

FLEX Power Supplies 1, 2 and 3 Phase(24Vdc)



Thank you for having chosen one of our products for your work. We are certain the RISH-AB-H INSTRUMENTS Power Supplies will meet your application requirements.

Application

The power supplies RISH 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 1, 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:

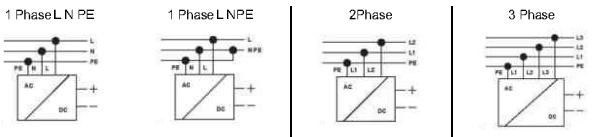
Cable Connection: The following cable cross-sections may be used:

	Solid (mm ²)	Stranded (mm ²)	AWG	Torque (Nm)	Stripping Length	Power Supply
Input:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.8	7 mm	Others
	4.0	8.0	30 – 10	0.8 – 1.0	7 mm	RISH Flex 500 series
Output:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.8	7 mm	Others
	4.0	8.0	30 – 10	0.8 – 1.0	7 mm	RISH Flex 500 series
Signal:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.8	7 mm	Others
	4.0	8.0	30 – 10	0.8 – 1.0	7 mm	RISH Flex 500 series

The connection is made by the screw type 2.5 mm² (RISH FLEX 60-90-170-280 series) or 4.0 mm² (RISH FLEX 500 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:	Output:
RISH FLEX xxxxxA series	1 Phase Switching Power Supplies
RISH FLEX xxxxxB series	1 Phase Switching Power Supplies
RISH FLEX xxxxxB series	2 Phase Switching Power Supplies
RISH FLEX 500xxB series	3 Phase Switching Power Supplies
	24 Vdc is made via the (+), (-).

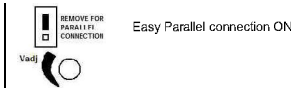
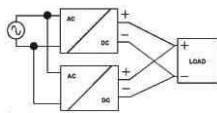


Signalling:

Red 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:

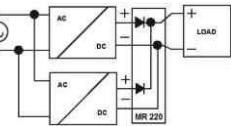
- Make parallel connection with same model of power supply to increase the output power.
- Adjust the output approximately to the same value ($\pm 20mV$) applying 1-2 A load to all devices output before connecting them in parallel.
- Easy parallel connections Jumper, In RISH FLEX 280xxX and RISH FLEX 500xxX 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 supplies.



Parallel connection Redundancy:

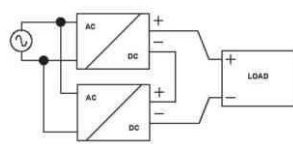
Power supplies can be paralleled for 1+1 redundancy to obtain a higher system availability. Redundant systems require a certain amount of extra power to support the load in case one power supply unit fails. The simplest way is to put two RISH FLEX power supplies in parallel. In case one power supply 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 red 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 RISH MR220. Recommendations for building redundant power systems:
 - Use separate input fuses for each power supply.
 - Monitor the individual power supply units. ADC-Red led and Power Good Contact are already included on RISH FLEX power supplies. This feature reports a faulty unit; see power Good Section for any technical detail.
 - When possible, connect each power supply to different phases or circuits.



Serial connection:

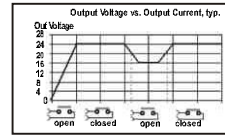
- It is possible to connect as many units in series as needed, providing the sum of the output voltage does not exceed 150Vdc.
- Voltages with a potential above 60Vdc are not SELV any more and can be dangerous. Such voltages must be installed with a protection against touching.
- For serial operation use power supplies of the same type.
- Earthing of the output is required when the sum of the output voltage is above 60Vdc.
- 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 (Not for RISH FLEX 60xxX)



Output is 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 $\pm 5\%$. This feature is particularly useful in redundant applications.
 Power Good Contact rating:
 Max. DC1: 30 Vdc 1A; Resistive load (EN 60947-4-1)
 AC1: 60 Vac 1A
 Min.: 1mA at 5Vdc | Min permissible load



Protection:

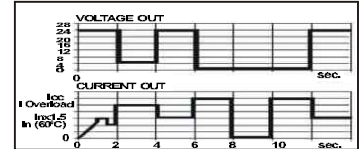
On the primary side: the device is equipped with an internal fuse; follow the next page table. If the internal fuse is blown (fails opens), it is most probable that there is a fault in the device. If this failure occurs, the device must be checked in the factory. **Caution:** in two phase Input models,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

Short circuit and overload Protection Modes:

Depending on the users application loads, the RISH 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 RISH FLEX 60xxA only Continuous Mode Condition)

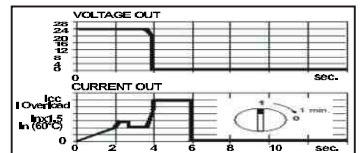
1) HICCUP MODE (default factory Jumper setting)

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 (ii) the problem is cleared.



