

Rhino PSM Power Supplies

Operating Instructions



RHINO Power Supplies PSM Series

Description

The PSM power supplies are built-in units. The mounting position for PSM power supplies must fulfill the requirements for fireproof case according to IEC/EN 60950 or other appropriate national standard. The relevant CSA regulations or equivalent national regulations must be observed during installation. The PSM power supplies are designed for mounting on a horizontal DIN rail (DIN EN 50022-35x15/7.5) mounted on a flat vertical surface and for operation from 115 or 230 VAC, 50/60Hz (universal input voltage range for PSM12-078S and PSM24-090S, and auto range for PSM12-156S, PSM24-180S, PSM24-360S and PSM24-600S) single-phase systems. The output voltage of the PSM power supplies is floating and protected against short circuit.



Before installation, read these instructions carefully and completely. These installation instructions cannot cover every possible installation, operation or maintenance situation. The most current information is available on our website at www.automationdirect.com. Information is subject to change without prior notice.



The power supplies are constructed in accordance with the safety requirements of IEC 60950, EN60950, EN60204, EN50178, EN61558-2-8, IEC/EN60079-15 (Class I, Zone 2, AEX nC II C T4 U). They fulfill the requirements for CE-compatibility, carry the CE-mark, and are CSA approved. The PSM built-in power supplies were designed especially for use in process automation and other industrial applications. Components with dangerously high voltage and high stored energy are located in the device; however, these are inaccessible. Failure to properly maintain the power supply can result in death, severe personal injury or substantial property damage. The power supplies should be installed and operated by qualified personnel only. The corresponding national regulations (e.g. CSA, ANSI, VDE, DIN) must be observed. The successful and safe operation of this power supply is dependent on proper storage, handling, installation and operation. The potentiometer to adjust the output voltage must be actuated using only an insulated screwdriver, because accidental contact may be made with parts inside the power supply carrying dangerous voltages.

Before operating:

- Read operating instructions carefully and completely.
- Ensure that the main power connection has been done by a qualified person, and protection against electrical shock is assured.
- Ensure that the power supply can be disconnected in accordance with applicable regulations, as in IEC/EN/UL 60950 or other applicable national regulations.
- Check that the protective ground is connected.
- Check that the input wiring is sufficiently protected and is the correct size.
- Check that the output wiring is rated for the maximum output current, and connected with the correct polarity.
- All output terminals shall be wired to the load.
- Verify that sufficient cooling is assured.
- Caution: The temperature of the housing can become very high, depending on the ambient temperature and load.
- **Never work on the power supply if power is applied!** Before installation, ensure that the main switch is off and locked out. Touching any live components or improper usage of this power supply can result in death or severe injury.
- Do not open the power supply until at least five minutes after the main power is completely disconnected.
- Power supply is an electrostatic sensitive device. Only qualified and trained personnel should open the power supply.

Installation

- This power supply is designed for professional indoor systems. During operation, the power supply must not be accessible. It is to be installed and put into service by qualified personnel only.
- Do not operate without Ground connection! To comply with EMC and safety standards (CE mark, approvals), the power supply must be operated only if Ground terminal is connected to the non-fused earth conductor.
- Mount the power supply horizontally on a flat vertical surface to provide proper ventilation. You cannot mount the power supply vertically, upside down, or on a flat horizontal surface.
- The internal fuse is not accessible, as it is not to be replaced by the user. If this internal fuse has blown, the power supply most probably has an internal defect and, for safety reasons, must be discarded, or returned if under warranty.
- Recycling: The unit contains some elements that are suitable for recycling, *and* some components that need special disposal. Make sure that the power supply is recycled properly at the end of its service life.



Warning: To minimize the risk of potential safety problems, follow all applicable local and national codes regulating the installation and operation of this equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes. Failure to follow all applicable codes, or exceeding the limiting value can impair the function and electrical safety and destroy the power supply. Serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication to be suitable for your particular application, nor do we assume any responsibility for your product design, installation or operations.

- If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 770-844-4200. This publication is based on information that was available at the time it was printed. At Automationdirect.com® we constantly strive to improve our products and services; therefore, we reserve the right to make changes to the products and/or publications at any time without notice and without any obligation. This publication may also discuss features that may not be available in certain revisions of the product.

