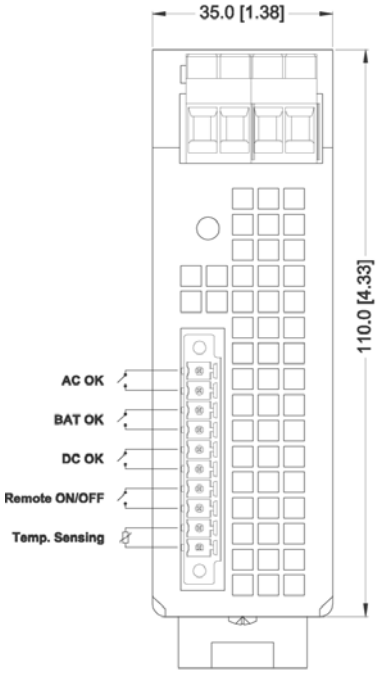
BATTERY CONTROLLER MODULE TSP-BCM24 & TSP-BCM24A

Operating Instructions

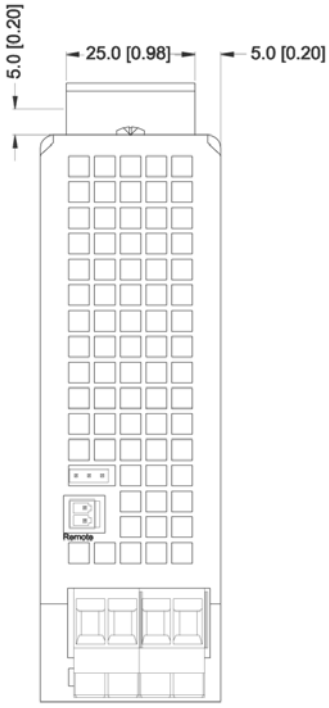
Dimensions drawings:

TSP-BCM24

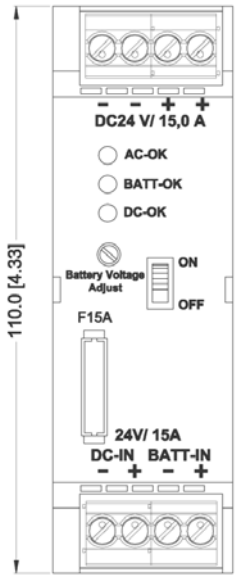
Bottom view



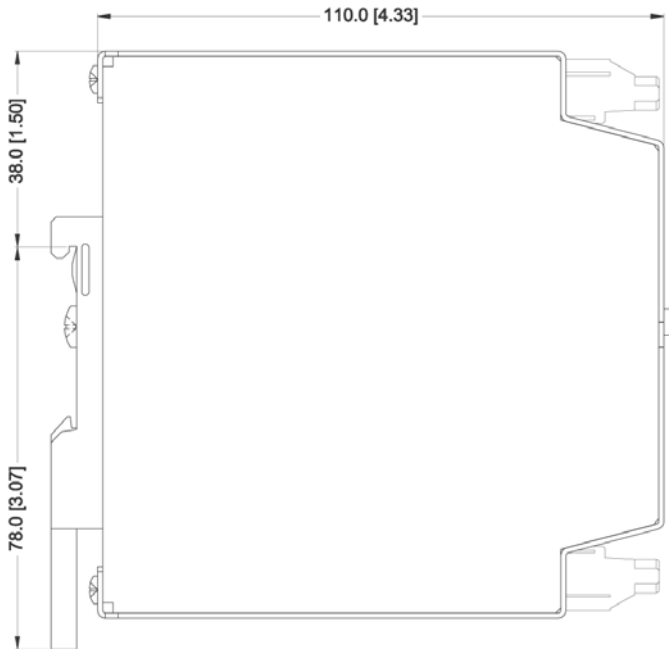
Top view



Front view



Side view

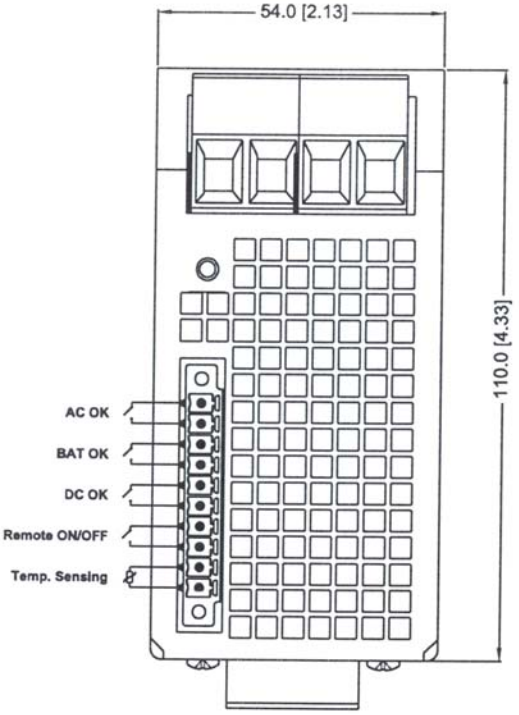


Weight: 0.816lb
Gewicht: 0.370kg

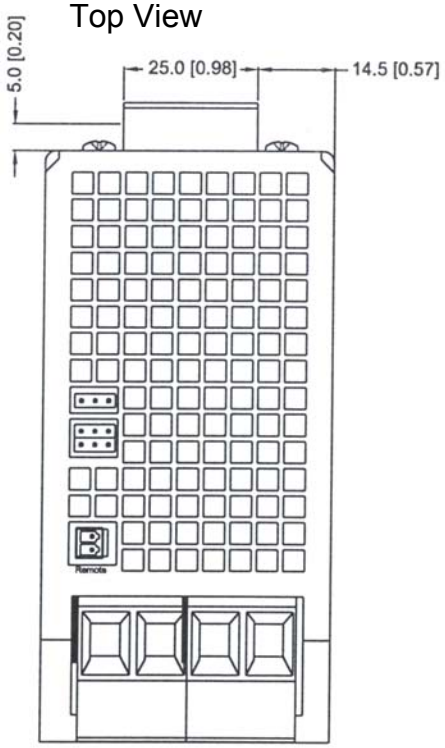
Dimensions drawings:

TSP-BCM24A

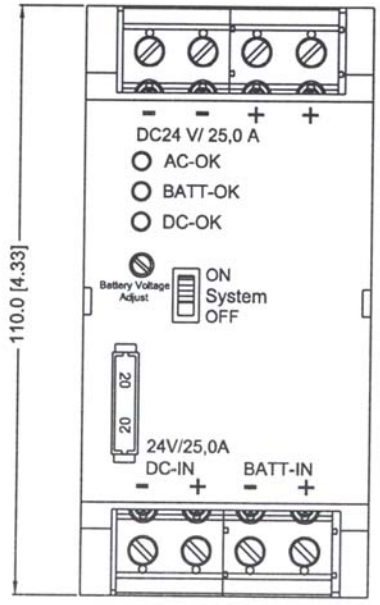
Bottom View



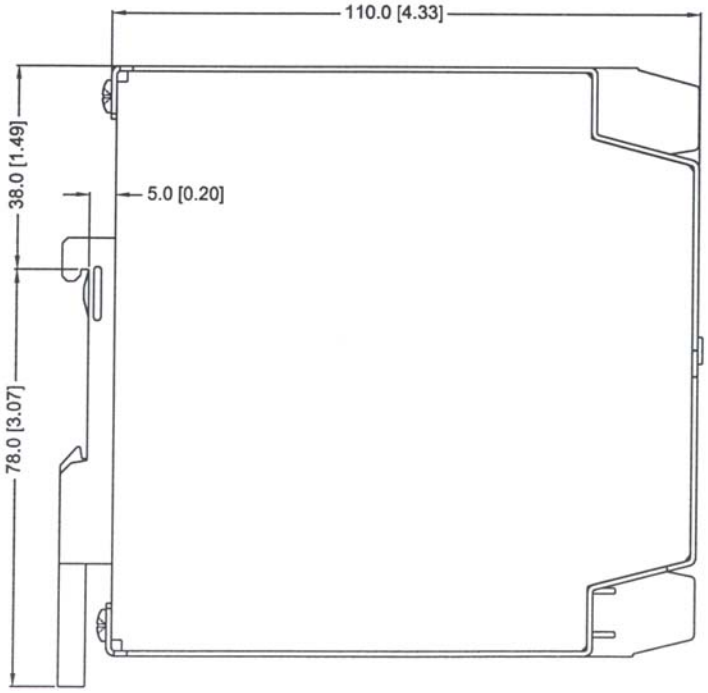
Top View



Front View



Side View



Weight: 1.102lb
Gewicht: 0.500kg

Note

This instruction cannot claim all details of possible equipment variations, nor in particular can they provide for every possible example of installation, operation or maintenance. Further information is available from your local distributor office or from the TSP industrial power supply data sheet. Subject to change without prior notice.

In order to guarantee safe operation of the TSP-BCM24 or TSP-BCM24A in combination with the TSP power supplies and to be able to make use of all the functions, please read these instructions thoroughly!

Warning

The TSP-BCM24 and TSP-BCM24A is designed and constructed in accordance with the safety requirements of IEC 60950-1, EN 60950-1, UL 60950-1, CSA 22.2 No. 60950-1-03, EN 60204, EN 50178, UL508 and CSA 22.2 No. 107.

The TSP-BCM24 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 TSP-BCM24 or TSP-BCM24A can result in death, severe personal injury or substantial property damage. **The TSP-BCM24 or TSP-BCM24A may only be installed and put into operation by qualified personnel.** 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 is only allowed to be actuated using an insulated screwdriver, because accidental contact may be made with parts inside the power supply carrying dangerous voltages.

Please observe following points before putting the device into operation:

- Read operating instructions thoroughly.
- That the input wiring is sufficiently dimensioned!
- That the output wiring is dimensioned according to the maximum output current or separately protected!
- Sufficient cooling is guaranteed!
- The temperature of the housing can become very high, depending on the ambient temperature and load.

Caution:

Risk of electrical shock and electrical discharge. Neither TSP-BCM24 nor TSP-BCM24A nor the TSP power supply must not be opened until at least 5 minutes after complete disconnection of the mains and battery.

