Industrial Power Supplies

TSP Series, 90–600 Watt

Innovative and Powerful Features!

- True industrial grade design
- Rugged metal case for harsh industrial environments
- For worldwide use – Autoselect input and international safety approvals
- ATEX and IECEx certification (opt. EX)
- Model TSP 090-124N meets NEC class 2
- Industrial operating temperature range: –25°C to +70°C
- Variable output voltage
- Indefinite short circuit, overvoltage and overtemperature protection
- Power OK signal
- Remote On/Off
- Shock and vibration proof
- Wall mounting (opt.)
- Redundancy module
- Buffer module for power backup
- Battery controller module
- 3-year product warranty

CE EMC LVD | CB Scheme IEC 60950-1 | GS | cULus UL 60950-1 UL 508 UL 60079-15 | Ex ATEX II3G IECEX

The TRACOPOWER TSP series is a new generation of high performance DIN-rail mount power supplies designed to work reliably even under difficult factory floor conditions. Excellent electrical specifications and high immunity against electrical disturbances makes these compact modules the best choice to power sensitive loads in industrial process control systems, machine tools or other demanding industrial applications. Easy installation with detachable screw terminal block and snap-on mounting on DIN-rails.

For system applications all models offer a DC-OK signal and external shut down function. Redundant operation with true power sharing is available as an option. With another option these power supplies can be extended to build a perfect DC-UPS system with automatic battery management.

The TSP series power supplies complies with the latest safety and EMC standards for industrial environments and are also available with ATEX certification for applications in hazardous locations (class I, division 2)

Models

Order Code	Output Power (Pmax)	**Output Voltage (Vnom)	***Output Current (Imax)
TSP 070–112*	72 W	12 VDC	6.0 A
TSP 090–124*	90 W	24 VDC	3.75 A
TSP 090–124N	90 W	24 VDC	3.75 A
TSP 090–148*	96 W	48 VDC	2.0 A
TSP 140–112*	144 W	12 VDC	12.0 A
TSP 180–124*	180 W	24 VDC	7.5 A
TSP 180–148*	192 W	48 VDC	4.0 A
TSP 360–124*	360 W	24 VDC	15.0 A
TSP 360–148*		48 VDC	7.5 A
TSP 600–124*	600 W	24 VDC	25.0 A
TSP 600–136		36 VDC	16.5 A
TSP 600–148*		48 VDC	12.5 A

* For ATEX / IECEx compliant model add appendix -EX to order code.

** Output voltage adjustable 12–14 VDC, 24–28 VDC and 48–56VDC

*** Max. current at nominal output voltage and operating temperature up to 40 °C max.

Product Features

The Ultimate DIN - Rail Power Supply !

Remote On/Off

Control Output for true N+1 Redundancy or Battery Operation

Jumper for Parallel Operation or Battery Charge Mode selectable by Jumper

Detachable Screw Terminal Block for quick disconnect and easy Installation

Rugged, Ultracompact Metal Case, Shock and Vibration tested per IEC 60068-2 Standard

Double Output Terminals for easy wiring of multiple loads

Industrial Safety Approval Package to comply with:
IEC/EN 60950-1
UL/cUL 60950-1
UL 508, CSA-C22.2 No.107
EN/UL 60079-15
ATEX 94/9/EC, IECEx (Opt. EX)
ANSI/ISA 12.12.01

Dual Color Status Indicator LED

Adjustable Output Voltage

EMC Compliance to EN 61204-3 Standard for Industrial Power Supplies SEMI F47

Remote Diagnostic via floating Relay Contact or PNP Output

Convection Cooling, no internal Fan, Thermal Overload Protection

Autorange Input for worldwide Use

Self-locking DIN-rail fixing Latch or optional Wall Mounting Brackets

Input Specifications

Input voltage range		– TSP 070/090	85 – 263 VAC universal input
		– other models:	85 – 132 / 187 – 264 VAC autoselect
	– output current derating at operation below 100 VAC		see graph B, page 5
Input voltage frequency			47 – 63 Hz
Harmonic limits			EN 61000-3-2, Class A (for limited output power)
Holdup time			20 ms min. (full load 115/230 VAC)
Inrush current			115 VAC / 230 VAC
		– TSP 070/090	< 12 A / < 20 A
		– TSP 140/180	< 13 A / < 25 A
		– TSP 360	< 16 A / < 25 A
		– TSP 600	< 25 A / < 30 A
Recommended circuit breaker, characteristic B		– TSP 070/090/140/180	6.0 – 16.0 A
		– TSP 360	10.0 – 16.0 A
		– TSP 600	16.0 – 25.0 A
Efficiency			87 % typ.