Assembly

Use a sufficiently strong horizontally mounted DIN rail, such as DN-R35S1. Leave a minimum free space of 80 mm [3.15 in.] above and below, and 50 mm [1.97 in.] on each side of the power supply to allow air convection. Do not cover any ventilation holes. The air temperature measured 10 mm [0.39 in.] below the device must not exceed the ranges specified (see Operating Temperatures table on page 7 of these instructions). Observe power derating above ambient temperatures of 40°C and at low line. Attach the unit to the DIN rail, following the in-box directions. Connect the wires as indicated on the power supply. For wall-mounting or chassis-mounting, remove the DIN clips by removing the screw and place the mounting brackets in the same place as the DIN-clips. Mount upright to maintain cooling.

Mounting		
Part Number	Panel	Wall or Chassis
PSM1-078S	DN-R35S1	PANEL1 mounting bracket countersink screws included (tightening torque 0.8-0.9Nm)
PSM24-090S (N)		
PSM12-156S		
PSM24-180S	DN-R35S1	PANEL2 mounting bracket countersink screws included (tightening torque 0.8-0.9Nm)
PSM24-360S		
PSM24-600S		

Connecting Cable

Allow only qualified personnel to install these power supplies. The PSM12-078S, PSM24-090S, PSM12-156S, PSM24-180S and PSM24-360S are equipped with a COMBICON plug connector. PSM24-600S has a COMBICON connector. This reliable and easy-to-assemble connection method provides a fast connection of the devices and a visible isolation of the electrical connection.

Input (Connector J1)

The 100-240 VAC connection is made by using the L, N and Ground connections and must be done in compliance with local regulations. Use the correct size input wiring. Supply a protective device (fuse, circuit breaker, etc.) and an easily accessible isolating device for disconnecting the power supply from mains. The Ground conductor must be connected. If flexible wires are used, terminate them using ferrules.

Input Specifications								
Part Number	Input Voltage Range	Input Frequency Range	Input Current (Typical) at full load		Inrush Current Max (<2ms) @ +25°C		Holdup Time	Efficiency (Typical) @ 115 VAC
			115 VAC	230 VAC	115 VAC	230 VAC		
PSM12-078S	100 - 240 VAC 85 - 264 VAC (63 Hz)	47 - 63 Hz	2.0 A	1.0 A	<12 A	<20 A	20 ms min. (full load 115/230 VAC)	82%
PSM24-090S			2.1 A	1.0 A				85%
PSM24-090S(N)			2.1 A	1.0 A				85%
PSM12-156S	100 - 120 VAC/ 220 - 230 VAC 85 - 132 VAC 187 - 264 VAC (47 - 63 Hz) Auto-select		2.5 A	1.4 A	<13 A	<25 A		85%
PSM24-180S			2.8 A	1.5 A				88%
PSM24-360S			5.0 A	2.5 A				<16 A
PSM24-600S		10.0 A	5.0 A	<25 A	<30 A	89%		

Output (Connector J2)

The 12 VDC or 24 VDC connection is made using the “+” and “-” connections. All output terminals shall be connected to the load. *Make sure that all output lines are sized according to the maximum output current, or are separately protected!* The wires on the secondary side should be large enough to keep the voltage drops on these lines as low as possible. Strip the connecting ends for a reliable and shockproof connection. If flexible wires are used, terminate them using ferrules. At delivery, the output voltage is 12 VDC (PSM12-xxx) or 24 VDC (PSM24-xxx). The output voltage can be set (using an insulated screwdriver) from 12 to 14 VDC (PSM12-xxx) or 24 to 28 VDC (PSM24-xxx) on the potentiometer. The device is electronically protected against overload and short circuit.

Output Specifications									
Part Number	Output Voltage	Output Voltage Adj. Range	Output Current (Max.)	Output Power (Max.)	Output Overvoltage Protection	Power - Good Signal			MTBF (IEC 61709 @ 25°C)
						Trigger Threshold	Active Output Signal	Relay Output	
PSM12-078S	12 VDC	12 - 14 VDC	6.5 A	78 watts	20 VDC	9 - 11 V	11 V ± 1 V/20 mA max	DC OK = contact closed (rated: 30 VDC 1.0 A)	350,000 hours
PSM24-090S	24 VDC	24 - 28 VDC	3.75 A	90 watts	35 VDC	18 - 22 V	22 V ± 2 V/10 mA max		
PSM24-090S-N			3.75 A	90 watts	35 VDC				
PSM12-156S	12 VDC	12 - 14 VDC	13.0 A	156 watts	20 VDC	9 - 11 V	11 V ± 1 V/40 mA max		
PSM24-180S	24 VDC	24 - 28 VDC	7.5 A	180 watts	35 VDC	18 - 22 V	22 V ± 2 V/20 mA max		
PSM24-360S			15.0 A	360 watts	35 VDC				
PSM24-600S			25.0 A	600 watts	35 VDC				