Electrostatic sensitive device. **Qualified and trained personnel only may open the TSP-BCM24 or TSP-BCM24A or the TSP power supply.**

Attention: In case of non-observance or exceeding the mentioned limiting value of the data sheet, the function and electrical safety can be impaired and can destroy the TSP-BCM24 and/or the power supply.

Before installation ensure that the main switch is switched off and prevented from being switched on again. In case of non-observance, touching of any live components or improper dealing with this TSP-BCM24 or TSP-BCM24A or power supply can result in death or fatal injury.

Danger: **Never work on the TSP-BCM24 or TSP-BCM24A or power supplies if power is applied or if the battery is still connected!**

1. Description and construction

The module TSP-BCM24 and TSP-BCM24A provides a professional battery management system to charge and monitor an external lead-acid battery (e.g. YUASA NP batteries). Together with a power supply of the TSP series (TSP 090-124, TSP 180-124 TSP 360-124 and TSP 600-124) a perfect DC-UPS system can be configured. The connected battery will be charged and held in charge mode by the power supply. In the event of a 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 achieves a long battery life time.

The battery is protected against deep discharge. Mains power and the battery status are monitored regulary and failures indicated by LED's and signal outputs.

Before connecting the input, output and sense lines (see Fig. 2.1 and Fig 3.1; J1, J2 and J3) the potentiometer on the TSP power supply has to be turned completely conterclockwise ($V_{out\,min}$). Afterwards the connection between the TSP (TSP xxx-124) and DC In on the TSP-BCM24 or TSP-BCM24A (see Fig. 3,1, J1 and chapter 2.2.1) as well as the remote sensing between these two devices using the wire supplied with the TSP-BCM24(A) modules (see Fig. 2.1 and Fig. 3.1, J3). Before connecting the battery the battery charging voltage has to be adjusted as recommended by the battery manufacturer. Further the Jumper J6 has to be set according to the TSP which is connected to the TSP-BCM24(A) modules (see Fig. 3.1 J6 and chapter 3.4). Than the battery can be connected to the Batt In connector (see Fig. 3.1, J1 and chapter 2.2.2). Now connect the load to DC-Out (see Fig. 3.1, J2 and chapter 2.2.3).

The TSP-BCM24 as well as the TSP-BCM24A is a built-in device. The mounting position has to fulfil the requirements for fireproof case 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 TSP-BCM24 as well as the TSP-BCM24A is designed for mounting on a DIN rail TS35 (DIN EN 50022-35x15/7.5).

The output voltage of the TSP-BCM24 as well as the output voltage of the TSP-BCM24A is protected against short circuit and open circuit conditions.

2. Installation

A sufficiently strong DIN-rail has to be provided. The correct mounting position for optimal cooling performance must be observed. Above and below the TSP-BCM24(A) a minimum free space of 80mm [3.15in] is required and on each side of the TSP-BCM24(A) a minimum space of 50mm [1.97in] is required which allows air convection. The air temperature measured 10mm [0.39in] below the device must not exceed the specified values in the data sheet. Observe same power derating above ambient temperatures of 40°C as specified for the TSP power supplies.

2.1 Assembly

To fix device on the DIN-rail, hook top part of clip on DIN-rail, push down and inward until you hear a clipping sound.

To remove the device, pull the latch of the clip with the aid of an insulated flat head screwdriver. When clip has cleared bottom DIN rail remove the screwdriver from recess. Lift the device off DIN-rail.

Wall mounting or chassis mounting can be achieved by use of optional mounting bracket TSP-WMK01 (1 bracket, see Fig. 4.1). 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, which are included with the wall mounting kit (1 countersink screw with TSP-WMK01) to fix the mounting brackets on the TSP-BCM24 (tightening torque 0.8-0.9Nm).

2.2 Connecting cable

Only qualified personnel may carry out the installation. The device is equipped with COMBICON connector. This reliable and easy-to-assemble connection method enables a fast connection of the device.

2.2.1 DC- Input (Fig. 3.1 ➔ Connector J1, pin 1 & pin 2):

The 24Vdc connection is made by using the –Vin (-DC In) and +Vin (+DC In) connections and has to be carried out in accordance with the local regulations. Sufficiently dimensioned wiring has to be ensured (see 2.2.1.1).

To achieve a reliable and shockproof connection strip the connecting ends according 2.2.1.1. If flexible wires are used the wires have to be terminated. (e.g. by using ferrules)

