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FLEX Power Supplies 1, 2 and 3 Phase



Thank you for having chosen one of our products for your work. We are certain the ADEL System Power Supplies will meet your application requirements.

Application

The power supplies FLEX Series can be used in areas from extreme industrial environment, and complies with the latest technical standard. Before working with the unit, read these instructions carefully and completely. All these power supplies are single output, IP20, have Mounting DIN Rail IEC 60715/TH35. Class 1 isolation devices suitable for SELV and PELV solutions.

Safety and warning notes

WARNING – Explosion Hazard Do not disconnect Equipment unless power has been switched off or the area is known to be non-hazardous.
WARNING – Explosion Hazard. Substitution of components may impair suitability for class I, Division 2.
WARNING – Switch off the system before connecting the module. Never work on the machine when it is live. The device must be installed in according with UL508. The device must have a suitable isolating facility outside the power supply unit, via which can be switched to idle. Danger of fatal Injury!

Connection:

Cable Connection: The following cable cross-sections may be used:

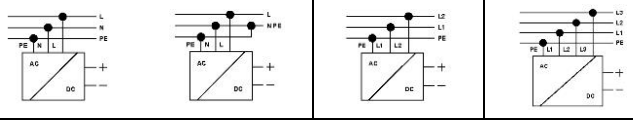
	Solid (mm²)	Stranded (mm²)	AWG	Torque (Nm)	Stripping Length	Power Supply
Input:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Others
	4.0	6.0	30 – 10	0.8 – 1.0 Nm	7 mm	Flex 500 series
Output:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Others
	4.0	6.0	30 – 10	0.8 – 1.0 Nm	7 mm	Flex 500 series
Signal:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Others
	4.0	6.0	30 – 10	0.8 – 1.0 Nm	7 mm	Flex 500 series

The connection is made by the screw type 2.5 mm² (FLEX60-90-170-280 series) or 4.0 mm² (FLEX500 series) terminal blocks. Use only copper cables that are designed for operating temperatures of > 75 °C. Wiring terminal shall be marked to indicate the proper connection for the power supply.

Input - Output power connection:

Input:		
FLEXxxxxxA series	1 Phase Switching Power Supplies	L, N, PE ⏚.
FLEXxxxxxB series	1Phase Switching Power Supplies	L, N, PE ⏚.
FLEXxxxxxB series	2 Phase Switching Power Supplies	L1, L2, PE ⏚
FLEX500xxB series	3 Phase Switching Power Supplies	L1, L2, L3, PE ⏚.
Output:	24 Vdc is made via the	(+), (-).

1 Phase L N PE | 1 Phase L NPE | 2Phase | 3 Phase

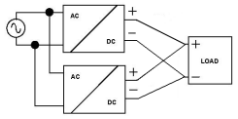


Signalling:

Led (Dc ok) status:	**Jumper Setting**
Output voltage OK: Lights up permanently	Hiccup Mode / Manual Reset / Continuous Mode
Switch off, in overload and short circuit conditions	Manual Reset / Continuous Mode
Blink, in overload and short circuit conditions	Hiccup Mode

Parallel Connection, to Increase Output Power:

- Made parallel connection with same model of power supply to increase the output power.
- Adjust the output approximately to the same value (± 20mV) applying 1-2 A load to all devices output before connecting them in parallel.
- Easy parallel connections Jumper. In FLEX280xxX and FLEX500xxX for more power, you must change position of the jumper to enable parallel connection. In this mode you can put in parallel up to 4 power supply





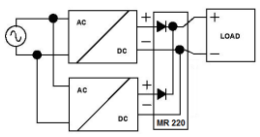
Easy Parallel connection OFF(factory selection)



Easy Parallel connection ON

Parallel connection Redundancy:

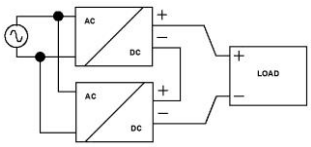
Power supplies can be paralleled for 1+1 redundancy to obtain a higher system availability. Redundant systems require a certain amount of extra power to support the load in case one power supply unit fails. The simplest way is to put two FLEX power supplies in parallel. In case one power supply unit fails, the other one is automatically able to support the load current without any interruption. This simple way to build a redundant system has two major disadvantages:
- The faulty power supply can not be recognized. The LED will still be ON since it is reverse-powered from the other power supply.