Signaling (connector J5, pin 1, pin 2, pin 3, pin 4, pin 5 & pin 6)

The two DC-OK outputs allow monitoring of the power supply functions. A floating signal contact (connector J2, pin 6 & pin 7) and an active DC-OK signal (Connector J2, pin 5) are available. The DC-OK LED also allows a visual evaluation of the function of the power supply directly on site.

Floating contacts

The floating signal contact opens and signals a drop in the output voltage. Signals and ohmic loads up to 30 VDC and currents of up to 1 amp can be connected. For inductive loads such as relay or solenoid, a suitable protection circuit (e.g., damping diode) is necessary.

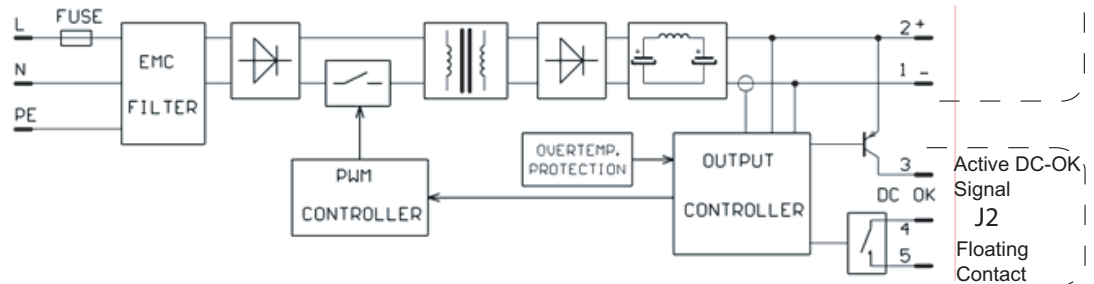
Active DC-OK signal output

This signal output is referenced to $-V_{out}$ (GND) and signals when the output voltage drops below 9 VDC for PSM12-xxx models and below 18 VDC for PSM24-xxx models by switching from high to low. The DC-OK signal is de-coupled from the power output, so it is not possible for parallel-switched devices to provide external supply. The DC-OK signal can be directly connected to a logic input for evaluation.

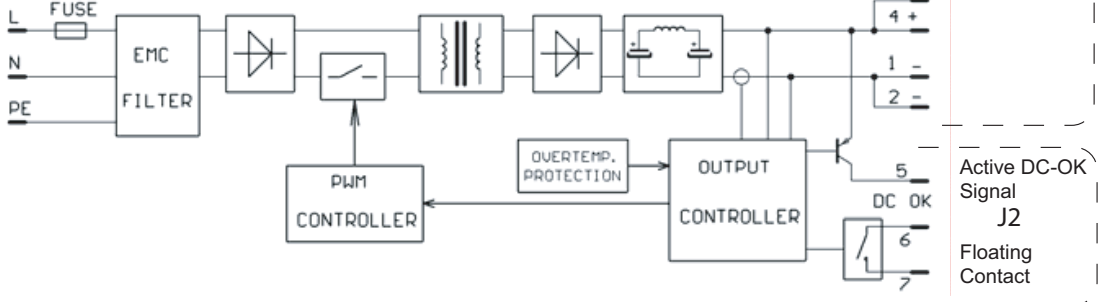
Floating Signal Contacts		
Part Number	Relay Contact Address	Trigger Threshold
PSM1-078S	J2 pin 4 & 5	9 to 11 VDC
PSM24-090S (N)		18 to 22 VDC
PSM12-156S	J2 pin 6 & 7	9 to 11 VDC
PSM24-180S		18 to 22 VDC
PSM24-360S		
PSM24-600S	J5 pin 1 & 2	