2.2.1.1 Connections and terminal assignment

Device	Terminals	Function	Solid or stranded wires		Torque	Stripping length
			[mm²]	[AWG]	[Nm]	[mm]
TSP 090-124 TSP 180-124	+Vin & -Vin	Input Voltage (24Vdc)	0.5 … 2.5	24 … 12	0.5 – 0.6	7.0
	+Bat & -Bat	Battery Voltage (24Vdc)	0.5 … 2.5	24 … 12	0.5 – 0.6	7.0
	+Vout & -Vout	Output Voltage (24Vdc)	0.5 … 2.5	24 … 12	0.5 – 0.6	7.0
	Signal	Relay inputs and relay outputs	0.2 … 2.5	32 … 12	0.5 – 0.6	7.0
TSP 360-124	+Vin & -Vin	Input Voltage (24Vdc)	1.0 … 2.5	18 … 12	0.5 – 0.6	7.0
	+Bat & -Bat	Battery Voltage (24Vdc)	1.0 … 2.5	18 … 12	0.5 – 0.6	7.0
	+Vout & -Vout	Output Voltage (24Vdc)	1.0 … 2.5	18 … 12	0.5 – 0.6	7.0
	Signal	Relay inputs and relay outputs	0.2 … 2.5	32 … 12	0.5 – 0.6	7.0
TSP 600-124	+Vin & -Vin	Input Voltage (24Vdc)	2.0 … 10.0	12 … 7	0.6 – 0.8	7.0
	+Bat & -Bat	Battery Voltage (24Vdc)	2.0 … 10.0	12 … 7	0.6 – 0.8	7.0
	+Vout & -Vout	Output Voltage (24Vdc)	2.0 … 10.0	12 … 7	0.6 – 0.8	7.0
	Signal	Relay inputs and relay outputs	0.2 … 2.5	32 … 12	0.5 – 0.6	7.0

2.2.1.2 Internal Fuse

Model	Ratings	Marking
TSP-BCM24	15.0 A / 60V	F1 ➔ 15A
TSP-BCM24A	30.0 A / 60V	F1 ➔ 30A

CAUTION: **For continued protection against risk of fire replace with same type and rating of fuse!** Only authorised and trained personnel should change this fuse.

2.2.2 Battery In (Fig. 3.1➔ Connector J1, pin 3 and pin 4):

The battery connection is made using the "+Bat In" and "-Bat In" connections. Make sure that the battery lines are dimensioned according to the maximum output current (see 2.2.1.1) or are separately protected! The wires on the secondary side should have large cross sections in order to keep the voltage drops on these lines as low as possible. To achieve a reliable and shockproof connection strip the connecting ends according 2.2.1.1. If flexible wires are used the wires have to be terminated. (e.g. by using ferrules)

2.2.3 Output (Fig. 3.1➔ Connector J2, pin 1, pin 2, pin 3 & pin 4):

The 24VDC connection is made using the "+Vout" and "-Vout" connections. All output terminals should be connected to the load. Make sure that all output lines are dimensioned according to the maximum output current (see 2.2.1.1) or are separately protected! The wires on the secondary side should have large cross sections in order to keep the voltage drops on these lines as low as possible.

To achieve a reliable and shockproof connection strip the connecting ends according 2.2.1.1. If flexible wires are used the wires have to be terminated. (e.g. by using ferrules)

At the time of delivery, the output voltage is 24VDC. The output voltage can be set (using an insulated screwdriver) from 24 to 28VDC on the potentiometer (see Fig. 3.1).

The device is protected against overload and short circuit.

2.2.4 Signalling (Fig. 3.1➔ Connector J5, pin 1, pin 2, pin 3, pin 4, pin 5 & pin 6):

The AC-OK, Bat-OK and DC-OK outputs are for enabling monitoring of the functions of the TSP-BCM24 or TSP-BCM24A, mains and battery. The floating AC OK signal contacts (see Fig. 3.1 ➔ Connector J5, pin 1 & pin 2) is monitoring if the mains is present. If mains is present the relay contact (30Vdc / 1A) is closed. It is detected by measuring the input at DC In.

The floating Bat OK signal contacts (see Fig. 3.1 ➔ Connector J5, pin 3 & pin 4) is monitoring if the battery can supply enough current for a given time.

The floating DC-OK (see Fig. 3.1 ➔ Connector J5, pin 5 & pin 6) is available to monitor if the TSP-BCM24 or TSP-BCM24A provides an output voltage. If the output voltage on the TSP-BCM24 or TSP-BCM24A is present the relay contact (30Vdc / 1A) is closed. It is detected by measuring the TSP-BCM24 output voltage or TSP-BCM24A output voltage.

Three LED's also enables a visual evaluation of the functions of TSP-BCM, mains and battery directly on site and are in parallel to the signal relay contacts.

2.2.4.1 AC-OK LED:

The AC-OK LED is a green colour LED that indicates the status of the TSP-BCM24 or TSP-BCM24A input and enables visual evaluation of the function locally in the control cabinet. AC-OK LED green on – DC input present. DC-OK LED green off – DC input failure.

2.2.4.2 Bat-OK LED:

The DC-OK LED is a green colour LED that indicates the status of the battery and enables visual evaluation of the function locally in the control cabinet. DC-OK LED green – battery can supply enough current. DC-OK LED green off – battery failure and should be changed to ensure a proper and reliable operation of the battery in the event of mains fail.

2.2.4.3 DC-OK LED:

The DC-OK LED is a green colour LED that indicates the status of the output and enables visual evaluation of the function locally in the control cabinet. DC-OK LED green on – normal operation. DC-OK LED green off – output failure.

3. Function

3.1 Remote ON/OFF:

The TSP-BCM24 as well as TSP-BCM24A provides an external remote on/off function by use of pin 7 and pin 8 at connector J5 (see Fig. 3.1). To switch off the power supply and TSP-BCM24 or the power supply and TSP-BCM24A a connection between Connector J5 pin 7 and Connector J5, pin 8 by use of a switch has to be made. At open connection between J5 pin 7 and J5 pin 8 the device is providing the adjusted output voltage.

