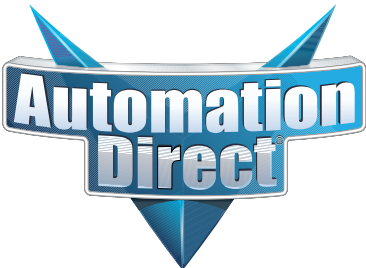


# Rhino Buffer Module PSM24-BFM600S

## Operating Instructions



# RHINO BUFFER MODULE PSM24-BFM600S

## Description

The PSM24-BFM600S Buffer Module will hold the output voltage of a 24 VDC power supply after brownouts or voltage dips of up to ten full 50 Hz cycles (200ms at 25 amps). During this buffer period, no deterioration of the 24 VDC output voltage will occur. This buffer module is an ideal and cost effective alternative to a battery-based backup system for many applications. The buffer module consists of a large bank of capacitors. When the power supply is switched on, the buffer capacitors will be charged. This will take approximately 30 seconds. An opto-coupler signal indicates the "READY" condition. When a power failure occurs, the capacitor bank is discharged, maintaining the output of the buffer module at its nominal voltage. This condition is indicated by a "POWER FAIL" signal. The hold-up time is typically 200 ms at 25 amps and 4 seconds, typically, at 1.2 amps. After 4 seconds, the buffer device will switch off the output voltage. The operation modes of the module are also indicated by an LED on the front panel. The greatest advantage of this buffer solution is that it is fully maintenance free, and its storage capability does not deteriorate over the lifetime of the product. A PSM power supply must be connected to the load as well as to the PSM24-BFM600S module. The buffer module is in parallel to the output voltage of the PSM power supply, and charges its internal hold-up capacitors during normal operation. The charge current (<0.6 A) is taken from the power supply output itself (charging time 30 sec max). The output voltage is monitored, and if it drops below an adjusted threshold, the PSM24-BFM600S will switch off. The stored energy in the hold-up capacitors is used to keep the output voltage at the threshold level. The quiescent current is 100 mA typ (typ 2.5 W). The output voltage of the PSM power supply must be one volt higher than the threshold level adjusted by the potentiometer. The threshold level can be adjusted in two different ways:

- Option 1: At the factory, the PSM24-BFM600S is charged and then discharged with no load, giving the operator approximately 4s to set the threshold level.
- Option 2: (Less accurate) Turn the PSM24-BFM600S potentiometer fully clockwise and connect the PSM24-BFM600S to a DC supply or the PSM power supply unit set to the correct level (22.5 V for 24 VDC output voltage use). Turn the Buffer potentiometer counter-clockwise until the charging LED starts flashing Green/Red.

The PSM24-BFM600S is a built-in unit. The mounting position must fulfill the requirements for fireproof enclosures, according to UL60950 IEC/EN 60950 or other appropriate national standard. The relevant UL regulations or equivalent national regulations must be observed during installation. The PSM24-BFM600S is designed for mounting on a DIN rail (DIN EN 50022-35x15/7.5). The output voltage of the PSM24-BFM600S is protected against short circuit and open circuit conditions. *The module is not protected against reverse input polarity.*



**Warning** The PSM24-BFM600S built-in module is 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 PSM24-BFM600S can result in death, severe personal injury or substantial property damage. The PSM24-BFM600S should be installed and put into operation by qualified personnel only. The corresponding national regulations (e.g. UL, ANSI, VDE, DIN) must be observed. The successful and safe operation of this module 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.



**Caution:** Risk of electrical shock and electrical discharge. Only qualified and trained personnel should open the PSM24-BFM600S or the power supply. Do not open the PSM24-BFM600S or the power supply until at least 5 minutes after complete disconnection of the main power. Electrostatic sensitive device. In case of non-observance or exceeding the limiting value mentioned in these instructions, the function and electrical safety can be impaired and can destroy the PSM24-BFM600S and/or the power supply.

**Danger:** Never work on the PSM24-BFM600S or power supplies if power is applied! Before installation ensure that the main switch is switched off and locked out. Touching of any live components or improper usage of PSM24-BFM600S or power supply can result in severe injury or death.



**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.

## Before operating

- Read these operating instructions carefully and completely.
- 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.
- Verify that sufficient cooling is assured.
- Caution: The temperature of the housing can become very high, depending on the ambient temperature and load.