It does not cover failures such as an internal short circuit in the secondary side of the power supply. In such a - virtually nearly impossible - case, the defective unit becomes a load for the other power supplies and the output voltage can not be maintained any more.
This can only be avoided by utilizing decoupling diodes which are included in the Redundancy Module MR220.
Recommendations for building redundant power systems:
a) Use separate input fuses for each power supply.
b) Monitor the individual power supply units. A DC-Led and Power Good Contact are already included on FLEX power supplies. This feature reports a faulty unit; see power Good Section for any technical detail.
c) When possible, connect each power supply to different phases or circuits.

Serial connection:

a) It is possible to connect as many units in series as needed, providing the sum of the output voltage does not exceed 150Vdc.
b) Voltages with a potential above 60Vdc are not SELV any more and can be dangerous. Such voltages must be installed with a protection against touching.
c) For serial operation use power supplies of the same type.
d) Earthing of the output is required when the sum of the output voltage is above 60Vdc.
e) Keep an installation clearance of 15mm (left/right) between two power supplies and avoid installing the power supplies on top of each other. Note: Avoid return voltage (e.g. from a decelerating motor or battery) which is applied to the output terminals.

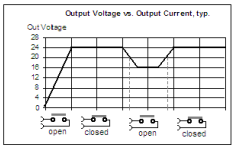


Power Good Output Function (No for FLEX60xxX)

PWR Good

Output are used for preventive function monitoring of the power supply. An electrically isolated signal contact is available. The signal contact Closes when output power is OK and Opens when output voltage falls below 20Vdc ±5%. This feature is particularly useful in redundant applications.
Power Good Contact rating:

Max. DC1: 30 Vdc 1 A; AC1: 60 Vac 1A	Resistive load (EN 60947-4-1)
Min.:1mA at 5 Vdc	Min permissive load



Protection:

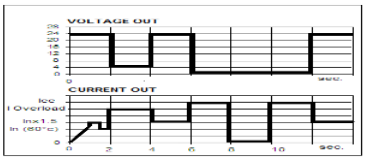
On the primary side: the device is equipped whit an internal fuse; follow the next page table. If the internal fuse is blown (fails opens), it is most probable that there is a fault in the device. If this failure occurs, the device must be checked in the factory. **Caution:** in two phase Input models, Double pole / Neutral Fusing.
On the secondary side: the devices are electrically protected against: Over Load, Over Voltage Output (typ.35 Vdc), and Short circuit automatically.

Short circuit and overload Protections Mode:

Depending on the users application loads, the ADEL Flex Line offers three types of protection modes which are available by removing the plastic window and changing the Jumper to the desired setting as shown below:
(No Settings jumper for FLEX60xxA only Continuous Mode Condition)

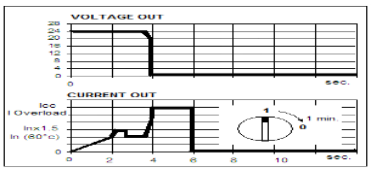
1) HICCUP MODE (default factory Jumper setting)

General purpose mode, used for normal load. In case of short-circuit or overloading, the output current is interrupted. The device tries again to re-establish output voltage and normal condition about every 2 second till the problem is cleared.



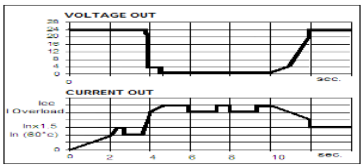
2) MANUAL RESET (manual Restart by Operator)

This protection mode is particularly suggested in applications where safety procedures require that reset be carried out only by an authorized person.
In case of short-circuit or overload, the output current is interrupted. In order to restart the output it is necessary to switch-off the input circuit for about 1 – 5 minutes.



3) CONTINUOUS OUTPUT MODE

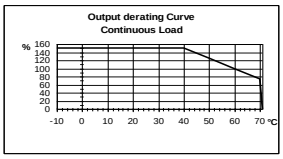
In case of short-circuit or overload, the output current is kept at high values with near zero voltage. In case of short circuit the current can reach up to 3 times the rated current at 60°C. This protection mode is used to meet the requirements of demanding loads such as motors, solenoid valves, lamps, PLC with highly capacitive input circuits and other loads with marked transient overload behavior



The output of the device is electrically protected against overload and short circuit. For the nominal voltage and nominal current at temperature condition, please see technical data. The device can supply at the nominal Current without switching off. As the overload increases, the output voltage is reduced until zero.