Output Specifications

Output voltage adj. range		– 12 VDC models:	12 – 14 VDC
		– 24 VDC models:	24 – 28 VDC
		– 36 VDC model:	36 – 42 VDC
		– 48 VDC models:	48 – 56 VDC
			At output voltage higher than nominal output voltage max. output current has to be reduced accordingly, in order not to exceed max. output power.
Regulation	– Input variation		0.5 % max.
	– Load variation (10–100 %)		0.5 % max.
Ripple and Noise (20MHz bandwidth)			100 mV pk-pk typ. (200 mV pk-pk max. at Imax)
Electronic short circuit protection			current limitation at Imax. constant current, automatic recovery
Output overvoltage protection		– 12 VDC models:	20 V
		– 24 VDC models:	35 V
		– 36 VDC model:	43 V
		– 48 VDC models:	60 V
Overload protection			electronic overload protection
Overtemperature protection			switch off at overtemperature, automatic restart
Power back immunity		– 12 VDC models:	16 V
		– 24 VDC models:	35 V
		– 36 VDC model:	48 V
		– 48 VDC models:	63 V
Status indicator			dual color LED (green: DC ok, red: DC off)
Power OK signal	– trigger threshold:	– 12 VDC models:	9 – 11 V
		– 24 VDC models:	18 – 22 V
		– 36 VDC model:	27 – 34 V
		– 48 VDC models:	36 – 46 V
	– active output signal: (reference to –Vout)	– 12 VDC models:	11.0 V ±1.0 V (20 mA max. for TSP 070, 40 mA max. for TSP 140)
		– 24 VDC models:	22.0 V ±2.0V / 20 mA max. (10 mA max. for TSP 090, 20mA max. for others)
		– 36 VDC model:	34.0 V ±2.0 V / 20 mA max.
		– 48 VDC models:	44.0 V ±4.0 V / 15 mA max.
	– relay output		DC OK = contact closed rated: 30 VDC/1.0 A for 12/24 VDC models rated: 30 VDC/2.0 A for 36 VDC model rated: 48 VDC/0.5 A for 48 VDC models

General Specifications

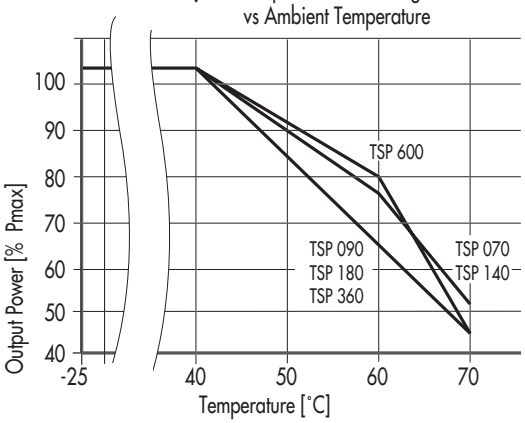
Max. capacitive load		unlimited
Temperature range	– Operating	–25°C to +70°C max. (for derating see graph A on page 5)
	– Storage	–25°C to +85°C
Cooling		convection cooling, no internal fan
Humidity (non condensing)		95 % rel. H max.
Pollution degree		2
Temperature coefficient		0.02 %/K
Reliability, calculated MTBF (at +25°C acc. to IEC 61709)	– TSP 070/090	>1.8 Mio h
	– TSP 140	>1.2 Mio h
	– TSP 180/360/600	>0.9 Mio h
Remote On/Off		by ext. contact. DC on: -S contact open DC off: -S connectetd via 1Kohm to -Vout
Isolation		according to IEC/EN 60950-1, UL 60950-1, UL 508
Safety standards	– Information technology equipment	IEC/EN 60950-1, UL 60950-1, CSA-C22.2 No. 60950-1-03
	– Industrial control equipment	UL 508, CSA-C22.2 No. 107
	– Electrical equipment for machines	EN 60204
	– Electronic equipment for power installation	EN 50178
	– Safety transformers for SMPS	EN 61558-2-4
	– Limited power source (model TSP 090-124N)	EN 60950 sect. 2.5 and NEC Class 2
	– Control equipment for hazardous location	UL 60079-15 (Class I, Division 2, Groups A,B,C,D AEx n C II C T4 U) IEC/EN 60079-15 (Class I, Zone 2, EEx nC II C T4 U), (Ex II3G EEX nAC IIC T4 (T3 with limited power)
Safety approvals and certifications	– CB report	for IEC/EN 60950-1 www.tracopower.com/products/tsp-cb.pdf
	– UL approvals	UL 60950-1 rec. File: e181381, UL 508C listed File: e210002 www.ul.com -> certifications
	– CSA certification	(file no. 219759) for UL 60950-1, UL 508, UL 60079-15-02, ANSI/ISA 12.12.01, CSA-22.2 No. 60950-1-03, CSA C22.2 No. 107, CSA 60079-15-02 www.tracopower.com/products/tsp-csa.pdf
	– Ex II3G ATEX 94/9/EC	certificate no. EPS 12 ATEX 1 424 X (option -EX only) www.tracopower.com/products/tsp-atex.pdf
	– IECEx test report	for IEC 60079-15 www.tracopower.com/products/tsp-iecex.pdf
	– BG certification	for EN 60950-1, EN 60204, EN 61558-2-4, EN 50178 www.tracopower.com/products/tsp-bg.pdf
Class of protection		safety class I (IEC 536)
Degree of protection		IP 20 (IEC/EN 60529)
Electromagnetic compatibility (EMC), Emissions		EN 61000-6-3, EN 61204-3
	– Conducted RI suppression on input	EN 55011 class B, EN 55022 class B,
	– Radiated RI suppression	EN 55011 class B, EN 55022 class B,
Electromagnetic compatibility (EMC), Immunity		EN 61000-6-2, EN 61204-3
	– Electrostatic discharge (ESD)	IEC / EN 61000-4-2 4 kV / 8 kV criteria B
	– Radiated RF field immunity	IEC / EN 61000-4-3 10 V / m criteria A
	– Electrical fast transient / burst immunity	IEC / EN 61000-4-4 2 kV criteria B
	– Surge immunity	IEC / EN 61000-4-5 1 kV / 2 kV criteria B
	– Immunity to conducted RF disturbances	IEC / EN 61000-4-6 10 V criteria A
	– Power frequency field immunity	IEC / EN 61000-4-8 30 A / m criteria A
	– Mains voltage dips and interruptions	IEC / EN 61000-4-11 criteria B/C
	– Voltage sag immunity	SEMI F47 www.tracopower.com/products/TSP_SemiF47.pdf