## Installation

### Assembly

A sufficiently strong DIN rail, such as DN-R35S1, must be used. Observe the correct mounting position for optimal cooling performance. A minimum free space of 80 mm [3.15 in.] is required above and below the PSM24-BFM600S; leave a minimum space of 50 mm [1.97 in.] (which allows air convection) on each side. The air temperature, as measured 10 mm [0.39 in.] below the device, must not exceed the specified values in these instructions. The power derating above ambient temperatures of 40°C is the same as specified for the PSM power supplies.

To attach PSM24-BFM600S to the DIN rail, hook top part of clip on DIN rail, then push down and inward until you hear a clicking sound. To remove the device, pull the latch of the clip using an insulated flathead screwdriver. When the clip has cleared the bottom DIN rail, remove the screwdriver from the recess. Lift the module off the DIN rail. Wall mounting or chassis mounting can be achieved by use of the optional mounting bracket, PSM-PANEL1. Remove the DIN clips by removing the screw and place the mounting brackets in the same place as the DIN clips. Use the countersink screws included with the wall mounting kit to attach the mounting brackets to the PSM24-BFM600S (tightening torque 0.8-0.9Nm).

### Connecting Cable

Allow only qualified personnel to install the module. The device is equipped with a COMBICON connector. This reliable and easy-to-assemble connection method provides a quick connection of the module.

### Input (Connector J1 pin 1 & pin 2)

The connection is made by using the –Vin and +Vin connections (connector J1 pin 1, pin 2, pin 3 and pin 4) as well as protective earth (connector J1 pin 5) following local codes and regulations. Choose correct wiring size from the Connections and Terminal Assignment table below. To achieve a reliable and shockproof connection, strip the connecting ends as listed in the following table. If flexible wires are used, terminate them using ferrules.

### Connections and Terminal Assignment

Device	Terminals	Function	Solid or Stranded Wires		Torque Nm	Stripping Length mm
			mm <sup>2</sup>	AWG		
PSM24-090S PSM24-180S	⏏	Protective earth conductor	0.5 to 2.5	24 to 12	0.5 to 0.6	7.0
	+ & -	Input voltage (24 VDC)	0.5 to 2.5	24 to 12	0.5 to 0.6	7.0
	Signal	Inhibit, active and ready signal	0.2 to 2.5	32 to 12	0.5 to 0.6	7.0
PSM24-360S	⏏	Protective earth Conductor	0.5 to 2.5	24 to 12	0.5 to 0.6	7.0
	+ & -	Output voltage (24 VDC)	1.0 to 2.5	18 to 12	0.5 to 0.6	7.0
	Signal	Inhibit, active and ready signal	0.2 to 2.5	32 to 12	0.5 to 0.6	7.0
PSM24-600S	⏏	Protective earth Conductor	1.0 to 4.0	18 to 10	0.5 to 0.6	7.0
	+ & -	Output voltage (24 VDC)	2.0 to 2.5	12 to 10	0.5 to 0.6	8.0
	Signal	Inhibit, active and ready signal	0.2 to 2.5	32 to 12	0.5 to 0.6	7.0

### Signaling (Connector J2 pin 3, pin 4, pin 5 and pin 6)

The output “Active” is for enabling monitoring of the functions when the PSM24-BFM600S is in operation. This signal is monitored by measuring the input voltage at the input pins, and is provided by an open collector opto-coupler which can handle 10 mA maximum (see also connector J2 pin 3 and pin 4). The output “Ready” provides the signal when the PSM24-BFM600S is ready to provide the current (connector J2 pin 5 and pin 6). The “Ready” signal is provided by an open collector opto-coupler which can handle 10 mA. It is monitored by measuring the PSM24-BFM600S voltage level at the capacitors.

### Status LED

The Status LED indicates the status of the PSM24-BFM600S module and provides visual confirmation of the function.

Status LED Function	
<b>LED Green</b>	Normal operation, PSM24-BFM600S is ready to provide a current of 25 A max
<b>LED Red</b>	Input voltage on PSM24-BFM600S is lower than the adjusted threshold level
<b>LED Changing from Green to Red</b>	PSM power supply is charging the PSM24-BFM600S module
<b>LED Green pulsing</b>	PSM24-BFM600S is providing output current, discharging of PSM24-BFM600S

### Inhibit Function

The PSM24-BFM600S unit provides an Inhibit function by use of pin 1 and pin 2 at connector J2 to control the PSM24-BFM600S module. To switch off the PSM24-BFM600S, a voltage level between 5 VDC and 28 VDC is applied on connector J2 pin 1 (Inhibit GND) and connector J2 pin 2 (Inhibit +). The device is ready to provide the output current for the requested buffer time at zero voltage or a voltage level between 0 VDC and 1 VDC between J2 pin 1 (Inhibit GND) and pin 2 (Inhibit +).

