in accordance with the diagram below (**JETA150-LP**); for example, they can be located on a metal wall of an equipment cabinet (use of heat-conducting paste is needed). As the ambient temperature rises, the output power needs to be reduced.

JETA700-LP - JETA3000-LP power supply units of higher power are designed only for use either with conductive cooling using aluminum or copper heatsink for forced air cooling or with a natural convection heatsink with vertical fins for easy passage of air between the fins from bottom up.



JETNA-LP series, 50 - 3000 W, 1 ph. AC/DC fan-less units. High precision CNC-milled aluminum cases. Top output power in low-profile. Operating case temperature range -60 ... +100°C



- Aluminum or copper CNC milled casings, mounting footprint replacing units of previous generations.
- Powered by 3-phase AC input 50 Hz up to 400 Hz on request without neutral or DC equivalent.
- The max heights of the units of this series are from 29 mm (800 W) to 40 mm (10 000 W).
- Ultra-wide case operating temperature range -60°C ... +100°C.
- Dual-zone unit temperature sensor.
- Output up to 400 VDC on request.

Application: AC/DC 3 phase power supply units of **JETNA-LP** series are designed to operate in both (a) protected sealed and (b) unprotected compartments of:

- flying and stationary objects at low and medium altitudes,
- ground transport, i.e. railway, automobile, and tracked types of vehicles,
- maritime equipment,
- telecommunication facilities, radars, supercomputers,
- digital signage equipment, flat displays and other informational devices.

Beyond standard long-term application **JETNA-LP** series units are also designed for **mission-critical** applications:

- operation in case of equipment compartment breach and loss of airseal,
- operation in case of contaminaton by sand, in salt fog, in high humidty.

Electric features: the **JETNA-LP** units operate with two variants of input mains (3 phases without neutral): **400** (323-440 VAC) and **220** (187-253 VAC). The power supplies have the standard range of service functions, including parallel operation. The series offers up to 96 % efficiency and +100°C of case operating temperature.

Design features: JETNA-LP series doesn't contain any fans, presents small dimensions, low profile and high power density up to 47 W/in³. Considering that all components are constructively connected to the base and submerged in heat-transferring potting – **resistance to and durability against mechanical stress is high.**

The power supply units are only meant to be attached to a coldplate or heatsink via thermal adhesive for one sided conductive or forced-air cooling. Power supplies of 300 W and higher are equipped with a dualzone temperature sensor with one control zone in the lower area next to the baseplate, and the second control area in the upper part of the unit under the cover. This ensures high reliability and makes it possible to solve the problems of so-called thermal pockets in the unit's operating area, for example, under its casing.

	Ν		A		((kVAC		insor			EMC Stan	dard	S
Type of the unit	Maximum output power, \	Dimensions, mm	Maximum output current,	Power density, W/in3	Input 220 (187 - 253 VAC) 3 phases without N	Input 400 (323 - 440 VAC) 3 phases without N	Isolation input-output, kV/	Number of outputs	Dual-zone temperature se	Trimming	Parallel operation	EN55022 Class B	EN55022 Class A	MIL-STD-461 CE
JETNA1000-LP	1000	A4: 174x92x29	60	36	×	•	3	1	•	•	•	JETAF15-400	•	•
JETNA2000-LP	2000	A5: 210x116x37	100	37	×	•	3	1	•	•	•	JETAF15-400	•	•
JETNA3000-LP	3000	A6: 250x141x38	125	37	×	•	3	1	•	•	•	JETAF15-400	•	•
JETNA5000-LP	5000	A7: 300x170x39	200	42	×	•	3	1	•	•	•	JETAF15-400	•	•
JETNA10000-LP in development	10000	A8: 350x220x40	270	47	×	•	3	1	•	•	•	JETAF30-400	•	•

Notes: • - available, × - on request, the standard version of the input voltage is highlighted in blue.

Possible cooling methods

These units do not have their own cooling system and are intended for use in conjunction with conductive cooling using an aluminum or copper heatsink or coldplate (for example, an aluminum plate 4 mm thick or more). Forced air cooling or a convection heatsink with a vertical arrangement of fins can also be used for easy air passage between the fins from bottom up.