On the TSP-BCM24 as well as theTSP-BCM24A a switch is available to switch off the system on site (in the control cabinet).

3.2 Battery test:

The TSP-BCM24 as well as the TSP-BCM24A is designed to monitor the batteries condition. The battery is loaded with a sudden current pulse (the actual load) as long as the mains is present to monitor the batteries condition. The time between the current pulses can be set either to 15 seconds (see Fig. 3.1, J4, Pin 1 & 2) or to 10 minutes (see Fig. 3.1, J4, Pin 2 & 3)

3.3 Temperature sensing (optional):

The TSP-BCM24 as well as the TSP-BCM24A is designed to operate with temperature compensation required for proper operation of the battery. The temperature is detected using an external NTC sensor (10kΩ) connected to the signal connector (J5 pin 9 and pin 10). If the sensor is not connected the device automatically switches to +25°C constant temperature operation mode.

Before connecting the sensor it is required to set the battery voltage as recommended for +25°C ambient using the potentiometer (see Fig. 5,1). E.g. for YUASA NP batteries it is: 2,26Vdc x 12 cells = 27,12Vdc. When the sensor is connected the device will automatically detect it and will start adjusting the correct voltage for the battery.

3.4 Jumper setting of TSP supplying the TSP-BCM24 or TSP-BCM24A:

The TSP-BCM24 device is designed to provide the remaining output current for battery charging current in maximum 15A (TSP-BCM24) or 25A (TSP-BCM24A). To asure that the TSP which is supplying the TSP-BCM24 or TSDP-BCM24A is not used in overload even if a descharged battery is connected, the jumper J6 has to be set (see Fig. 3.1). The factory setting (position 1) is for the use of a TSP 360-124 (TSP-BCM24) or TSP 600-124 (TSP-BCM24A). The jumper J6 has to be set to position 2 if a TSP 180-124 (TSP-BCM24) or TSP 360-124 (TSP-BCM24A) is used and to position 3 if a TSP 090-124 (TSP-BCM24) or TSP 180-124 (TSP-BCM24A) is used.

4. Compliance to UL508C

The TSP-BCM24 is a built-in device and to comply with UL508C the device must be installed in a cabinet with minimum dimensions of: 400mm (Width) x 500mm (Height) x 200mm (Depth)

4.1 Operating Temperature Ranges and load derating:

Depends on the TSP supplying the TSP-BCM24 or TSP-BCM24A. Please see operating temperature range and load derating at the TSP power supply datasheet or TSP operating instructions.

5. Technical Specifications

5.1 Input Specifications

Order code Model	Input voltage	max. Input Power	* Output Voltage	**max. Output Power
TSP-BCM24	24Vdc power supply and 24Vdc battery	360 Watt	24 Vdc	360 Watt
TSP-BCM24A		600 Watt	24 Vdc	600 Watt

* Output voltage adjustable
** Maximum current at Vout nom.

5.2 Output Specifications

Output Voltage adjustable Range with Potentiometer		24 - 28 Vdc
Ripple and Noise (20MHz Bandwidth)	at $V_{in\ nom}$ und $I_{out\ max}$	200mV pk-pk max
Max. Capacitive Load		unlimited

5.3 General Specifications

Operating Temperature Range		-25°C … +70°C -13°F … +158°F
Cooling		Convection cooling; no internal fan
Storage Temperature Range		-25°C … +85°C -13°F … +185°F
Load Derating above +40°C (104°F)		1.5%/K
Battery protection		Over voltage, deep discharge, short circuit and reverse connection (built-in fuse)
Status signal		DC-OK input, DC-OK output, BAT OK All relay contact closed at status OK
Humidity (non condensing)		95% rel H max.
Pollution Degree		2
Temperature Coefficient		0.02%/K
Reliability, calculated MTBF	in accordance to IEC 61709	>350'000 hours
Remote ON/OFF	see Fig. 3.1	2 pin connector (see Fig. 3.1; J5 pin 7 and pin 8) connect via a switch ➔ Contact closed = Device off
Signal Relay Contacts		30Vdc / 1A
Remote link cable (0.5m)		1 cable included with TSP-BCM24 module
Case protection	in accordance to IEC 529	IP20
Isolation		See Safety Standards
Safety Standards according to	- Information Technology Equipment - Industrial Control Equipment	IEC / UL / EN 60950-1 UL 508C
Electromagnetic compatibility (EMC) Emissions		in correspondence to connected units (no internal switching device
Electromagnetic compatibility (EMC) Immunity		in correspondence to connected units (no internal switching device
Environment	Vibration Shock	IEC 60068-2-6 3 axis, sine sweep, 10 … 55Hz, 1g, 1oct/min. IEC 60068-2-27 3 axis, 15g, half sine, 11ms
Enclosure Material		Aluminium (Chassis) / Zinc plated Steel (Cover)
Mounting	DIN-Rail mounting Wall mounting	For DIN-Rails as per EN 50022-35 x 15 / 7.5 (snap-on self-locking spring) With wall mounting bracket option TSP-WMK01 (see datasheet page 9)
Connection		Screw terminals