## Compliance to UL508C

The PSM24-BFM600S is a built-in device. To comply with UL 508C it must be installed in a cabinet with minimum dimensions of 400 mm (width) x 500 mm (height) x 200 mm (depth).

## Operating Temperature Ranges and load derating:

Operating temperature ranges and load derating depend on the PSM power supply connected to the PSM24-BFM600S. Please see operating temperature range and load derating values listed in the operating instructions for the applicable PSM power supplies.

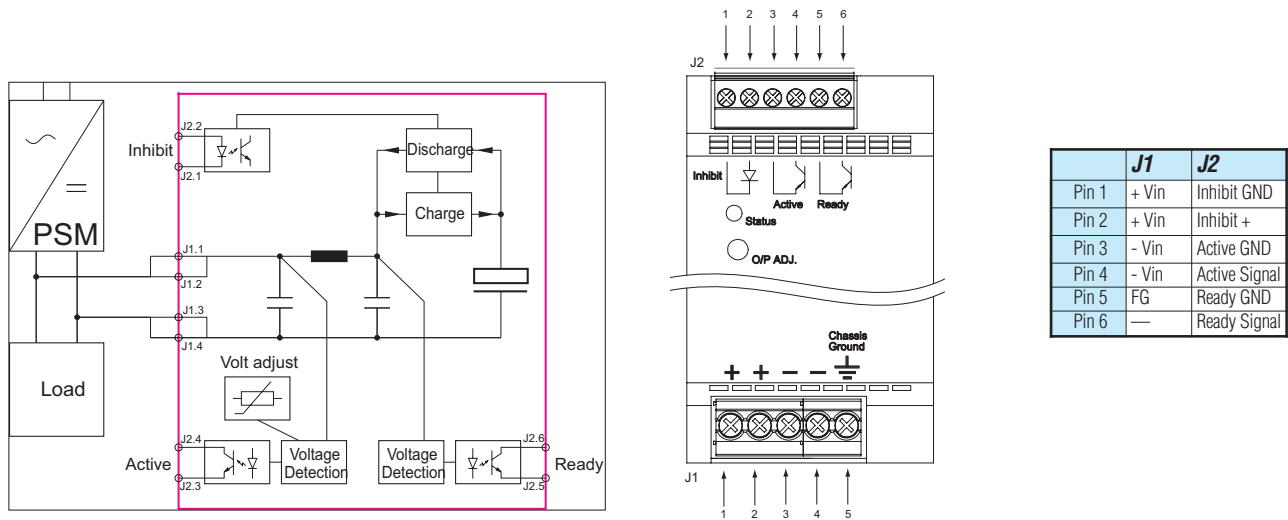
## Technical Specifications

Input Specifications				
Part Number	Input	Buffer Time	* Output Voltage Range	**Max. Output Current
PSM24-BFM600S	24 VDC power supply	Load dependent 200 ms @ 25 A, 4 s @ 1.2 A load	22 VDC to 28 VDC	25.0 A (600 W)

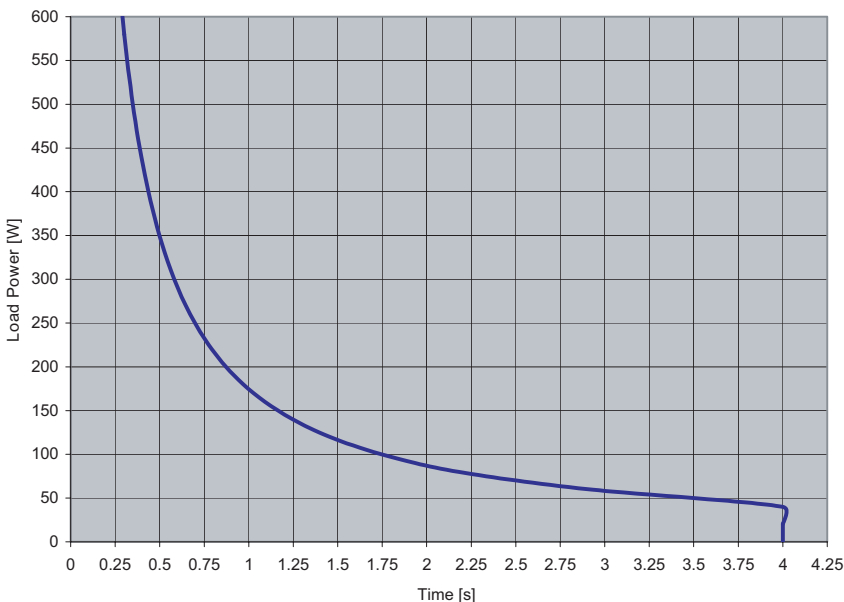
Output Specifications		
Output Voltage Adjustable Range with Potentiometer		22 to 28 VDC
Ripple and Noise (20MHz Bandwidth)	At $V_{in\ nom}$ and $I_{out\ max}$	200 mV peak-to-peak max
Parallel Operation		2 devices possible