Active Signal Outputs				
Part Number	Active Signal Outputs	Contact Address	Signals at voltage level	mA
PSM12-078S	11 VDC \pm 1 VDC	J2 pin 3	9 to 11 VDC	60
PSM24-090S (N)	22 VDC \pm 2 VDC		18 to 22 VDC	30
PSM12-156S	11 VDC \pm 1 VDC	J2 pin 5	9 to 11 VDC	60
PSM24-180S	22 VDC \pm 2 VDC		18 to 22 VDC	30
PSM24-360S				
PSM24-600S		J5 pin 3		

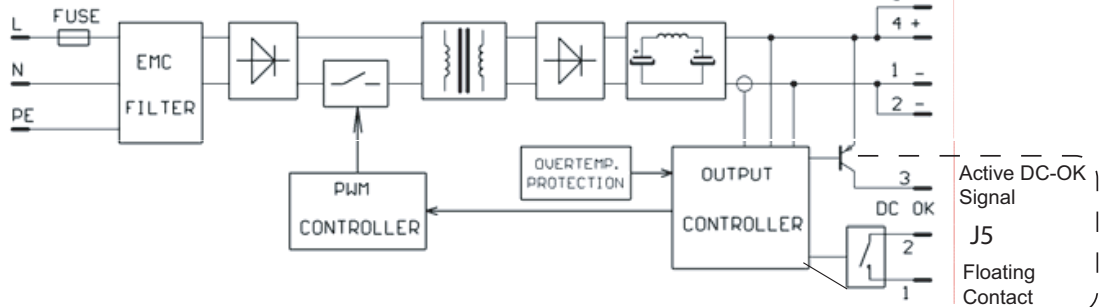
PSM12-078S, PSM24-090S (N)



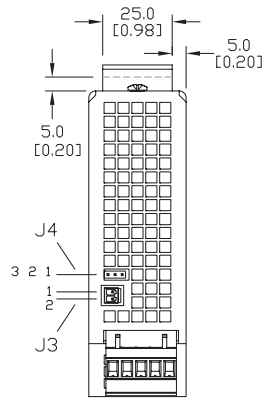
PSM12-156S, PSM24-180S, PSM24-360S



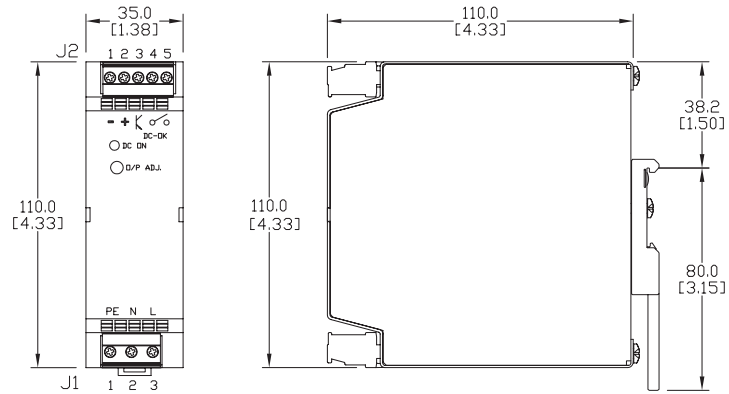
PSM24-600S



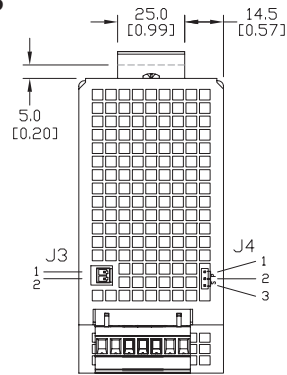
PSM12-078S/PSM24-090S
PSM24-REM360S
PSM24-BCM360S



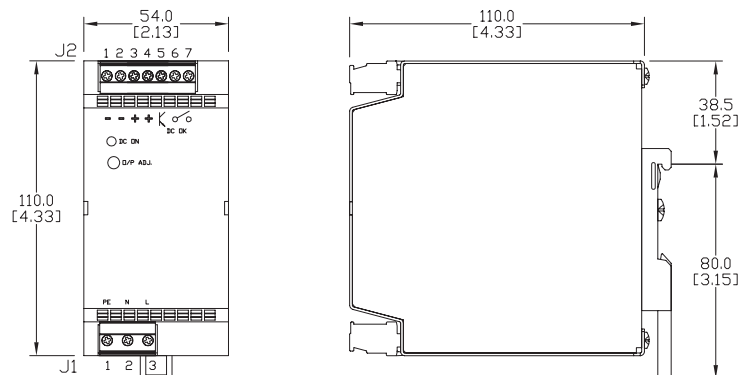
	J1	J2	J3	J4
Pin 1	Earth	GND (-)	S+	Normal mode
Pin 2	Neutral	Vout (+)	S-	Common
Pin 3	Line	DC-OK Signal	—	Parallel mode
Pin 4	—	DC-OK Relay contact 1	—	—
Pin 5	—	DC-OK Relay contact 2	—	—