JETDF series, 2.5-20 A, filtersuppressors for DC/DC units - limiting short electromagnetic noise pulses and voltage surges, metal case

JETDF series are DC/DC filter-suppressor units with varistor and suppressor limiters for short electromagnetic noise pulses and voltage surges coming from the input mains.

The AEPS-group's **JETDF** series filter-suppressor units are designed to operate in harsh-conditions environment. The units (a) provide protection of critically important analogue and digital circuitry against pulse main surges and (b) filter out noise in input and output circuit parts of power supply units and blocks. High reliability, mechanical strength and resistance to vibration and shock, temperature stability are all ensured by the use of electromagnetic components based on amorphous nanocrystalline materials.

Nominal current, A	Type of the unit	Dimensions, mm	Current surge kA, max. 8/20 µs	Input 28W (16-50V)	Input 48W (9-80V)	Case operating temperature - 60+125 °C	lsolation input/output, kVDC	Insertion loss 1 -10 MHz, dB
2,5	JETDF2.5M	32x21x10 DIP 24	0.25-1.2	•	•	•	1	≥55
5	JETDF5M	37x26x11 1/16 BRICK	0.25-1.2	•	•	•	1	≥55
10	JETDF10M	51x26x11 1/8 BRICK	0.25-1.2	•	•	•	1	≥55
20	JETDF20M	58x37x11 1/4 BRICK	0.25-1.2	•	•	•	1	≥55





JETAF series, 1-20 A, filter-suppressors for AC/DC units - limiting short electromagnetic noise pulses and voltage surges, metal case

JETAF series are AC/AC filter-suppressor units with varistor and suppressor limiters for short electromagnetic noise pulses and voltage surges coming from the input mains.

Nominal current, A	Type of the unit	Dimensions, mm	Current surge kA, max. 8/20 µs	Input ~400W (~323-440 VAC) no surge	Input ~ 220W (~187-253 VAC) no surge	Input ~ 115W (~80-138 VAC) surge ~150 VDC	Input ~230W (100-264 VDC) no surge	Operating case temperature -60+100 °C	Insulation case to input/output, kVAC	Insertion loss 1 -10 MHz, dB
1	JETAF1	58x37x11	1.2		•	•	•	•	1,5	55
5	JETAF5	100x51x19	1.2		•	•	•	•	1,5	55
10	JETAF10	110x61x21	1.2		•	•	•	•	1,5	55
20	JETAF20	133x83x25	1.2		•	•	•	•	1,5	55
15	JETAF15-400	133x83x25	4.5	•	•	•	•	•	1,5	55

The AEPS-group's **JETAF** series filter-suppressor units are designed to operate in harsh-conditions environment. The units (a) provide protection of critically important analogue and digital circuitry against pulse main surges and (b) filter out noise in input and output circuit parts of power supply units and blocks. High reliability, mechanical strength and resistance to vibration and shock, temperature stability are all ensured by the use of electromagnetic components based on amorphous nanocrystalline materials.

The greatest effect is achieved when used together with ALEXANDER ELECTRIC power supply AC/DC units.



Recommendations for safe use, operation and typical connection schemes of power supply units (PSU) of Alexander Electric

Our team is confident that You have highly qualified personnel with skills in the power supply industry, a good grasp of the PSU structure and view our innovative solutions with optimism. We have experience investigating your typical mistakes caused by traditional approaches to new products. As the General designer of ALEXANDER ELECTRIC, I will try to tell you about the most "effective" mistakes.

1. You must understand that the most destructive thing for a PSU is heat - due to the direct influence of temperature on reliability. The most important thing both you and we should strive for is to spread the heat center-spots over the heat dissipating surface of the PSU, bottom of its base, as much as possible!

The trending miniaturization of **your** own equipment as a process aimed at reducing and thinning of everything is fully relevant to what is described above.

As a result, the heat dissipating base in our products design has minimal thickness of 0.4 mm in the thinnest places of low-power PSUs and 0.8-1.5 mm in high-power PSUs. For some of the units, if they are turned on without any heat dissipating coldplate or heatsink connected - internal components temperatures (transistors, diodes, suppressors, chips) may rise quickly to dangerous values (150-200 °C) and even if turned off in time, it does not mean that fate will forgive you another such attempt.

Be warned: a plastic fan is no help to you in such case, even if used with a cardboard tube for efficiency.