\*Output voltage adjustable, \*\* Maximum current at  $V_{out\ nom}$ .

## Buffer Module Function Diagram and Connector Positions



## Buffer Time vs Load Power (typical values)



## General Specifications

General Specifications		
<b>Electromagnetic Compatibility</b>	In correspondence to connected units (no internal switching device)	
<b>Buffer Voltage</b>	Adjustable, >1 V below input voltage, min. 22 VDC.	
<b>Operating Voltage Range</b>	22 to 28 VDC	
<b>Charging</b>	0.6 A max/30s max	
<b>Buffer Time</b>	200 msec typical @ 25A max load 4.0 sec maximum @ 1.2 A load	
<b>Input</b>	24 VDC	
<b>Output Power Max</b>	25.0 A (600 W)	
<b>Status Signals</b>	Buffer Active, Buffer Ready (Opto-coupler output), dual-color LED for status indication	
<b>Inhibit Input</b>	Opto-coupler input: supply between 5 VDC and 28 VDC to Inhibit	
<b>Dimensions</b>	HxWxD = 54.0 mm (2.43 in.) x 110.0 mm (4.33 in.) x 110.0 mm (4.33 in.)	
<b>Signal Output Ratings</b>	10 mA @24 VDC	
<b>Temperature</b>	<b>Operating (ambient):</b> -25°C to +70°C max (-13°F to 158°F). Above +40°C(104°F) load derating <b>Storage (non-operating):</b> -25°C to +85°C max (-13°F to 185°F). <b>Temperature drift:</b> 0.02%/K. <b>Cooling:</b> convection, no internal fan	
<b>Reliability, Calculated MTBF</b>	In accordance with IEC 61709 > 350,000 hours	
<b>Humidity</b>	95% (non-condensing) relative humidity maximum	
<b>Isolation</b>	According to IEC/EN 60950, UL 60950, UL 508C, EN50178, EN61558-2-8, EN60204	
<b>Output Regulation</b>	Input variation: 0.5% maximum. Load variation (10 to 100%): 0.5% maximum	
<b>Output Voltage Ripple</b>	100 mV peak to peak typical (20 MHz bandwidth), (200 mV peak-to-peak maximum at I <sub>max</sub> )	
<b>Status Indicator</b>	Dual color LED <b>Green:</b> normal operation <b>Red:</b> Input voltage low <b>Red-to-Green:</b> charging <b>Pulsing Green:</b> discharging	
<b>Remote ON/OFF</b>	2-pin connector. J5 pin 7 and pin 8 connect via a switch Device off	
<b>Vibration</b>	IEC 60068-2-6: 3 axis, sine sweep, 10-55 Hz, 1g, 1 oct/min	
<b>Shock</b>	IEC 60068-2-27: 3 axis, 15g half sine, 11ms	
<b>Enclosure Rating</b>	IP20 (IEC 529)	
<b>Enclosure Material</b>	Aluminum (chassis) / zinc plated steel (cover)	
<b>Mounting</b>	Snap-on with self-locking spring for 35mm DIN rails per EN 50022-35x15/75, or wall mount with bracket	
<b>Connection</b>	Pluggable screw terminals (plugs included)	
General Specifications – Safety Standards		
Specification	Standard	Document Number
<b>Safety Class</b>	Degree of electrical protection Class 1	IEC 536
<b>Electromagnetic Compatibility (EMC), Emissions</b>	EMC, Emissions	Corresponds to connected units ( no internal switching device)
<b>Electromagnetic Compatibility (EMC), Immunity</b>	EMC, Immunity	Corresponds to connected units ( no internal switching device)
<b>Pollution Degree</b>	2	n/a

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

## Dimensions