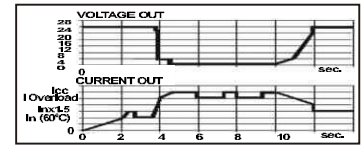
2) MANUAL RESET (manual Restart by Operator)

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 minute.



3) Continuous Output Mode

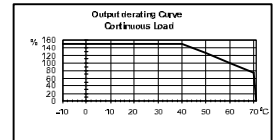
In case of short-circuit or overload, the output current is kept at high values with near zero voltage. In case of short circuit the current can reach up to 3 times the rated current at 60°C. This protection mode is used to meet the requirements of demanding loads such as motors, solenoid valves, lamps,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

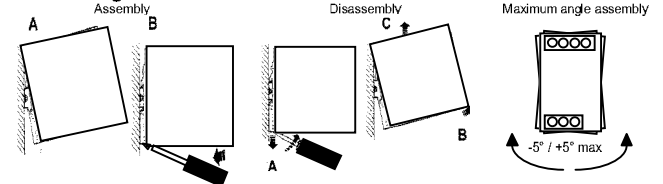
Surrounding air temperature 50 °C for RISH FLEX 60xxA, and for others 60°C. At the temperature of 70°C the output current will be 75% - 60% of In. The equipment does not switch off in case of ambient temperature above 70°C or thermal overload. The devices are protected for Over temperature conditions "worst case"; in this situation the device Shut-downs the output and automatically restarts when temperature inside falls.



Standards and Certification

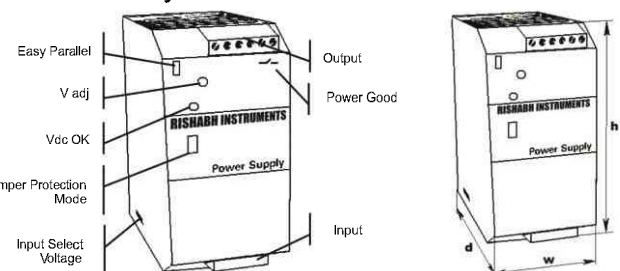
Electrical Safety:
 Assembling device: IEC/EN 60950 (VDE 0805) and EN 50178 (VDE 0160).
 Installation according: IEC/EN 60950.
 Input / Output separation: SELV EN 60950-1 and PELV EN 60204-1. Double or reinforced insulation.
EMC Standards Immunity:
 EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5.
EMC Standards Emission:
 EN 61000-6-4, EN 61000-3-2.
Standards Conformity:
 Safety of Electrical Equipment/Machines: EN 60204-1.
 The CE mark in According to EMC 2004/108/EC and Low voltage directive 2006/95/EEC

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 air convection. Depending on the ambient temperature and load of the device, the temperature of the housing can become very high!

Dimension and Lay-out:



FLEX power supply		1 Phase (Input 115 - 230Vac)						2 and 3Phase (Input 400 - 480Vac)						3Phase									
TECHNICAL DATA		FLEX 6024A		FLEX 9024A		FLEX 17024A		FLEX 28024A		FLEX 50024A		FLEX 7024B		FLEX 17024B		FLEX 28024B		FLEX 50024B		FST 2430B		FST 2440B	
		40-70W		90-120W		120-180W		240-330W		480-600W		95-120W		120-180W		240-330W		480-600W		720W		980W	
INPUT DATA		Input Voltage Range VAC		90 - 135Vac (IP selectable 180 - 280Vac by Switch)		90 - 135Vac (IP selectable 180 - 280Vac by Switch)		90 - 135Vac (IP selectable 180 - 280Vac by Switch)		90 - 135Vac (IP selectable 180 - 280Vac by Switch)		187 - 264Vac (IP selectable 330 - 550Vac by Switch)		187 - 264Vac (IP selectable 330 - 550Vac by Switch)		187 - 264Vac (IP selectable 330 - 550Vac by Switch)		187 - 264Vac (IP selectable 330 - 550Vac by Switch)		330 - 550Vac		330 - 550Vac	
		Input Voltage Range VDC		250 - 373Vdc		250 - 373Vdc		250 - 373Vdc		250 - 373Vdc		467 - 780Vdc		467 - 780Vdc		467 - 780Vdc		467 - 780Vdc		510 - 750Vdc #		510 - 750Vdc #	
		Inrush Current (Vin and In Load) †1		≤ 11 A ≤ 5msec		≤ 11 A ≤ 5msec		≤ 16 A ≤ 5msec		≤ 16 A ≤ 5msec		≤ 17 A ≤ 5msec		≤ 17 A ≤ 5msec		≤ 17 A ≤ 5msec		≤ 17 A ≤ 5msec		≤ 10 A ≤ 5 msec		≤ 10 A ≤ 5 msec	
		Frequency		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		47 - 63 Hz ±6%		48 - 63 Hz		48 - 63 Hz	
		Input Current		1.0 - 0.7A		2.8 - 1.3A		4.6 - 2.2A		1.5 - 0.8 - 0.4A		1.5 - 0.8 - 0.7A		3.0 - 1.4 - 1.0A		3.0 - 1.4 - 1.0A		3.0 - 1.4 - 1.0A		1.38 - 1.2A		1.7 - 1.5 A	
		Internal Fuse		4A		4A		6.3A		4A		4A		4A		4A		4A		6.3A		6.3A	
		External Fuse (recommended)		10A		10A		16A		16A		10A		10A		16A		16A		Fast 6.3A		Fast 6.3A	
OUTPUT DATA		Output Voltage		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc		24Vdc	
		Adjustment Range (Vadj)		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 27Vdc		22 - 28Vdc		22 - 28Vdc	
		Start up with capacitive load		≤ 50,000µF		≤ 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)		2.5sec. (max)		2.5sec. (max)	
		Continuous Current at 24 V < 40°C (In)		5.0A		7.5A		14A		25A		5.0A		7.5A		14A		25A		30A		40A	
		Continuous Current at 24 V < 50°C (In)		4.5A		6.0A		12A		22A		4.5A		6.0A		12A		22A		30A		40A	
		Continuous Current at 24 V < 60°C (In)		4.0A		5.0A		10A		20A		4.0A		5.0A		10A		20A		30A		40A	
		Power Boost Current (at 24Vdc 60°C ≤ 5min.)		3.5A at 50°C		5.0A		7.5A		14A		3.5A at 50°C		5.0A		7.5A		14A		30A		40A	
		Current Max. Overload approx. 4Vdc (permanent)		In 50°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)		In 60°C x (1.8 - 2.2)	
		Short circuit current (Isc)		7.0A		12A		30A		60A		7.0A		12A		30A		60A		90A		90A	
		Line Regulation		0.1%		0.1%		0.1%		0.1%		0.1%		0.1%		0.1%		0.1%		0.1%		0.1%	
		Load Regulation (From 0% to 100% load)		0.5%		0.5%		0.5%		0.5%		0.5%		0.5%		0.5%		0.5%		1%		1%	
		Hold-up Time (min. Vadj) 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		Typ. 27 msec	
		Residual Ripple		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 80 mVpp		≤ 100mVpp		≤ 100mVpp	
		Efficiency (50% of In)		≥ 88%		≥ 91%		≥ 91%		≥ 92%		≥ 91%		≥ 91%		≥ 91%		≥ 91%		≥ 86%		≥ 86%	
		Dissipation power load max (W)		b		11		23		54		11		17		28		54		88%		88%	
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		-10 - +70°C		-10 - +70°C	
		Derating T _a > (In)		> 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		> 50° 1% / °C		> 50° 1% / °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		-25 - +85°C		-25 - +85°C	
		Humidity at 25 °C		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%	
GENERAL DATA		Isolation Voltage (IN / OUT)		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac		3000Vac	
		Isolation Voltage(IN / PE)		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac		1605Vac	
		Isolation Voltage(OUT / PE)		500Vac		500Vac		500Vac		500Vac		500Vac		500Vac		500Vac		500Vac		500Vac		500Vac	
		Pollution Class (EN IEC 60529)		IP 20		IP 20		IP 20		IP 20		IP 20		IP 20		IP 20		IP 20		IP 20		IP 21	
		Reliability (MTBF IEC 61709)		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h		> 5,000,000 h	
		Pollution Degree Environment		2		2		2		2		2		2		2		2		2		2	
		Connection Terminal Blocks Screw Type		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²		2.5mm ²	
		Protection class (with PE connected)		I		I		I		I		I		I		I		I		I		I	
		Dimension (w-h-d)		50x120x50 mm		55x110x105 mm		55x110x135 mm		55x110x135 mm		55x110x135 mm		55x110x135 mm		55x110x135 mm		55x110x135 mm		68x120x140mm		250 x 150x 160	
		Weight		0.30 kg approx		0.50 kg approx		0.72 kg approx		1.1 kg approx		0.60 kg approx		0.60 kg approx		0.72 kg approx		1.0 kg approx		4.2 kg approx		4.4 kg approx	

All parameters are measured at 230VAC input, nominal load and 25 °C of ambient temperature where it is not specially mentioned.
 †1 Flex 600xxX needs minimum load of 500mA to work properly.
 # No Input selection switch present VDC can be applied to the total input range.