TIP: follow the datasheet carefully, don't turn on the PSU on an office desk without a heat dissipating plate at least partially simulating your future heatsink or coldplate.

2. If you have a heatsink, to avoid typical mistakes follow the guidelines:

- the heatsink surface contacting with a PSU cooling surface should have flatness of less than 0.1 mm per 100 mm;
- thermal paste used as heat transfer medium thermal coefficient should be higher than 3.0 W/(m*K);
- thermal paste should be applied with a mesh stencil in a pattern of squares (i.e. 2x2 mm to 4x4 mm squares mm with 0.5-1 mm spacing between the squares), which allow the paste to be evenly spread in a thin layer and excess air to escape when tightening screws during unit mounting;
- finally, don't forget to remove the product label if it's located on it's heat transferring bottom.

If you need to turn on the unit for a short time, e.g. for input inspection, **a 4-8mm copper plate should be used as a temporary heatsink**. The width and length of the plate should be in 1.5-2 times the size of the unit itself.

3. Do not solder wires to the DC/DC units pins! All DC/DC PSUs with pins are designed to be mounted on printed circuit boards only!

When (a) soldering a wire to the pins, especially a large diameter wire, (b) when the unit is operating in an environment with vibrations and mechanical shocks and (c) even during assembly - the unit pins are practically cantilevers that transmit forces to the PCB inside the PSU. This happens both during soldering and long term operation. Combined with heating - the resulting micro-movements act on the ceramic capacitors inside the PSU that split and shatter the ultra-thin layers of ceramic capacitor structure. **Explosions and PCB burnouts in these areas are inevitable and lead to unexpected failures.**

PSU filling potting, even highly stiff, does not help in that case and may even cause more trouble during thermal PSU cycles.

TIP: If you have difficulty designing a part of the PCB for a PSU - we can help you with that. The best way of connecting the PSU pins inside equipment is **to use PCBs with at least four layers of 100-400 µm copper layers**. We may design and provide these printed circuit boards on request. Often, we also offer preliminary analysis and construction of the cooling system.

4. One of the big mistakes customers often do is measuring ripple at the output of the PSU incorrectly.

We RECOMMEND:

a) Use an oscilloscope cable with a "closed" input and with a increased wire resistance, for example 50-200 ohms;

b) The cable should be loaded with an impedance equal to the wave impedance (often 50 ohms), usually placed in a **shielded volume at the oscilloscope input connector**;

c) A resistor equal to the cable impedance and an isolating capacitor (not ceramic) should be connected in series with the cable wire on the output side of the unit, in the shielded volume;

d) Conduct measurements only using the external components recommended in the datasheet of the PSU;

e) Do not measure ripple if the unshielded part of the cable (facing the PSU output) is longer than 3-4 mm;

f) It is better to measure ripple at some distance from the unit's case; the distance should be approximately corresponding to the real one in the equipment. We recommend connecting the output contacts of the PSU to the measuring point via a twisted wire pair;

All of the above may sound quite complex and require certain preparation, but otherwise you won't measure true PSU output ripple - instead you'll see artefacts occurring in the oscilloscope cable, caused by the resonance of the cable and connection scheme! The measurement error might be tens to hundreds.

In our opinion, it is better to use a specialized oscilloscope with a differential input and at least a specialized cable for measuring accurate ripple values at the output of a PSU.

AC/DC PSUs have all the necessary components inside for matching with typical electronic and electrical systems and usually do not require additional components on the input or output.

However, it should be borne in mind that the input fuse they contain is only intended for **fire-protection functions**, i.e. it is designed to withstand a considerable excess of input current caused by a major malfunction in the unit itself.

This fuse is irreplaceable, the unit itself in such accident also suffers damages and is not repairable. For example, cause by external factors - varistors inside a PSU and semiconductor suppressors may fail (in emergency of input mains overvoltage), printed circuits might get damaged, etc.

In this regard, for safety reasons for AC/DC units, it is mandatory to implement a hardware type fast-acting fuse of replaceable type (or a fast-acting circuit breaker) and, most importantly, with a triggering current value that prevents ignition in the power supply unit structure.

The fuse as well as the mains protection circuit breaker is selected based on the following condition. Its current should be 2-2.5 times of the maximal input unit current (with sufficient accuracy obtained by dividing output unit power by its input operating voltage).