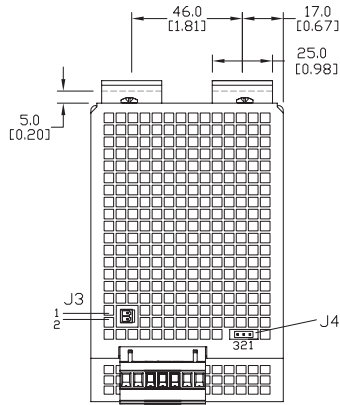
PSM12-156S/PSM24-180S
PSM24-BFM600S



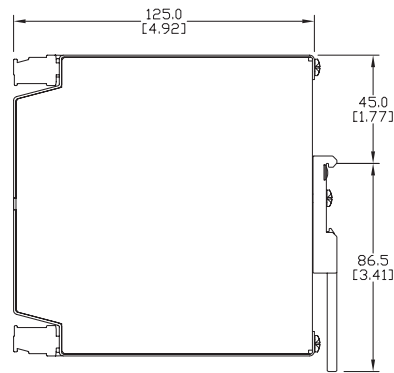
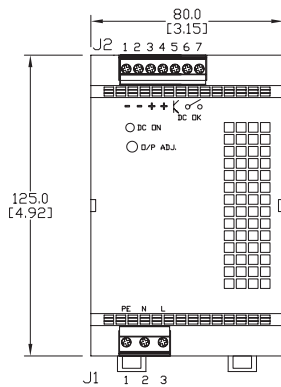
	J1	J2	J3	J4
Pin 1	Earth	GND (-)	S+	Normal mode
Pin 2	Neutral	GND (-)	S-	Common
Pin 3	Line	Vout (+)	—	Parallel mode
Pin 4	—	Vout (+)	—	—
Pin 5	—	DC-OK Signal	—	—
Pin 6	—	DC-OK Relay contact 1	—	—
Pin 7	—	DC-OK Relay contact 2	—	—



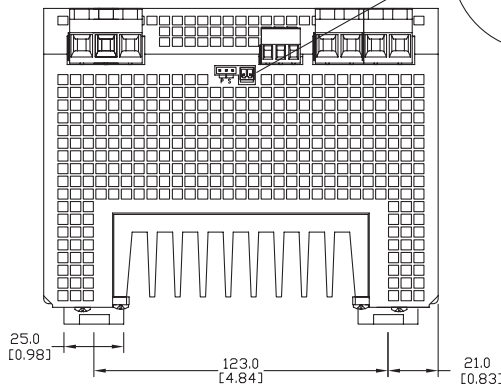
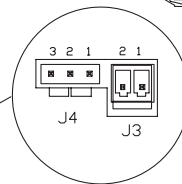
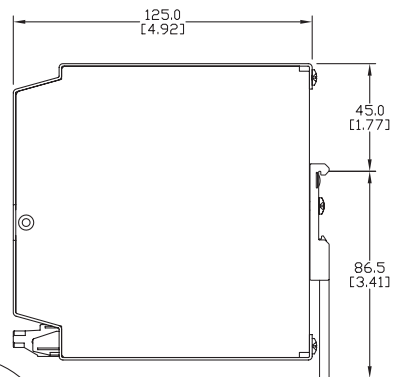
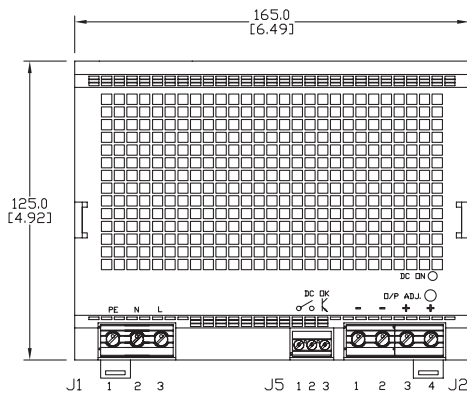
PSM24-360S