6.1 Block diagram TSP-BCM24 & TSP-BCM24A

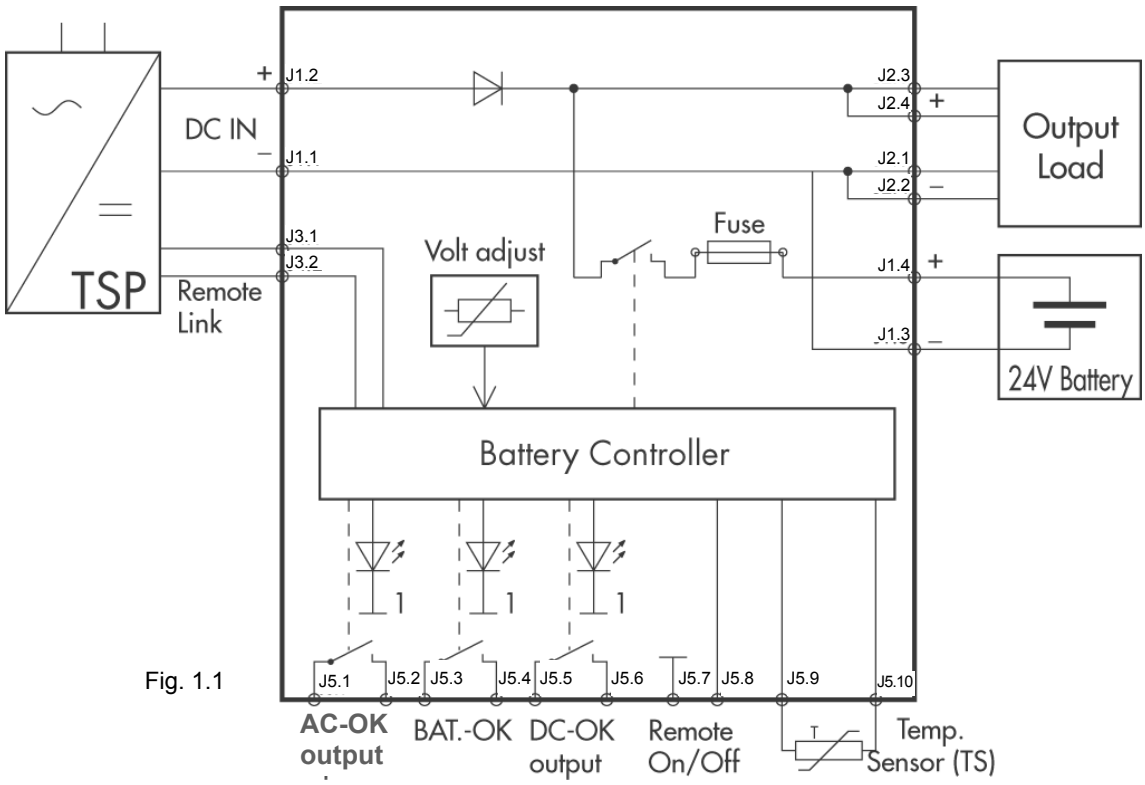


Fig. 1.1

6.2 Connection of TSP-BCM24 & TSP-BCM24A

Fig.: 2.1

6.3 Connectors of TSP-BCM24 & TSP-BCM24A

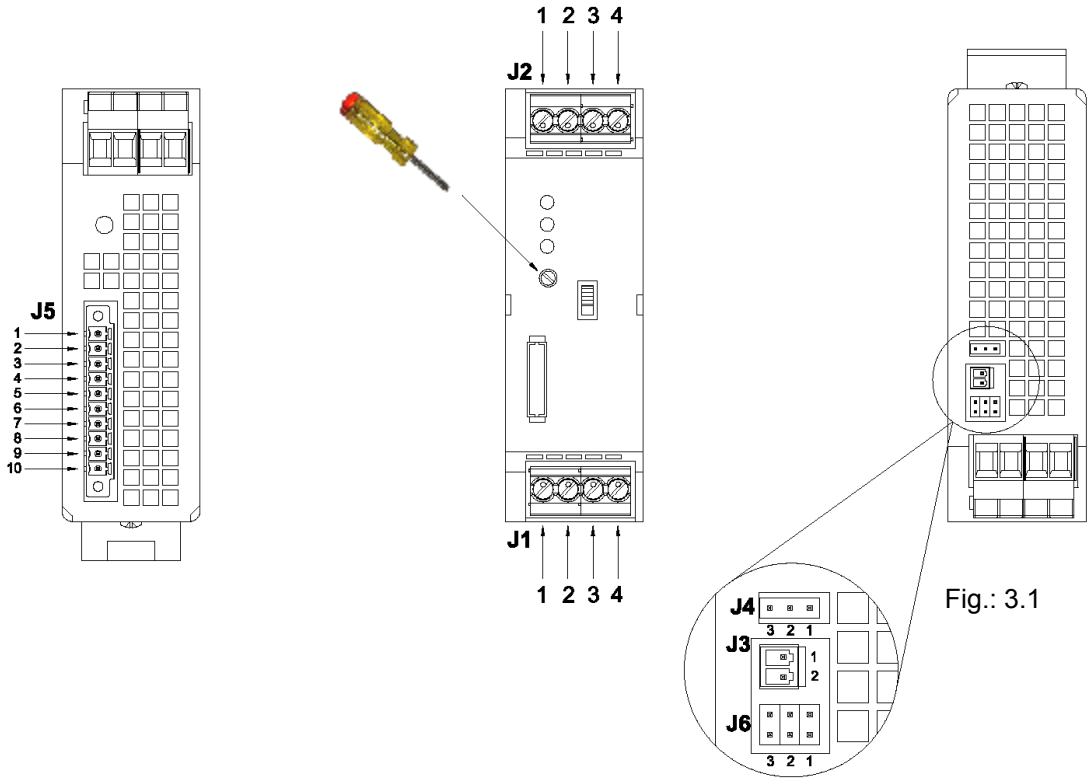


Fig.: 3.1

TSP-BCM24						
Pin No.	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**
Pin 1	-Vin (DC In)	GND (-)	S+	15 sec test	AC-OK Signal	TSP 360-124 (Factory setting)
Pin 2	+Vin (DC In)	GND (-)	S-	Com	AC-OK Relay contact	TSP 180-124
Pin 3	-Bat in	Vout (+)	-	10 min test	Bat-OK Signal	TSP 090-124
Pin 4	+Bat in	Vout (+)	-	-	Bat-OK Relay contact	
Pin 5	-	-	-	-	DC-OK Signal	
Pin 6	-	-	-	-	DC-OK Relay contact	
Pin 7	-	-	-	-	Remote ON/OFF	
Pin 8	-	-	-	-	Remote ON/OFF	
Pin 9	-	-	-	-	Temperature Sensing	
Pin 10	-	-	-	-	Temperature Sensing	

TSP-BCM24A						
Pin No.	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**
Pin 1	-Vin (DC In)	GND (-)	S+	15 sec test	AC-OK Signal	TSP 600-124 (Factory setting)