General Specifications

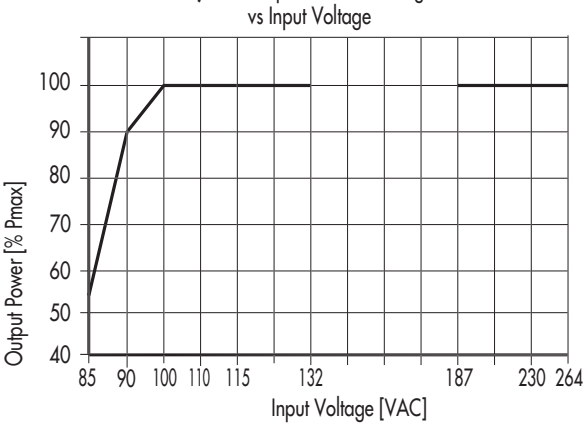
Environment	– Vibration acc. IEC 60068-2-6; – Shock acc. IEC 60068-2-27	3 axis, sine sweep, 10 – 55 Hz, 1 g, 1 oct/min 3 axis, 15 g half sine, 11 ms
Enclosure material		aluminium (chassis) / stainless steel (cover)
Mounting	– DIN-rail mounting – Wall mounting (option)	for DIN-rails as per EN 50022-35x15/7.5 (snap-on with self-locking spring) with wall mounting bracket - see page 12
Connection		detachable screw terminals (plugs included) 2 terminals per output
Remote On/Off connection	– 2 pin molex male terminal KK series	mating connector information (cable not included) www.tracopower.com/products/tsp-rc-cable.pdf
Installation instructions		www.tracopower.com/products/tsp_inst.pdf

Output Power Derating

A) Output Power Derating vs Ambient Temperature



B) Output Power Derating vs Input Voltage



All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

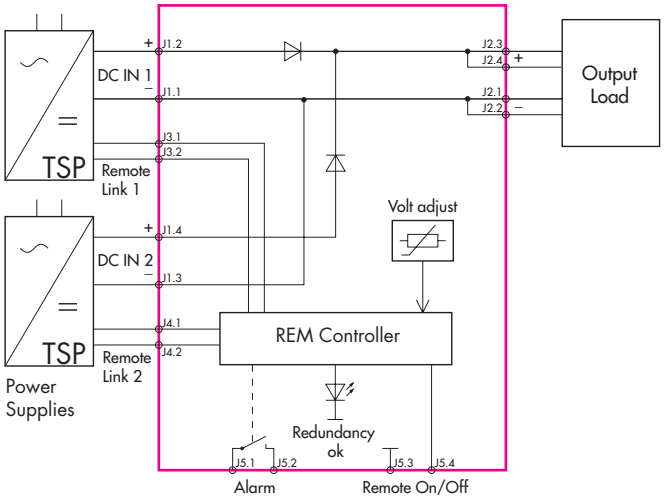
TSP–REM Redundancy Module

With this module and two power supplies of the TSP series (of same type) a highly reliable, truly redundant power system can be configured without any additional components. This module enforces the equivalent sharing of the output current by each power supply. The system is fully redundant and provides output power even if one power supply has completely failed e.g. by short circuit on the output. In the event of either power supply failing or being disconnected, the second unit will automatically supply the full current to the load. The redundancy of the system is monitored and if lost, indicated by an alarm output. The inputs are hot swappable and can be loaded up to 15 A each.

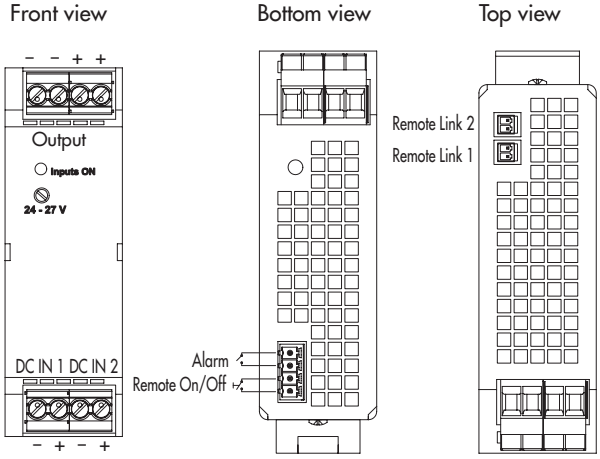
Models

Order Code (includes terminal plugs)	Input	Max Power per Input	Output Voltage adjust.	Output Power max.
TSP–REM360	2 x 24 VDC 2 x Control input	2 x 360 W	24 VDC (24–27 VDC)	360 W
TSP–REM600		2 x 600 W		600 W

Function Diagram



Connector Positions



Specifications

Operating temperature		–25°C to +70°C max. derating above +40°C : 1.5 %/K
Electromagnetic compatibility		in correspondence to connected units (no internal switching device)
Redundancy OK signal (Alarm)		trigger threshold at 18...22VDC, contact open if both inputs failed
Reliability, calculated MTBF at +25°C acc. to IEC 61709	– TSP–REM360 – TSP–REM600	>2 Mio h >1.9 Mio h
Safety approvals	– UL 508 – CSA (UL60079-15-2 class 1, division 2) – CB test certificate IEC 60950-1 (SIQ for EN) – Ⓔx II3G Ex nA nC IIC T4 Gc – BG certificate	www.tracopower.com/products/tsp-rem-ul508.pdf www.tracopower.com/products/tsp-rem-csa.pdf www.tracopower.com/products/tsp-rem-cb.pdf www.tracopower.com/products/tsp-rem-atex.pdf www.tracopower.com/products/tsp-rem-bg.pdf
Dimensions		see page 10
Remote link cable (0.5 m)		2 cables included (order code TSP-JC) www.tracopower.com/products/tsp-rc-cable.pdf
Remote On/Off		by ext. contact: contact open = On, contact closed = Off
Installation instructions		www.tracopower.com/products/tsp-rem-inst.pdf