	J1	J2	J3	J4
Pin 1	Earth	GND (-)	S+	Normal mode
Pin 2	Neutral	GND (-)	S-	Common
Pin 3	Line	Vout (+)	—	Parallel mode
Pin 4	—	Vout (+)	—	—
Pin 5	—	DC-OK Signal	—	—
Pin 6	—	DC-OK Relay contact 1	—	—
Pin 7	—	DC-OK Relay contact 2	—	—



PSM24-600S



	J1	J2	J3	J4	J5
Pin 1	Earth	GND (-)	S+	Normal mode	DC-OK Relay contact 1
Pin 2	Neutral	GND (-)	S-	Common	DC-OK Relay contact 2
Pin 3	Line	Vout (+)	—	Parallel mode	DC-OK Signal
Pin 4	—	Vout (+)	—	—	—

Signal loop

The two Power Good relay outputs can be easily combined. Example: monitoring of two devices. Use the active signal output of device one and loop in the floating signal output of device two. A common alarm is available in the event of malfunctioning. Up to five units can be looped in. This signal combination saves wiring costs and logic inputs.

DC-OK LED

The two-color DC-OK LED indicates the status of the output and allows visual evaluation of the function.

Output Status LED Function	
DC-OK LED Green	Normal operation
DC-OK LED Red	Output failure (if input main power is still present)

Device	Terminals	Function	Solid or Stranded Wires		Torque Nm	Stripping Length mm
			mm ²	AWG		
PSM24-090S PSM24-090S-N PSM24-180S	L1 & N	Input voltage (85 to 264 VAC)	0.5 ... 2.5	24 ... 12	0.5 - 0.6	7.0
	⏚	Protective earth Ground conductor	0.5 ... 2.5	24 ... 12	0.5 - 0.6	7.0
	+ & -	Output voltage (2C)	0.5 ... 2.5	24 ... 12	0.5 - 0.6	7.0
	Signal	DC - OK, active output and relay outputs	0.2 ... 2.5	32 ... 12	0.5 - 0.6	7.0
PSM12-078S PSM12-156S PSM24-360S	L1 & N	Input voltage (85 to 264 VAC or 115/240 VAC))	0.5 ... 2.5	24 ... 12	0.5 - 0.6	7.0
	⏚	Protective earth Ground conductor	0.5 ... 2.5	24 ... 12	0.5 - 0.6	7.0
	+ & -	Output voltage (12 VDC and 2C)	1.0 ... 2.5	18 ... 12	0.5 - 0.6	7.0
	Signal	DC - OK, active output and relay outputs	0.2 ... 2.5	32 ... 12	0.5 - 0.6	7.0
PSM24-600S	L1 & N	Input voltage (115 to 230 VAC)	1.0 ... 4.0	18 ... 10	0.5 - 0.6	7.0
	⏚	Protective earth Ground conductor	1.0 ... 4.0	18 ... 10	0.5 - 0.6	7.0
	+ & -	Output voltage (2C)	2.0 ... 4.0	18 ... 10	0.5 - 0.6	8.0
	Signal	DC - OK, active output and relay outputs	0.2 ... 2.5	32 ... 12	0.5 - 0.6	7.0