Pin 2	+Vin (DC In)	GND (-)	S-	Com	AC-OK Relay contact	TSP 360-124
Pin 3	-Bat in	Vout (+)	-	10 min test	Bat-OK Signal	TSP 180-124
Pin 4	+Bat in	Vout (+)	-	-	Bat-OK Relay contact	
Pin 5	-	-	-	-	DC-OK Signal	
Pin 6	-	-	-	-	DC-OK Relay contact	
Pin 7	-	-	-	-	Remote ON/OFF	
Pin 8	-	-	-	-	Remote ON/OFF	
Pin 9	-	-	-	-	Temperature Sensing	
Pin 10	-	-	-	-	Temperature Sensing	

6.4 Wall mounting brackets (TSP-WMK01) for TSP-BCM24 & TSP-BCM24A

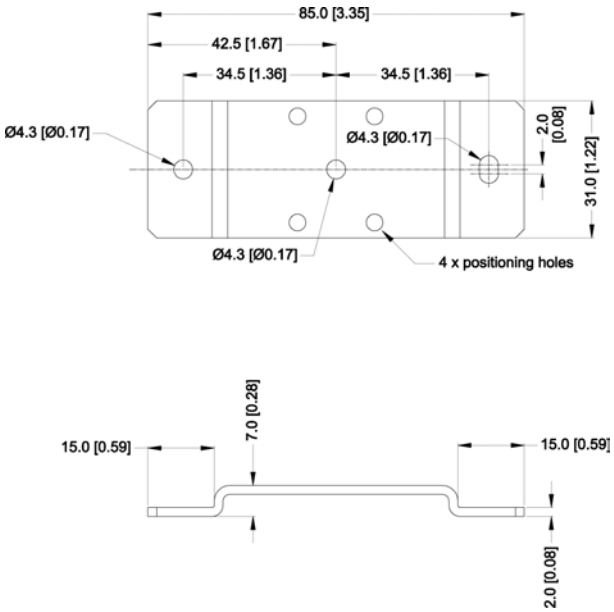


Fig.: 4.1

7. TSP-BAT Battery Pack

7.1 Description

The battery packs are designed to built, in connection with the TSP-BCM24 or TSP-BCM24A battery controller module, a complete DC-UPS system. The entire range utilizes 12V maintanance free VRLA (valve regulated lead acid) batteries made by Panasonic. These are not spillable lead gel type batteries. Two 12V batteries are connected in series and assembled inot a stainless steel enclosure, with integrated connector and connection cable.