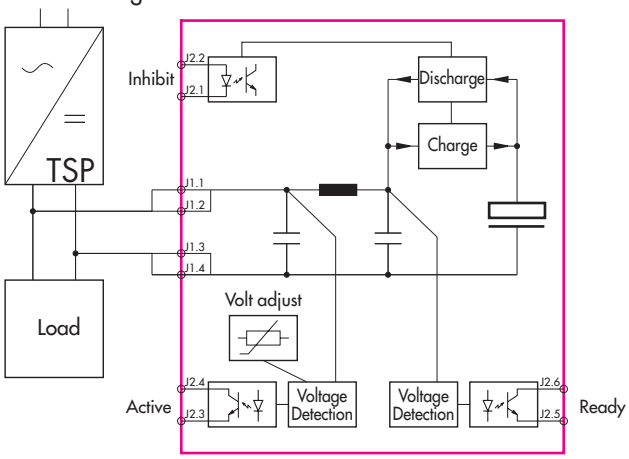
TSP–BFM24 Buffer Module

The TSP-BFM24 buffer module will hold the output voltage of a 24 VDC power supply after brown outs or voltage dips of ten 50 Hz cycles at full road. During this buffer period no deterioration of the 24 VDC output voltage will occur. For many applications this buffer module is an ideal and cost effective alternative to a battery based backup system. 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 second and an opto-coupler signal indicates the "READY" condition. When a power fail occurs, the capacitor bank is discharged, maintaining the output of the buffer module at its nominal voltage. This condition is indicated by an "POWER FAIL" signal. The hold up time is typically 200 ms at 25 A and 4 seconds typically at 1,2 A. After 4 seconds the buffer device will switch off the output voltage. The operating modes of the module are also indicated by a LED on the front panel also. The major advantage of this buffer solution is, that it is fully maintenance free and its storage capability does not deteriorate over the live time of the product.

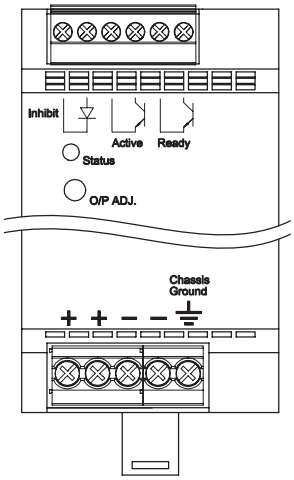
Models

Order code (includes terminal plugs)	Operating Voltage Range	Buffer Time	Output Power max.
TSP-BFM24	24...28VDC	200ms typ. @ 25A max. 4.0 s max. @1.2A	600 W

Function Diagram



Connector Positions

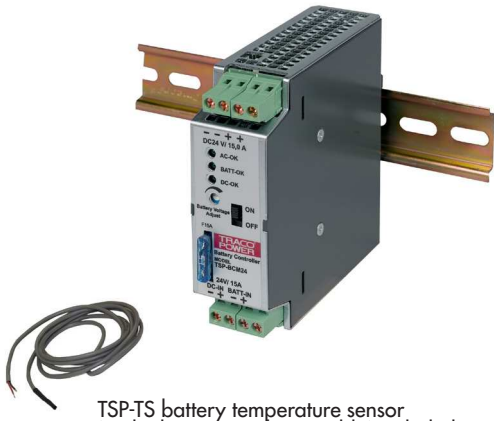


Specifications

Operating temperature		–25°C to +70°C max. derating above 40°C : 1.5 %/K
Electromagnetic compatibility		in correspondence to connected units (no internal switching device)
Buffer voltage		adjustable, >1 V below input voltage, min. 22 VDC
Charging		0.6 A max. / 30s max.
Status signals		Buffer Active , Buffer Ready (optocoupler output) and dual colour LED for status indication
Inhibit		optocoupler input: 35V max. <5mA
Reliability, calculated MTBF at +25°C acc. to IEC 61709		>3.3 Mio h
Dimensions		see page 10
Safety approvals	– CB test certificate IEC 60950-1 (SIQ for EN)	www.tracopower.com/products/tsp-bfm24-cb.pdf
Installation instructions		www.tracopower.com/products/tsp-bfm-inst.pdf

TSP–BCM24 Battery Controller Module

This module provides a professional battery management system to charge and monitor an external lead-acid battery. Together with a power supply of the TSP series, a perfect DC-UPS system can be configured. The connected battery will be charged and held in charged mode by the power supply. In the event of a mains power failure the battery will supply the output power until the battery is discharged. As a consequence, the output voltage of the system is equivalent to the battery voltage. To avoid overcharging the battery, an external temperature sensor adjusts the battery voltage automatically to the required end of charge voltage. This can extend the battery life. The battery is protected against deep discharge. Mains power and battery status are monitored regularly and failures indicated by corresponding LED's and alarm outputs. The module also provides an external On/Off input to switch-off both, power supply and battery.