For example, for the **JETA2000-LP** unit with minimum line voltage of 100 VAC one should a fuse for 40-60 A (unit input current is 2000 W / 100 V = 20 A).

In critical cases to reduce EM noise - it's highly effective to form common-mode chokes (put on both input and output wires) using ferrite cores with high magnetic permeability (5000-10000). Usually one or two

turns are required. But the most effective solution to improve the EMC parameters is to use the interference filters in this catalogue.



But there are significant differences in case of DC/DC type units. Small dimensions and high power density in my cases do not leave enough space to place all protective and interference-suppressing elements inside DC/DC units.

Also, DC/DC units in general have pronounced negative input impedance, which often worsens their stability. Therefore, we recommend connecting electrolytic and ceramic capacitors of different types to the input pins (you may consult with us).

Further in picture below we show a minimal connection scheme, i.e. the DC/DC unit must not be operated without the external elements shown in the diagram!



Here you may see the input and output points of connection (pins), the unit case as a rectangle and the case pin as ground. The components shown in the picture, electrolytic and ceramic capacitors, are should be connected in the shortest way possible to the corresponding case pins as well as the case is grounded in the shortest way possible.

Ceramic capacitors of temperature group X7R with capacitance 10-20 nF are chosen for operating input voltages of up to 50 V. At higher voltages, e.g. 100-200 V, they are chosen with capacitance of 3-6 nF.

Electrolytic capacitors (aluminium, polymer aluminium, polymer tantalum), are placed in close proximity to the corresponding pins. In this case, their internal ohmic resistance is used to damp high-frequency resonance oscillations.

Their maximum operating voltage should be at least 1.5 times the maximum voltage applied to them, any foreseeable surges, even of microsecond duration, should be taken into account when choosing the components.

In special cases, if there are circuits with commutated inductances near the unit (e.g. relays, chokes, transformers, electric motors, etc., which can cause pulsed EM interference in the conductors connected to

the unit) - it is desirable to have semiconductor suppressors on the input and output wires of the unit (not shown in the diagram above).

It is highly desirable (!) that the printed circuit board conductors connecting external capacitors to the unit's pins are not "drawn" in such way that they get under the unit's "belly". What is good to place under the "belly" is a shielding surface, connected to the unit's ground pin. It is not good practice to run signal conductors in this area.

An approximate calculation of the required capacitance of the input electrolytic capacitors to ensure **stable** operation of the DC/DC type unit is as following.

Let's imagine that the minimum input voltage at the inputs of a unit is 9 VDC, the output power of a unit is 100 W. In that case, you would need an electrolytic capacitor directly on the input pins with a capacitance greater than 250 μ F. For a unit with minimum input voltage of 16 VDC, the capacitance greater than 100 μ F for every 100 W of power should be chosen. Considering that the capacitance can be reduced by about 2.5-3 times if the voltage is increased by a factor of 2, we provide an approximate table for the selection of electrolytic capacitors for our "28", "28W", "48W", "150" and "270" mains of DC/DC units.

Mains	"48W"	"28", "28W"	"48"	"150"	"270"
Input capacitance per 100 W	6x478x47 μF or 3x1004x100 μF 100V e.g., UBW NICHICON	3x474x47 μF or 2x1003x100 μF 100V e.g.,UBW NICHICON	3x224x22 μF or 2x473x47 μF 160V e.g.,UBX NICHICON	3x6,84x6,8 μF or 2x103x10 μF 350V e.g.,UBX NICHICON	2x153x15 μF or 2x183x18 μF 500V e.g.,UCY NICHICON

We remind you that the best solution to reduce the level of electromagnetic noise is to use *our own* filtersuppressor products along with the recommended filtration circuitries.

Best regards, general designer of ALEXANDER ELECTRIC

ALEXANDER GONCHAROV

Diagrams

JETDiRs-SP series



JETDiV series



JETDIR series



JETDi series



JETA-LP series





ALEXANDER ELECTRIC s.r.o.

AEPS-group located in the Czech Republic is an European developer and manufacturer of high-tech planar AC/DC and DC/DC power supply units, converters and custom systems of power from 10 to 10 000 Watts for reliable use in demanding applications and extreme harsh environment operating conditions.

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