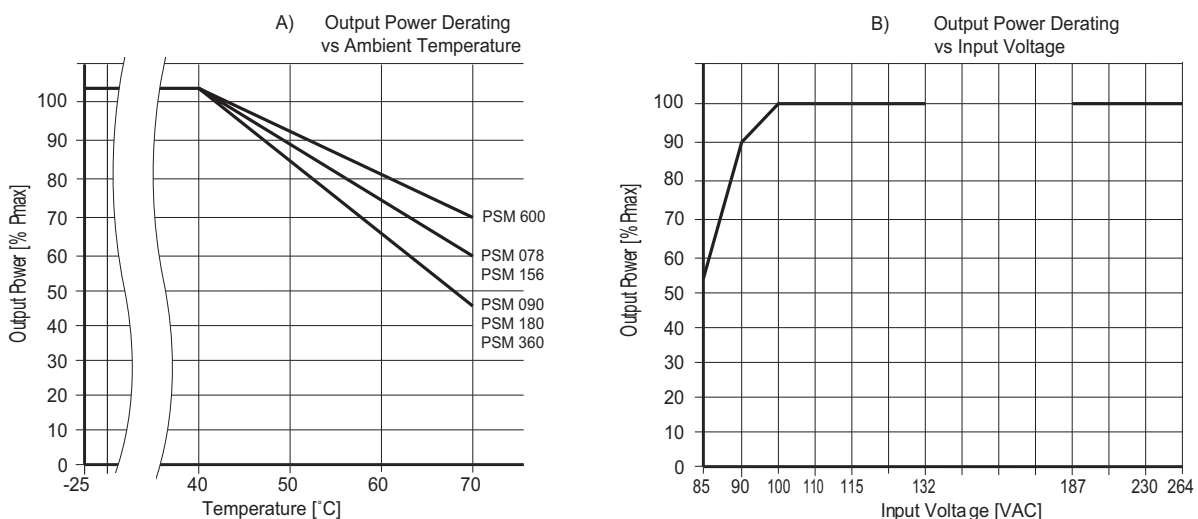
Connections and Terminal Assignments

Function

Output characteristic curve

When the ambient temperature is no higher than +40°C, the device can continuously supply I-out max. In the event of a higher load, the operating point follows the U/I characteristic curve by use of overcurrent protection. The output current is limited at I-out max. by use of a constant current characteristic, with automatic restart if the short circuit or overload condition has been removed. The U/I characteristic curve ensures that heavily capacitive loads can be fed without problems.

Output Power Derating



Thermal behavior

The device should not be operated at higher loads than indicated on the derating graphs, and automatically switches off at thermal overload. After sufficient cooling, the device will switch on again.

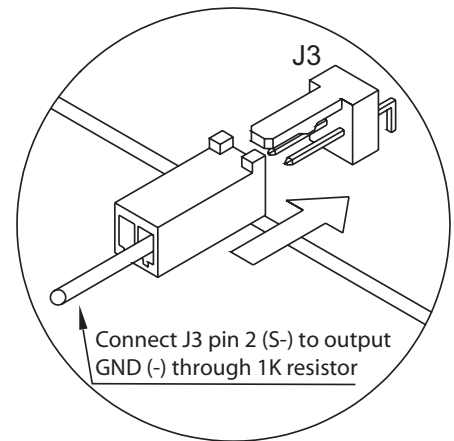
Parallel operation

Parallel connection to increase efficiency is used for the expansion of existing systems. It is advisable to use parallel connection if the power supply does not cover the current requirement of the most powerful consumer. Otherwise the consumers should be spread among individual devices independent of one another. No more than five devices of the same type can be connected in parallel to enable increased output power. For n parallel connected devices, the output current can be increased to nx I_{max}. To provide a proper and reliable startup, the jumper at connector J4 has to be set. At delivery, the jumper is set for normal operation with the jumper at connector J4 between pin 1 and 2. Set the jumper at connector J4 between pin 2 and 3 for parallel operation. Setting all paralleled power supplies to the same output voltage assures an equal distribution of power. To ensure symmetrical distribution of power if output voltage is adjusted, all cables from the power supplies must be the same length and diameter. Install a protective circuit (e.g., de-coupling diode or DC fuse) at the output of each device when more than two power supplies are paralleled. This will prevent high reverse-feed currents if there is a secondary device fault.

Remote ON/OFF Function

The standard device provides a remote ON/OFF function by use of pin 2 at connector J3. With no connection between J3 pin 2 and J2 pin 1, the device is providing the adjusted output voltage. Make a connection between connector J3 pin 2 (S-) and connector J2 pin 1 GND (-) by use of a 1K resistor to switch the power supply off. When the “OFF” function is engaged, a maximum of 3VDC will be across V_{out}(+) and V_{out}(-).