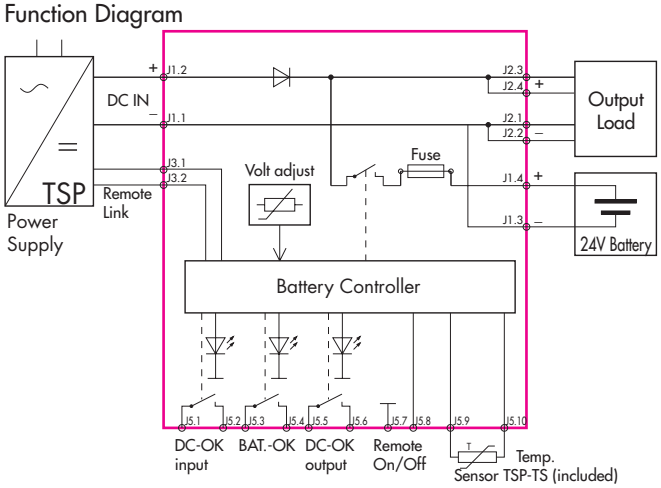
TSP-TS battery temperature sensor
(10 kOhm NTC with 2m cable) included

Models

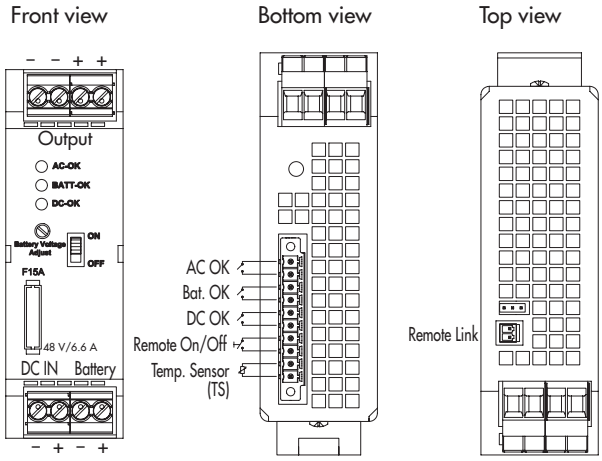
Order code (includes terminal plugs)	Inputs	Input Power max	Output Voltage nom.	*Output Power max.
TSP-BCM24	24 VDC Power Supply and 24 VDC Battery	360 W	24 VDC	360 W
TSP-BCM24A		600 W		600 W

*reduce max. output current by battery charging current

Function Diagram



Connector Positions



Specifications

Operating temperature		–25°C to +70°C max. derating above +40°C : 1.67 %/K
Electromagnetic compatibility		in correspondence to connected units (no internal switching device)
Battery protection		against over voltage, deep discharge, overcharge, short circuit and reverse connection (built-in fuse)
Status signals		DC OK input, DC OK output, BAT OK all relay contact closed at status OK
Rating per relay contact		30 VDC / 1.0 A max.
Reliability, calculated MTBF, at +25°C acc. to IEC 61709		>1.5 Mio h
Dimensions		see page 10
Remote link cable (0.5 m)		1 cable included (order code TSP-JC) www.tracopower.com/products/tsp-rc-cable.pdf
Remote On/Off		by ext. contact: contact open = On, contact closed = Off
Safety approvals	– CB test certificate IEC 60950-1 (SIQ for EN) – BG certificate	www.tracopower.com/products/tsp-bcm-cb.pdf www.tracopower.com/products/tsp-bcm24-bg.pdf
Installation instructions		www.tracopower.com/products/tsp-bcm-manual.pdf

TSP–BCM48 Battery Controller Module

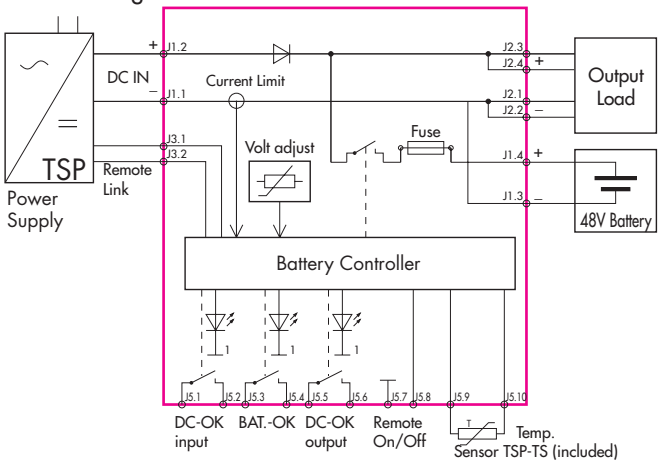
This module provides a professional battery management system to charge and monitor an external lead-acid battery. Together with a power supply of the TSP series, a perfect DC-UPS system can be configured. The connected battery will be charged and held in charged mode by the power supply. In the event of a mains power failure the battery will supply the output power until the battery is discharged. As a consequence, the output voltage of the system is equivalent to the battery voltage. To avoid overcharging the battery, an external temperature sensor adjusts the battery voltage automatically to the required end of charge voltage. This can extend the battery life. The battery is protected against deep discharge. Mains power and battery status are monitored regularly and failures indicated by corresponding LED's and alarm outputs. The module also provides an external On/Off input to switch-off both, power supply and battery.

TSP-TS battery temperature sensor
(10 kOhm NTC with 2m cable) included

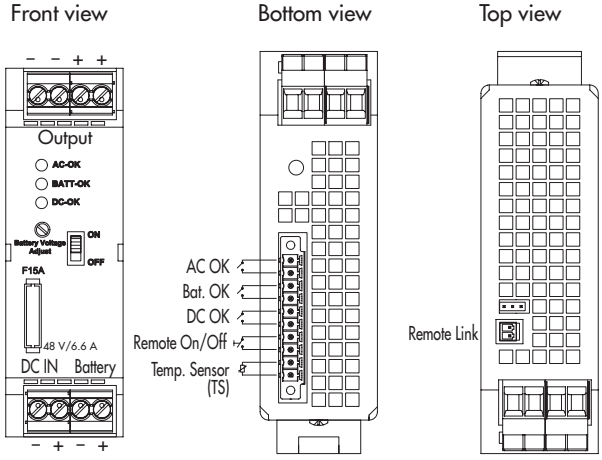
Models

Order code (includes terminal plugs)	Inputs	Input Power max	Output Voltage	*Output Current max.
TSP-BCM48	48 VDC Power Supply and 48 VDC Battery	360 W	48 – 56 VDC	6.6 A
TSP-BCM48A		600 W		11.0 A