8. Technical Specifications

8.1 Input Specifications

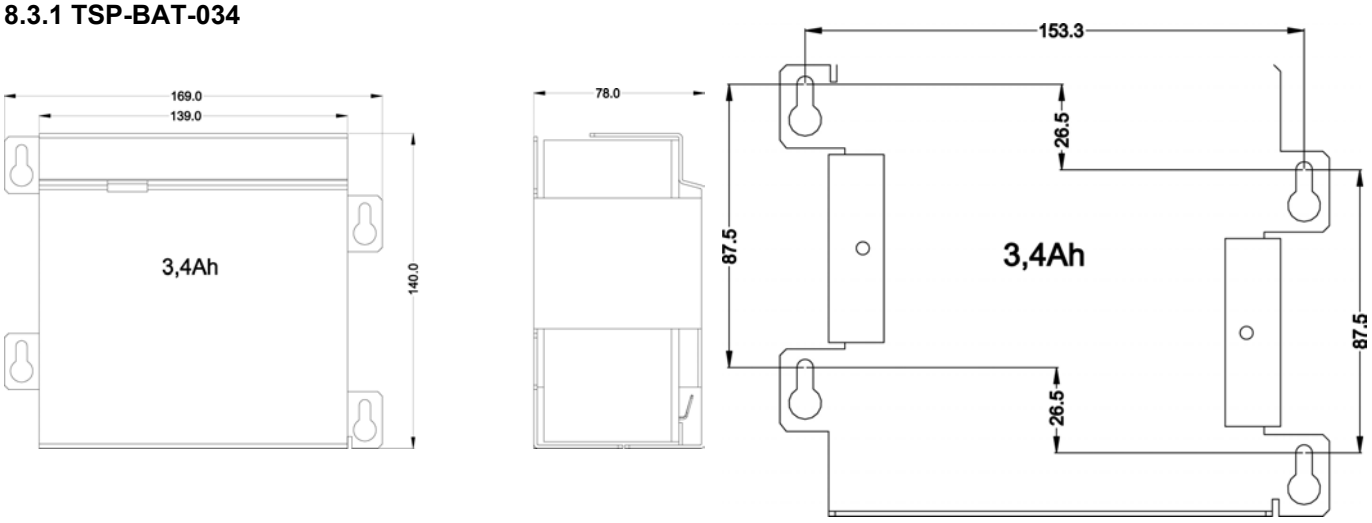
Order code Model (includes mating connector)	Nominal voltage	Charge current recommended	Nominal capacity (at +25°C, 77°F)
TSP-BAT-034	24Vdc	0.80 A	3.4 Ah
TSP-BAT-072		1.75 A	7.2 Ah
TSP-BAT-120		3.00 A	12.0 Ah
TSP-BAT-240		6.00 A	24.0 Ah

8.2 General Specifications

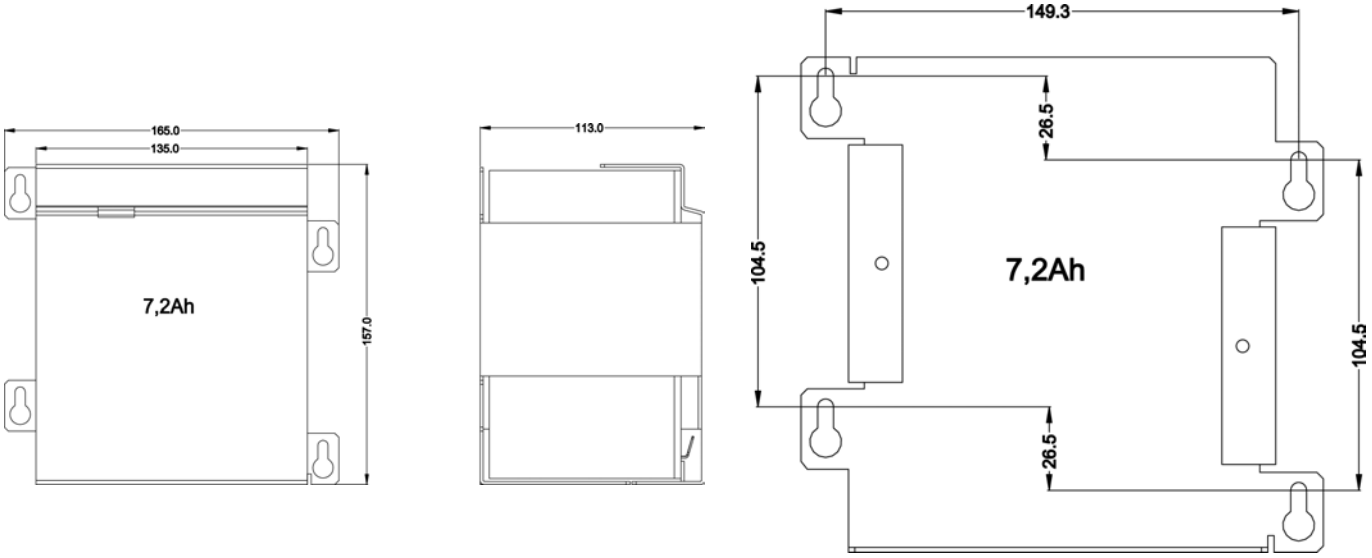
Temperature range (max)	- during discharge - when charging / charged - storage	-15°C - +50°C max (+5°F - +122°F) 0°C - +40°C max (+32°F - +104°F) -15°C - +40°C max. (+5°F - +104°F)
Battery lifetime		3 - 5 years
Remote link cable		1 cable (0.5m) included
Weight	TSP-BAT-034 TSP-BAT-072 TSP-BAT-120 TSP-BAT-240	3.2kg (7.1lb.) 5.8kg (12.8lb.) 9.0kg (19.8lb.) 18.0kg (39.7lb.)

8.3 Dimensions

8.3.1 TSP-BAT-034



8.3.2 TSP-BAT-072



8.3.2 TSP-BAT-120