Temperature Ratings

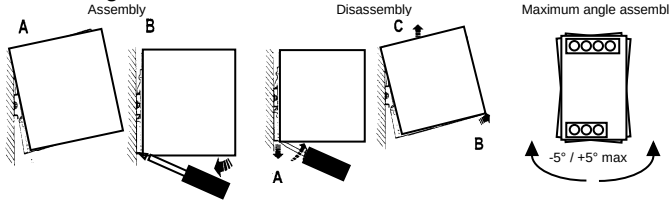
Surrounding air temperature 50 °C for FLEX60xxA, for the other 60°C. At the temperature of 70°C the output current will be 75% - 50% of In. The equipment does not switch off in case of ambient temperature above 70°C or thermal overload. The devices are protected for Over temperature conditions "worst case"; in this situations the device Shut-down the output and automatic restart when temperature inside fall.



Standards and Certification

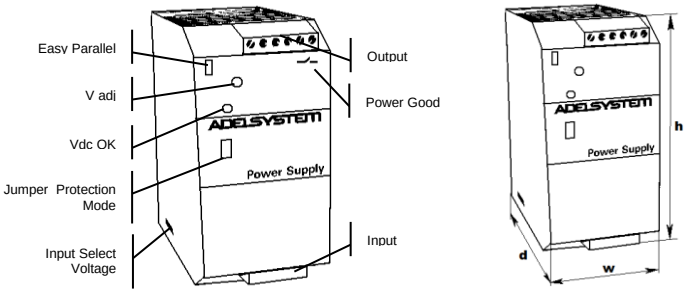
Electrical Safety:
Assembling device: UL508, IEC/EN 60950 (VDE 0805) and EN 50178 (VDE 0160).
Installation according: IEC/EN 60950. Safety EN IEC 61010-2-201:2018
Input / Output separation: SELV EN 60950-1 and PELV EN 60204-1. Double or reinforced insulation.
EMC Standards Immunity:
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5.
EMC Standards Emission:
EN 61000-6-4, EN 61000-3-2,
Standards Conformity:
Safety of Electrical Equipment Machines: EN 60204-1.
CE The CE mark in According to EMC 2014/30/UE and Low voltage directive 2014/35/UE
UL Listed 508
Except for model **FLEX50024A** and **FLEX50024B**, these devices are intended to be connected to a "Secondary Circuit Overvoltage Category II"

Rail Mounting:



Other models / modules must have a minimum vertical and horizontal distance of 10 cm to this power supply in order to guarantee sufficient auto convection. Depending on the ambient temperature and load of the device, the temperature of the housing can become very high!

Dimension and Layout:



FLEX Power Supply	24Vdc								
	1 Phase					2 and 3 Phase			
Technical Data									
Model	FLEX6024A	FLEX9024A	FLEX17024A	FLEX28024A	FLEX50024A	FLEX9024B	FLEX17024B	FLEX28024B	FLEX50024B
Wattage	40–70W	95–120W	120–180W	240–330W	480–600W	95–120W	120–180W	240–330W	480–600W
INPUT DATA	2 x Vac					2 x Vac			3 x Vac
Nominal Input Voltage	115 – 230Vac	115 – 230Vac Input selectable	115 – 230Vac Input selectable	115 – 230Vac Input selectable	115 – 230Vac Input selectable	230 – 400 – 500Vac Input selectable	230 – 400 – 500Vac Input selectable	230 – 400 – 500Vac Input selectable	400 – 500Vac
Input Voltage Range	90 – 264Vac	90 – 135Vac 170-264 Vac 238-370 Vdc	90 – 135Vac 170-264 Vac 238-370 Vdc	90 – 135Vac 170-264 Vac 238-370 Vdc	90 – 135Vac 170-264 Vac 238-370 Vdc	187 – 264Vac 330 – 550Vac 462 – 770Vdc	187 – 264Vac 330 – 550Vac 462 – 770Vdc	187 – 264Vac 330 – 550Vac 462 – 770Vdc	330 – 550Vac
Inrush Current (Vn and In Load) I^2t	≤ 19 A ≤ 5msec	≤ 36 A ≤ 5msec	≤ 36 A ≤ 5msec	≤ 42 A ≤ 5msec	≤ 50 A ≤ 5msec	≤ 28 A ≤ 5msec	≤ 28 A ≤5 msec	≤ 34 A ≤5 msec	≤ 35 A ≤ 5 msec
Frequency	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Input Current	1.0 – 0.7A	1.9 – 0.9A	2.8 – 1.4A	4.4 – 2.2A	8.5 – 4.2 A	1.0 – 0.5 – 0.4A	1.5 – 0.8 – 0.7 A	2.5 – 1.4 – 1.0A	1,3A max
Internal Fuse	4A	4A	4A	6.3A	10A	4A	4A	4A	6.3A
External Fuse (recommended)	6A	10A	10A	16A	16A	10A	10A	16 A	16A
OUTPUT DATA									
Output Voltage Factory Setting ±3%	24Vdc	24Vdc	24Vdc	24Vdc	24Vdc	24Vdc	24Vdc	24Vdc	24Vdc
Adjustment range	22 – 27	22 – 27	22 – 27	22 – 27	22 – 27	22 – 27	22 – 27	22 – 27	22 – 27
Start up with capacitive load	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF	≤ 50.000µF
Turn-On delay after applying mains voltage	1.5 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)	1 sec. (max)
Continuous Current < 40°C (In)	2.0A (115) 3.0A (230)	5.0A	7.5A	14A	25A	5.0A	7.5A	14A	25A
Continuous Current < 50°C (In)	1.5A (115) 2.5A (230)	4.5A	6.0A	12A	22A	4.5A	6.0A	12A	22A
Continuous Current < 60°C (In)	–	4.0A	5.0A	10A	20A	4.0A	5.0A	10A	20A
Power Boost Current (60°C ≥ 3min.)	3.5A	5.0A	7.5A	15A	25A	5.0A	7.5A	14A	25A
Current Max Oveload approx. 4Vdc (permanent)	Imax = In 50°C x (1,8 – 2,2)	Imax = In 60°C x (1,8 – 2,2)							
Short circuit current (Icc)	7.0A	12A	16A	30A	60A	12A	16A	30A	60A
Hold-up Time (min. Vac) 24Vdc	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec	Typ. 20 msec
Residual Ripple	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp	≤ 80 mVpp
Efficiency (50% of In)	≥ 85%	≥ 89%	≥ 89%	≥ 89%	≥ 90%	≥ 89%	≥ 89%	≥ 89%	≥ 91%
Dissipation power load max (W)	13	15	22	42	54	12	22	40	54
Over temperature Protection	Shut-down output and automatic restart								
Short-circuit protection	Continuous Mode	1° Hiccup Mode ;2° Manual Reset; 3° Continuous Mode							
Over Load protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Over Voltage Output protection (Internal Failure)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)	Yes(typ. 35Vdc)
Parallel connection	Yes	Yes	Yes	Easy parallel	Easy parallel	Yes	Yes	Easy parallel	Easy parallel
Relay power good	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CLIMATIC DATA									
Ambient Temperature operation	-25 – +70°C	-25 – +70°C	-25 – +70°C	-25 – +70°C	-25 ÷ +70°C	-25 ÷ +70°C	-25 ÷ +70°C	-25 ÷ +70°C	-25 ÷ +70°C
De rating Tª > (In)	> 50° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C	> 60° 2.5% °C
Ambient Temperature Storage	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C	-40 ÷ +85°C
Humidity at 25 °C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C	95% to 25°C
GENERAL DATA									
Isolation Voltage (IN / OUT)	3000Vac	3000Vac	3000Vac	3000Vac	3000Vac	3000Vac	3000Vac	3000Vac	3000Vac
Isolation Voltage(IN / PE)	1605Vac	1605Vac	1605Vac	1605Vac	1605Vac	1605Vac	1605Vac	1605Vac	1605Vac
Isolation Voltage(OUT / PE)	500Vac	500Vac	500Vac	500Vac	500Vac	500Vac	500Vac	500Vac	500Vac
Protection Class (EN/IEC 60529)	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
Reliability (MTBF IEC 61709)	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h	> 500 000 h
Pollution Degree Environment	2	2	2	2	2	2	2	2	2
Connection Terminal Blocks Screw Type	2,5mm	2,5mm	2,5mm	2,5mm	4 mm	2,5mm	2,5mm	2,5mm	4 mm
Protection class (with PE connected)	I	I	I	I	I	I	I	I	I
Dimension (w-h-d)	50x120x50 mm	55x110x105 mm	55x110x105 mm	72x115x135 mm	85x120x140mm	55x110x105 mm	55x110x105 mm	72x115x135 mm	85x120x140mm
Weight	0.30 Kg approx	0.56 Kg approx	0.56 Kg approx	0.85 Kg approx	1.2 Kg approx	0.56 Kg approx	0.56 Kg approx	0.85 Kg approx	1.2 Kg approx
Safety Standard Approval	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508	CE, UL 508