Function Diagram



Connector Positions



Specifications

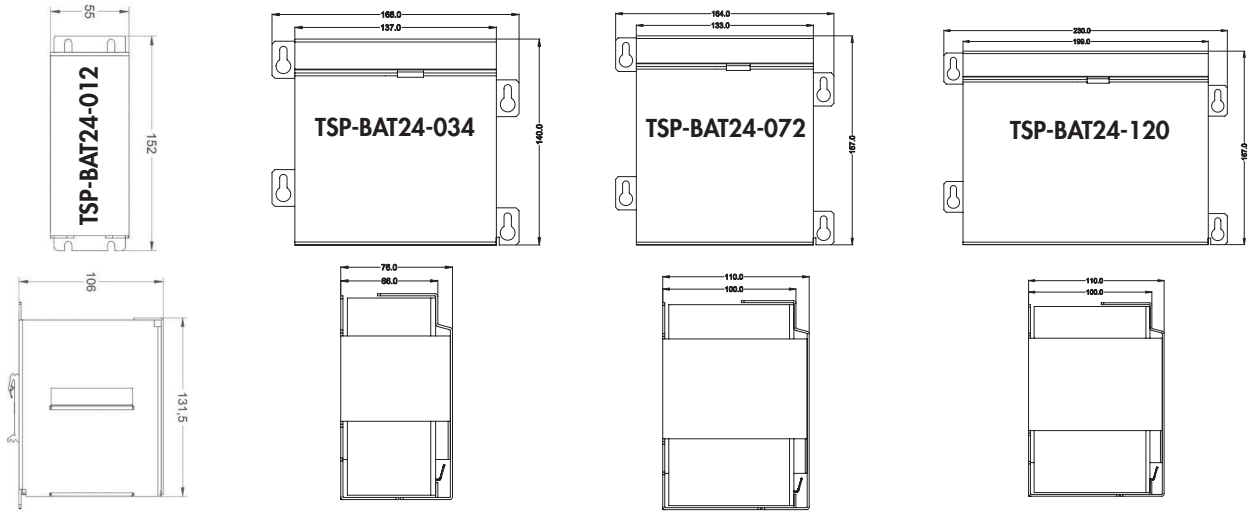
Operating temperature	–25°C to +70°C max. derating above +40°C : 1.67 %/K
Electromagnetic compatibility	in correspondence to connected units (no internal switching device)
Battery protection	against over voltage, deep discharge, overcharge, short circuit and reverse connection (built-in fuse)
Status signals	DC OK input, DC OK output, BAT OK all relay contact closed at status OK
Rating per relay contact	30 VDC / 1.0 A max.
Reliability, calculated MTBF, at +25°C acc. to IEC 61709	>1.5 Mio h
Dimensions	see page 10
Remote link cable (0.5 m)	1 cable included (order code TSP-JC) www.tracopower.com/products/tsp-rc-cable.pdf
Remote On/Off	by ext. contact: contact open = On, contact closed = Off
Installation instructions	www.tracopower.com/products/tsp-bcm-manual.pdf

TSP–BAT Battery Pack

The TSP battery packs are designed to build, in connection with the TSP-BCM battery controller module, a complete DC-UPS system. The entire range utilizes 12 V maintenance free VRLA (valve regulated lead acid) batteries made by PANASONIC. These are not spillable lead gel type batteries. Two 12 V batteries are connected in series and assembled into a stainless steel enclosure, with integrated connector and connection cable.

Models

Order code (includes mating connectors)	Nominal Voltage	Charge current max.	Nominal Capacity (at 25°C, 77°F)
TSP-BAT24-012		0.36 A	1.2 Ah
TSP-BAT24-034	24 VDC	0.80 A	3.4 Ah
TSP-BAT24-072		1.75 A	7.2 Ah
TSP-BAT24-120		3.00 A	12.0 Ah
TSP-BAT24-072KIT	Installation rack without batteries		
TSP-BAT24-120KIT			