Remote ON/OFF function



Operating Temperature Ranges and Load Derating

Model	Operating Temperature Range
PSM12-078S	-10 to 40°C (from 40 to 70°C Load derating by 0.5w/°c)
PSM24-090S (N)	-10 to 40°C (from 40 to 70°C Load derating by 1.5w/°c)
PSM12-156S	-10 to 40°C (from 40 to 70°C Load derating by 3.0w/°c)
PSM24-180S	-10 to 40°C (from 40 to 70°C Load derating by 3.0w/°c)
PSM24-360S	-10 to 40°C (from 40 to 70°C Load derating by 6.0w/°c)
PSM24-600S	-10 to 40°C (from 40 to 70°C Load derating by 6.0w/°c)

General Specifications

General Specifications	
Specification	Description
Temperature	Operating (ambient): -25°C to +70°C max (-13°F to 158°F). Above +40°C(104°F) load derating Storage (non-operating): -25°C to +85°C max (-13°F to 185°F). Temperature drift: 0.02%/°C. Cooling: convection, no internal fan
Humidity	95% (non-condensing) relative humidity maximum
Isolation	According to IEC/EN 60950, EN50178, EN61558-2-8, EN60204, CSA
Output Regulation	Input variation (Line regulation) $V_{in, min} - V_{in, max}$: 0.5% maximum. Load variation (Load regulation) (10 to 100% of $I_{out, max}$): 0.5% maximum; 2.0% in parallel operation
Output Voltage Ripple	100 mV peak-to-peak typical (20 MHz bandwidth), (200 mV peak-to-peak maximum at I_{max})
Output Protection	Current limit: 110% constant current, automatic recovery, thermal protection, output rating, Voltage limit: 140% $V_{out, nom}$
Reverse Voltage Protection	35 VDC (40 VDC < 1 sec.)
Over-temperature Protection	Switch off at over-temperature, automatic restart
Hold-up Time	At full load and $V_{in} = 115$ VAC: 10 ms. min. At full load and $V_{in} = 230$ VAC: 20 ms. min.
Status Indicator	Dual color LED: Green: normal operation; Red: Output failure (if AC input main power is present)
Remote ON/OFF	By external contact. DC On: -S contact open. DC Off: -S connected via 1 K Ω to -Vout [3VDC max across Vout(+) and Vout(-)]
Maximum Capacitive Load	Unlimited
Vibration	IEC 60068-2-6: 3 axis, sine sweep, 10-55 Hz, 1g, 1 oct/min.
Shock	IEC 60068-2-27: 3 axis, 15g half sine, 11ms
Enclosure Rating	IP20 (IEC 529)
Enclosure Material	Aluminum (chassis) / zinc plated steel (cover)
Mounting	Snap-on with self-locking spring for 35mm DIN rails per EN 50022-35x15/75, or wall mount with bracket. Mount in upright and horizontal orientation.
Connection	Pluggable screw terminals (plugs included) 2 terminals per output (not available on 600 watt model).
Agency Approvals	CSA

Note: Unless otherwise stated, all specifications are valid at nominal input voltage, full load and +25°C after warmup time.

Safety Standards		
Specification	Standard	Document Number
Harmonic Limits	Harmonic Current Limits	EN 61000-3-2, Class A for limited output power
Safety Standards	Information technology equipment	IEC/EN60950
	Industrial control equipment	CSA
	Electrical equipment of machines	EN 6020
	Electronic equipment for power installation	EN 50178
	Safety, transformers	EN 61558-2-8
	Limited power source (model PSM24-090S-N)	EN 60950 sect. 2.5 and NEC Class 2
Safety Approvals	CC-Report per IEC 60950	EN 50178, EN 60079-15 EN 61558-2-8, CSA
Safety Class	Degree of electrical protection Class1	IEC 536
Electromagnetic Compatibility (EMC), Emissions	EMC, Emissions	EN 61204-3, EN61000-6-3
	Conducted RI suppression on input	EN 55011 class B, EN 55032 class B
	Radiated RI suppression	EN 55011 class B, EN 55032 class B
Electromagnetic Compatibility (EMC), Immunity	EMC, Immunity	EN 61000-6-2, EN 61204-3
	Electrostatic Discharge (ESP)	IEC / EN 61000-4-24 kY (contact discharge) / 8 kY (air discharge)
	Radiated RH field immunity (80-1000 MHz)	IEC / EN 61000-4-3 10 V / m
	Electrical fast transient / burst immunity	IEC / EN 61000-4-4 2 kY
	Surge immunity	IEC / EN 61000-4-5 1 kY / 2 kY
	Immunity to conducted RH disturbances (0.15 to 80 MHz)	IEC / EN 61000-4-6 10 V
	Power frequency field immunity	IEC / EN 61000-4-8 30 A / m
	Voltage dips	IEC / EN 61000-4-11(70% UN Cr. B/four40%/100% UN Cr. C)
Pollution Degree	2	