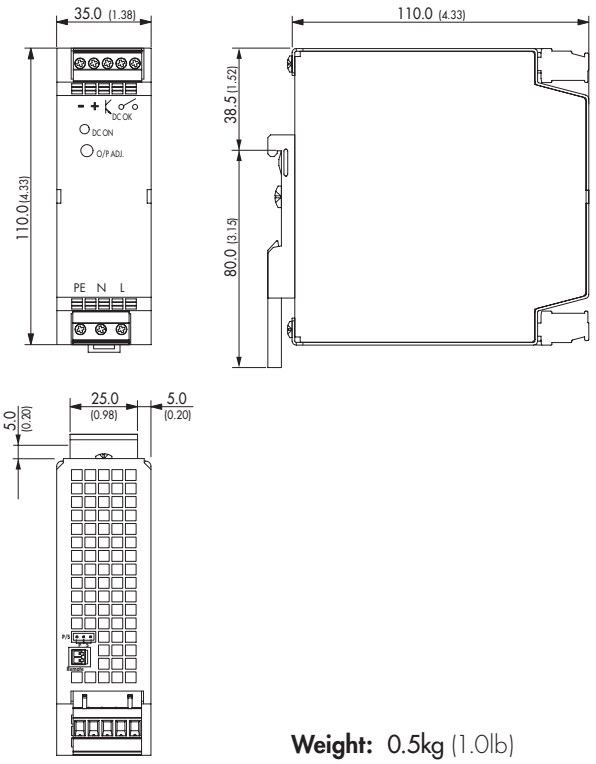


Specifications

Temperature ranges (max)	– during discharge	–15°C to +50°C max.
	– when charging / charged	0°C to +40°C max.
	– storage	–15°C to +40°C max.
Battery lifetime		3 – 5 years see general battery information for details & warranty limitations www.tracopower.com/products/tsp-panas_gen.pdf
Remote link cable (0.5 m)		1 cable included (order code TSP-JC) www.tracopower.com/products/tsp-rc-cable.pdf
Weight	TSP–BAT24–034	3.2 kg (7.1lb)
	TSP–BAT24–072	5.8 kg (12.9lb)
	TSP–BAT24–120	9.0 kg (20.0lb)
Battery datasheets	TSP–BAT24–012	www.tracopower.com/products/tsp-powers_012.pdf
	TSP–BAT24–034	www.tracopower.com/products/tsp-panas_034.pdf
	TSP–BAT24–072	www.tracopower.com/products/tsp-panas_072.pdf
	TSP–BAT24–120	www.tracopower.com/products/tsp-panas_120.pdf

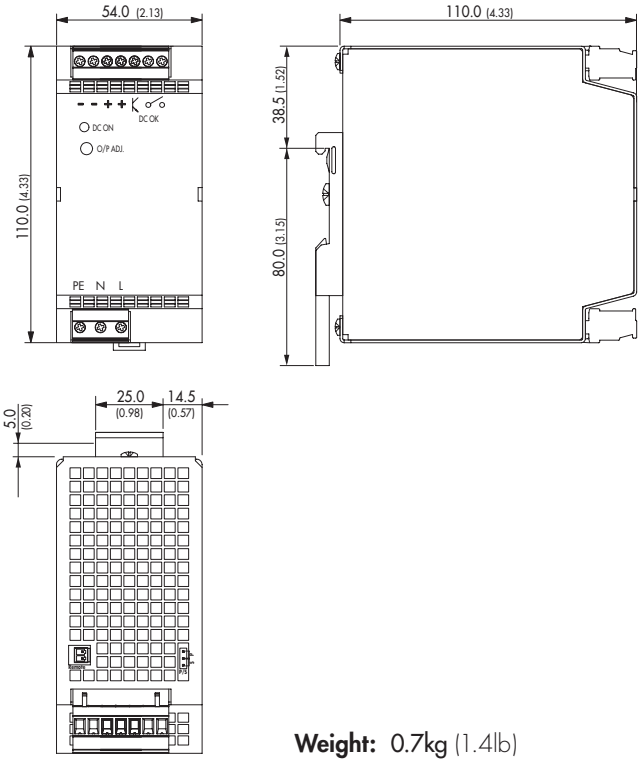
Outline Dimensions

Models:
TSP 070/090
TSP-REM360
TSP-BCM24



Weight: 0.5kg (1.0lb)

Models:
TSP 140/180
TSP-REM600
TSP-BCM24A
TSP-BFM24

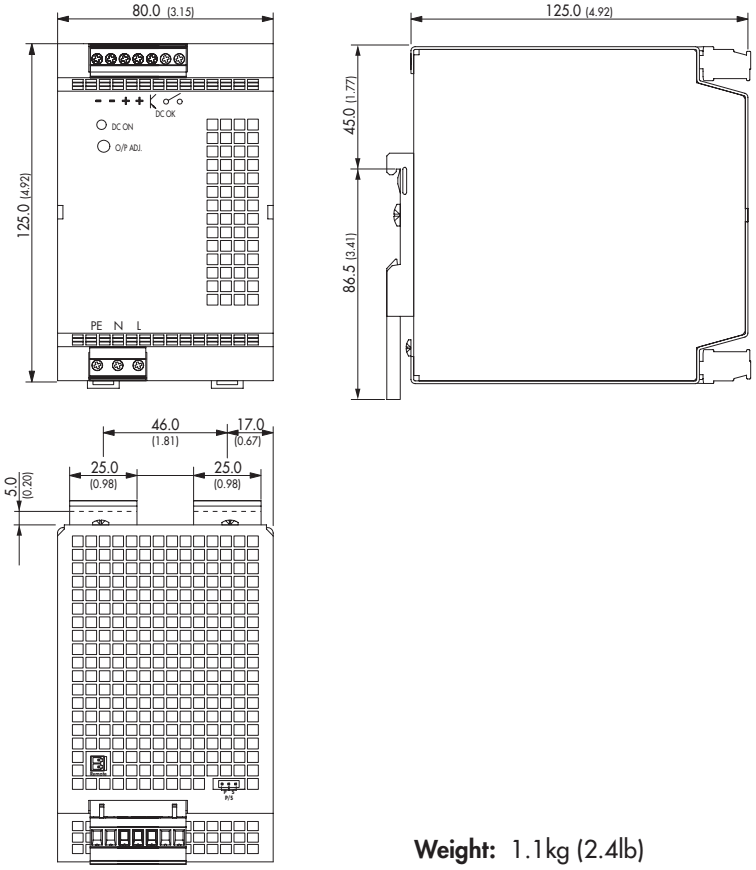


Weight: 0.7kg (1.4lb)

Dimensions in [mm], ( ) = inch
Tolerances: ±0.5 mm (±0.02)

Outline Dimensions

TSP 360

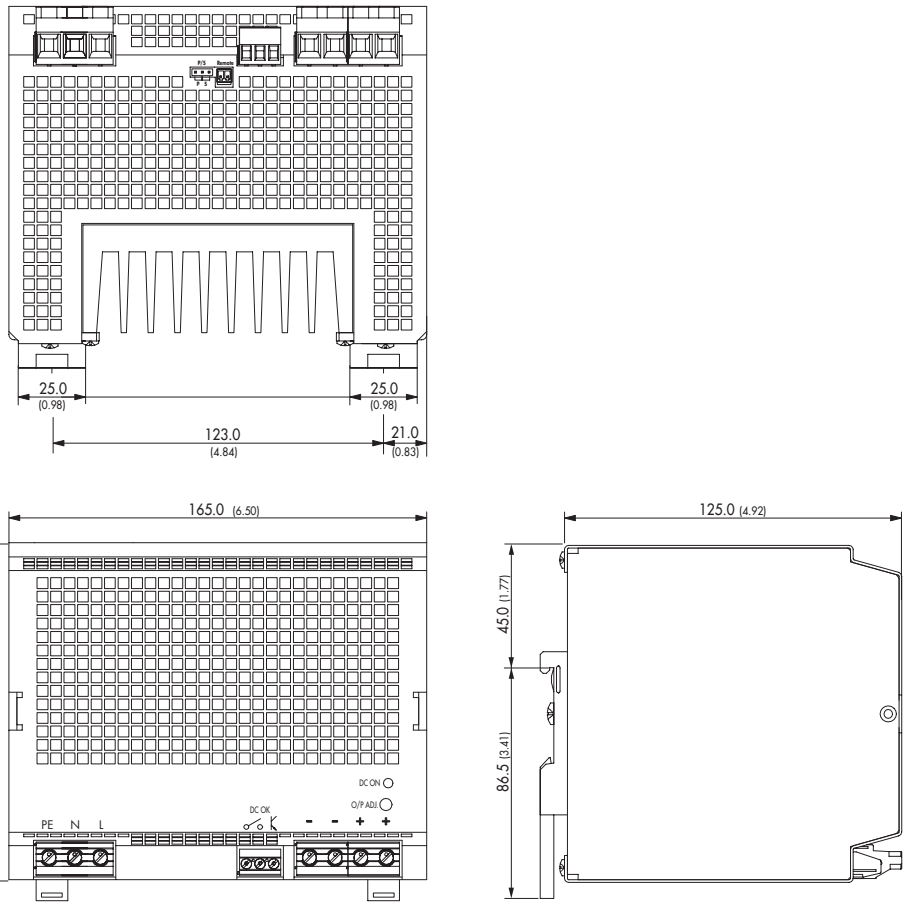


Weight: 1.1kg (2.4lb)

Dimensions in [mm], ( ) = Inch
Tolerances: ±0.5 mm (±0.02)

Outline Dimensions

TSP 600



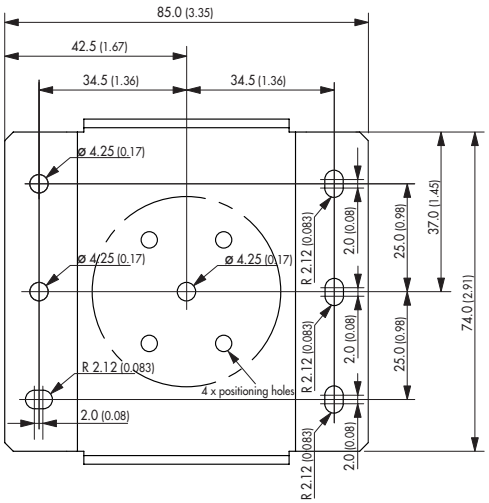
Weight: 2.8kg (6.0lb)

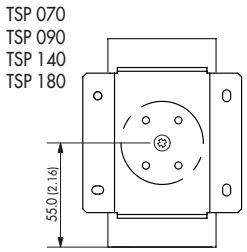
Dimensions in [mm], ( ) = Inch
Tolerances: ±0.5 mm (±0.02)

TSP–WMK Wall Mounting Bracket

Ordercode of Kit	For Models	Content of Kit
TSP-WMK03	TSP 070, TSP 090, TSP 140, TSP 180	1 bracket
TSP-WMK02	TSP 360, TSP 600	2 brackets

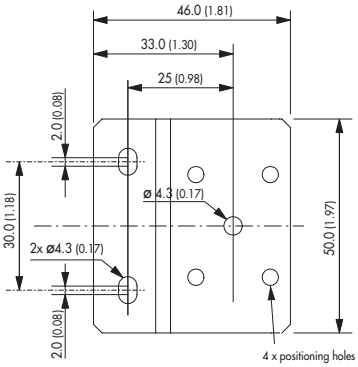
TSP-WMK03

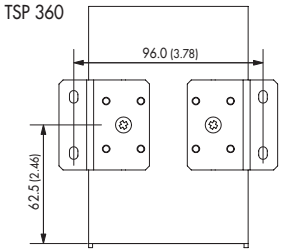


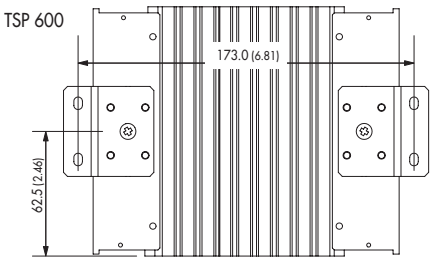


Material: 2 mm Mild Steel
Tolerance: ±0.1mm (± 0.004)

TSP-WMK02







Material: 2 mm Mild Steel
Tolerance: ±0.1mm (± 0.004)

Dimensions in [mm], ( ) = Inch
Tolerances: ±0.5 mm (±0.02)